Appetite 113 (2017) 368–375

Contents lists available at ScienceDirect

Appetite

journal homepage: www.elsevier.com/locate/appet

The application of defaults to optimize parents' health-based choices for children

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ARTICLE INFO

Article history:
Received 27 October 2016
Received in revised form
31 January 2017
Accepted 27 February 2017
Available online 28 February 2017

Keywords:
Optimal defaults
Choice behavior
Eating behavior
Child
Parents

ABSTRACT

Optimal defaults is a compelling model from behavioral economics and the psychology of human decision-making, designed to shape or “nudge” choices in a positive direction without fundamentally restricting options. The current study aimed to test the effectiveness of optimal (less obesogenic) defaults and parent empowerment priming on health-based decisions with parent-child (ages 3–8) dyads in a community-based setting. Two proof-of-concept experiments (one on breakfast food selections and one on activity choice) were conducted comparing the main and interactive effects of optimal versus sub-optimal defaults, and parent empowerment priming versus neutral priming, on parents' health-related choices for their children. We hypothesized that in each experiment, making the default option more optimal will lead to more frequent health-oriented choices, and that priming parents to be the ultimate decision-makers on behalf of their child's health will potentiate this effect. Results show that in both studies, default condition, but not priming condition or the interaction between default and priming, significantly predicted choice (healthier vs. less healthy option). There was also a significant main effect for default condition (and no effect for priming condition or the interaction term) on the quantity of healthier food children consumed in the breakfast experiment. These pilot studies demonstrate that optimal defaults can be practicably implemented to improve parents' food and activity choices for young children. Results can inform policies and practices pertaining to obesogenic environmental factors in school, restaurant, and home environments.

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Childhood obesity is considered a public health crisis with negative implications for the physical (Baker, Olsen, & Sorensen, 2007; Janssen et al., 2005; Llewellyn, Simmonds, Owens, & Woolacott, 2016), social (Janssen, Craig, Boyce, & Pickett, 2004; Wang, Beydoun, Liang, Caballero, & Kumanyika, 2008), and socio-economic (Au, 2012; Wang, Wild, Kipp, Kuhle, & Veugelers, 2009) well-being of youth worldwide (Spruijt-Metz, 2011). As the complexities of obesity as a multi-determined disease continue to be studied, sustainable solutions remain elusive, particularly within personal responsibility models of change (Brownell, Schwartz, Puhl, Henderson, & Harris, 2009; Brownell et al., 2010; Katz, 2006, 2014). Data strongly implicate “toxic” environmental influences among a variety of factors (Schwartz & Brownell, 2007). By extension, it has been argued that such evidence demands a public policy-level set of responses to reduce obesity prevalence - currently 17% among 2-19 year-old children and adolescents (Ogden, Carroll, Kit, & Flegal, 2014) - and support prevention (Brownell et al., 2009; Katz, 2006, 2014; McKinnon, 2010).

One strategy that has been shown to have utility for other areas of public health is *optimal defaults*. Optimal defaults is a compelling model from behavioral economics and the psychology of human decision-making, designed to shape or “nudge” (Thaler, Sunstein, & Balz, 2010) choices in a positive direction without fundamentally restricting options (Choi, Laibson, Madrian, & Metrick, 2003a;

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http://dx.doi.org/10.1016/j.appet.2017.02.039
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Kahneman, 2003; Simon, 1955, 1986; Smith, Goldstein, & Johnson, 2013). It thus falls within the policy theory framework of "asymmetric" or "libertarian" paternalism (Loewenstein, Brennan, & Volpp, 2007; Thaler & Sunstein, 2003). Specifically, optimal defaults capitalize on the human tendency to remain with the status quo, rather than actively seeking out available alternatives, by positioning the default option in a choice paradigm to be consistent with public welfare, while allowing individuals to retain access to choices deemed less desirable by taking active steps (Kahneman, Knetsch, & Thaler, 1991; Samuelson & Zeckhauser, 1988). Its powerful effects have been demonstrated in multiple domains, including organ donation (Abadie & Gay, 2006; Johnson & Goldstein, 2003), green energy (Pichert & Katsikopoulos, 2008), pension plan enrollment (Choi, Laibson, Madrian, & Metrick, 2003b; Choi et al., 2003a), physician orders for laboratory tests (Probst, Shaffer, & Chan, 2013) and influenza vaccinations (Chapman, Li, Colby, & Yoon, 2010). Hypothesized mechanisms of the power of defaults include conservation of the effort required to access the alternative option; implied or assumed endorsement of the default by an authority; and reference dependence, or the tendency to evaluate options as gains or losses relative to a reference point (Dinner, Johnson, Goldstein, & Liu, 2011; Johnson & Goldstein, 2003; McKenzie, Liersch, & Finkelstein, 2006).

Optimizing defaults has unique potential as a strategy for childhood obesity prevention. Children's reliance on systems-level environments (e.g., home, school) for availability and accessibility of options for energy intake and expenditure renders them vulnerable to the ill effects of sub-optimal environmental defaults. At the same time, this dependency provides an opportunity to convert the defaults in these systems to health-oriented ones (Radnitz et al., 2013). Conversely, personal responsibility models of weight-related change for children are not only ineffective but arguably developmentally inappropriate (Brownell et al., 2010).

In environments such as the school system, changes in food presentation strategy can be generated at a policy level; food preparation and delivery methods are typically determined without children present and there is little opportunity for direct feedback from children about food service. In the home, however, parents often navigate purchasing, preparing, and serving food while interacting with their children. Thus, strategies to help parents buffer against petitions for suboptimal choices may be essential for the successful implementation of defaults to a family's health advantage. In fact, there is a strong link between permissive or indulgent parenting – that is, a parenting style characterized by high responsiveness and low demands (Baumrind, 1971; Hughes, Power, Fisher, Mueller, & Nicklas, 2005; Maccoby & Martin, 1983) - and childhood obesity (Golan, 2006; Golan, Kaufman, & Shahar, 2006; Rhee, Lumeng, Appugliese, Kaciroti, & Bradley, 2006; Sleddens, Gerards, Thijs, de Vries, & Kremers, 2011; Wake, Nicholson, Hardy, & Smith, 2007). While the mechanisms behind this association are likely complex, interventions designed to elicit a more authoritative parenting stance (high responsiveness coupled with high demands; Baumrind, 1971; Maccoby & Martin, 1983), as a complement to optimal defaults in the home, may potentiate the strategy's success toward childhood obesity prevention.

The idea for optimal defaults as a powerful strategy for obesity prevention has been put forward in the literature at a theoretical level (Brownell et al., 2009, 2010; Katz, 2014; Liu, Wisdom, Roberto, Liu, & Ubel, 2014; Radnitz et al., 2013; Roberto et al., 2015; Schwartz & Brownell, 2007), and has begun to be tested in empirical research as a method to alter food choices. Promising proof-of-concept results have been observed in the restaurant and home environment, while school-based findings are mixed depending on study design (Anzman-Frasca et al., 2015; Cravener et al., 2014; Downs, Loewenstein, & Wisdom, 2009; Just & Price, 2013; Just & Wansink, 2009; Lee, Kiesler, & Forlizzi, 2011; Loeb et al., 2016; Peters et al., 2016; Wisdom, Downs, & Loewenstein, 2010). Moreover, qualitative research shows that mothers like the idea of automatic healthier defaults in fast-food restaurants, citing reasons including increased efficiency and less parent-child conflict (Henry & Borzekowski, 2015).

Adding to this literature, the current study aimed to test the effectiveness of optimal defaults and parent empowerment priming with parent-child dyads in a community-based setting, with conditions that have potential application to both family and school systems. Specifically, we conducted two proof-of-concept experiments (one on breakfast food selections and one on activity choice) comparing the main and interactive effects of optimal versus suboptimal defaults, and parent empowerment priming versus neutral priming, on parents' health-related decisions for their children. Parent empowerment priming consisted of information designed to prime parents to adopt a more authoritative position around child eating; neutral priming was control information intended to have no impact on parenting style. Thus, we aimed to manipulate conditions related to both energy intake and energy expenditure, factors implicated in etiologic and maintenance models of childhood obesity (Bleich, Ku, & Wang, 2011). We hypothesized that in each experiment, making the default option more optimal (less obesogenic) will lead to more frequent health-oriented choices, and that priming parents to be the ultimate decision-makers on behalf of their child's health will potentiate this effect.

1. Method

1.1. Design

We conducted two randomized, 2 by 2, experiments (a children's breakfast selection study and a children's activity choice study) testing the main and interactive effects of defaults and priming on parents' or other primary caregivers' health-related choices on behalf of their children. The primary outcome variable for each experiment was binary (healthier choice opted by parent yes/no). For the breakfast experiment, a secondary outcome variable was consumption (quantity, using plate waste methodology) of healthier foods, i.e., the foods served in the optimal default breakfast array.

The experimental sessions were run with individual or small groups of participant parent -child dyads [in the breakfast experiment mean (M) number of dyads per session = 3.10, SD = 1.89; in the activity experiment, M = 3.63, SD = 2.33]. For each experiment (breakfast and activity), randomization to one of the four conditions was assigned by session, not by dyad, to avoid confounds in a group setting. Experimental sessions were offered in either English or Spanish. Families were paid $50 for their participation, which required approximately two-and-a-half hours of their time on a single visit. All procedures were approved by the first author's university Institutional Review Board.

1.2. Sample

Parent-child dyads were recruited for both experiments via flyers through a local community center, which functioned as the study performance site, from its broad network of affiliates, including schools and health centers, and from the surrounding communities. Eligibility was determined by telephone with a screening questionnaire.

Inclusion criteria were a child aged 3–8 with at least one parent or guardian willing to participate. We were interested in studying a developmental stage in which parents typically make choices on behalf of their children but where children are also vocal about their preferences. Exclusion criteria were a diagnosis of autism, mental retardation, or other developmental disability that would make participation in group activities challenging. For the food experiment, we also excluded children with any medical condition that would preclude fasting before the experimental breakfast or eating the foods that were served (e.g., food allergies), and families who participated in a recent nutritional counseling program at the community center, the curriculum of which overlapped with a portion of the educational material in the priming videos. For the activity experiment, we excluded children with any medical condition that would preclude participating in moderate exercise, as well as families who participated in the breakfast experiment, which was conducted and completed prior to the commencement of the activity experiment.

A power analysis indicated that N = 27 dyads per cell within each 2 by 2 experiment (108 per study) would provide at least 80% power to detect a large difference in proportions of 0.35 in parental selection of healthier options between conditions.

1.3. Data analysis

For the primary outcome variable (healthier choice opted by parent yes/no) in each experiment, we performed logistic regressions to examine the two main effects (default condition and priming condition) and their interaction term. Child age was entered as a covariate, as degree of parental decision-making capacity may vary across developmental stage. Choice was determined by each participant dyad either remaining with the assigned default condition, or by actively choosing the alternative. For example, in the breakfast experiment, "healthy choice opted" was coded as present for children assigned to the optimal default breakfast whose parents stayed with that food array (i.e., passive choice), as well as for children randomized to the suboptimal default breakfast whose parents actively requested the optimal menu instead (see Procedures below). For the food experiment, we also conducted a 2 × 2 ANCOVA, with child age and child BMI as covariates, to analyze the secondary outcome variable, quantity of healthier food consumed by the child participants. Quantity was determined using plate waste methodology, and "healthier foods" were the items in the optimal default breakfast array. Child BMI was selected as an additional covariate for this model because of its relationship to food intake (Baxter et al., 2010).

2. Procedures

Study One: Breakfast Optimal Default Experiment: Participants arrived at a set time in the morning having followed prior instructions for the child to not have anything to eat after wakening (to minimize variability in hunger/satiety across participants). Following consent and assent procedures, parents completed a demographic questionnaire and research assistants measured parent and child height and weight using a physician's balance scale with a stadiometer. Measurements were taken twice for accuracy and body mass index (BMI) was calculated with the standard formula [weight in kg/(height in m^2)]. For children, gender-specific BMI-for-age percentiles and BMI z-scores were also calculated (Centers for Disease Control and Prevention, 2000; Kuczmarski et al., 2002).

Children in attendance were then directed to a room in which they had monitored free play. During this time, parents watched a 15-min educational video about childhood nutrition and eating that briefly reviewed topics such as hunger and satiety, the importance of feeding children nutritious foods including fruits and vegetables, food groups, portion size, healthy beverages, breakfast, healthy snacks, and fast food. Beyond this core content, depending on randomization assignment, the video also contained either empowerment primes supporting parents in facilitating an environment of optimal defaults for their child (e.g., "The most important part to learn is that you – as a parent-have the power to implement changes for your child that will help him or her become healthier. No one is in a better position to make health easy for your child than you. Making health easy for your child means making the best choices for him or her."), or neutral material related to food preparation safety (e.g., avoiding cross-contamination when cooking raw chicken). The two versions of the video (each filmed in both English and Spanish) were matched for number of lines in the script and presentation time. All videos featured the same bilingual speaker, a psychologist, to avoid methodological confounds.

Following the video presentation, parents and children convened in the community center dining room, with dyads seated at separate tables to minimize social comparison and influence. Each dyad was presented with a printed children's breakfast menu in which the default items to be served were prominently displayed, and the alternate menu selections, available upon request, were listed in standard font at the bottom (see Fig. 1). The choices were available as arrays; parents could not substitute individual items across menu categories (default or alternative). To access the alternative breakfast array, the parent would opt out of the default menu by actively requesting the secondary breakfast from the research assistant server. In the optimal default condition, the default menu consisted of "healthier" food and beverage items. In the suboptimal default condition, the default breakfast contained less healthy selections. After two minutes of menu-viewing time, servers approached each table, stating that they would be bringing the child's breakfast shortly and asking if there were any questions. This provided the opportunity for parents to request the alternative menu array. The server deferred to the parent as the decision-maker in the menu procedures. The absence of an active request for the alternative menu selection prompted the server to bring the default breakfast array. Once a tray was served no changes could be requested. Research assistant servers stated, "Please make sure your child only – not you or any other children - eats from this tray. After breakfast, just leave the tray on the table and I will clean up." There was no time limit placed on breakfast consumption. Parents indicated when their children were finished with the meal, or, if no food was touched after eight minutes, the server would approach the table and state, "We don't want to rush you. Please tell us when your child is finished with the tray." The research team recorded menu choice (via passive acceptance of the default menu, or active request of the alternative breakfast, by the parent) for each dyad and weighed each food item on a professional-grade food scale pre- and post-meal.

Study Two: Activity Optimal Default Experiment: Participants arrived at a set time in the afternoon, and following consent and assent procedures, children had monitored free play while the parents watched one of two videos, depending on randomization assignment. The core content across videos briefly reviewed key topics in child exercise, including the positive effects of physical activity, low-cost and home-based physical activity options, compensating for reduced physical activity in the school system, and reducing sedentary behaviors like watching television and playing video games. The empowerment prime video included statements such as "If our children are given the power to choose completely how to spend free their free time, they might well choose to use entertainment media, to the exclusion of exercise. In fact, companies that advertise their video games are counting on families allowing children to make the decisions about what they will do after school and on weekends! But in your family, YOU will make the decision about what is a healthy activity." The control

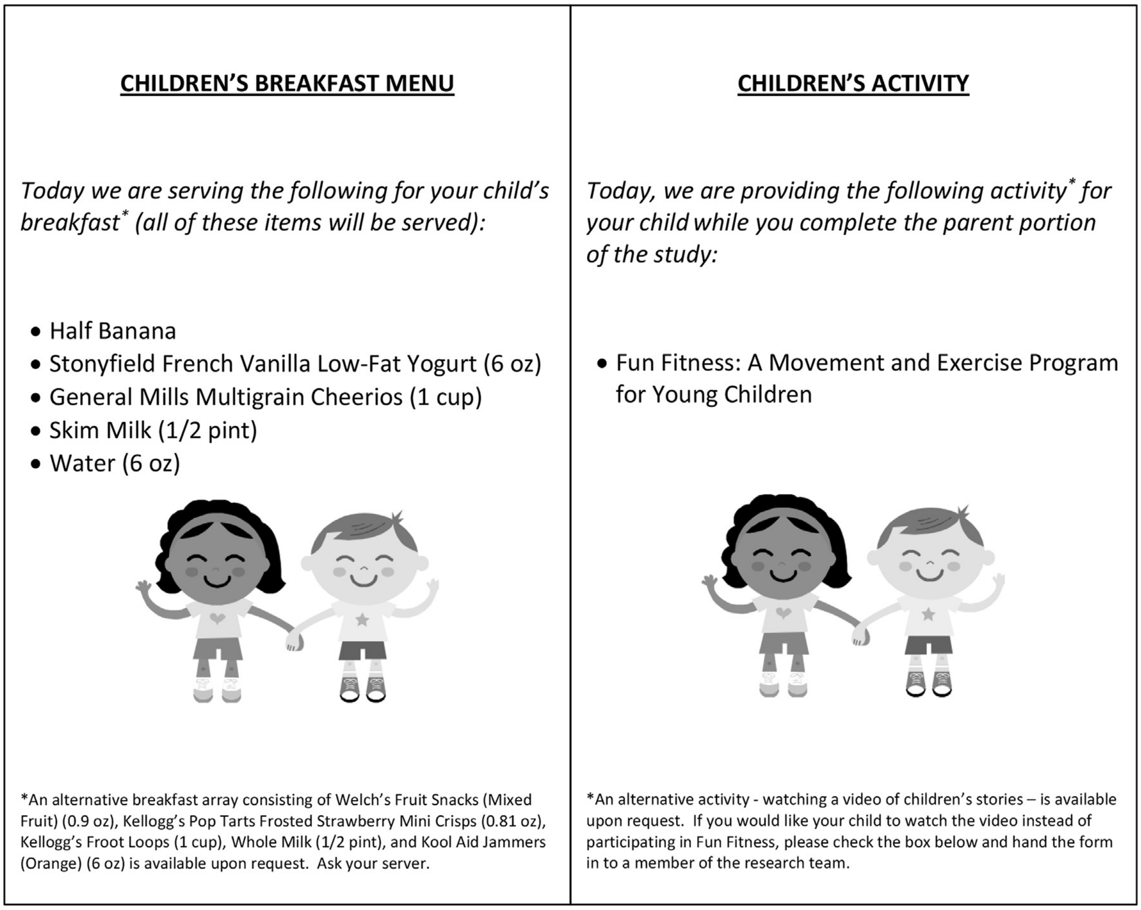

Fig. 1. Breakfast menu (left) and activity flyer (right) for optimal default conditions.[11]

video substituted these statements with neutral material related to exercise safety (e.g., the importance of wearing helmets while bike riding).

Following the video presentation, parents and children reconvened, and parents were presented with one of two activity flyers, according to randomization assignment (see Fig. 1). In the optimal condition, the default activity was a single-session exercise program designed for the study and led by the research staff, entitled "Fun Fitness." This option included group-based exercises, using props, metaphors (e.g., "bubble stretch", "fruit salad" body movements), and child-friendly instructions to encourage in-session energy expenditure. Parents could opt out of this and into a sedentary activity by checking a box on the flyer and submitting it to the research assistant. In the suboptimal condition, the default activity was watching videos of animated children's stories, with the option to switch into the exercise activity. After two minutes, the research team collected the flyers, which indicated parents' activity choice (via passive acceptance of the default activity or active request of the alternative activity), and directed children to the selected program. As in the breakfast experiment, height, weight, and demographic data were also collected.

3. Results

Study One: Breakfast Optimal Default Experiment: Table 1 shows the demographic characteristics of the parents and children who participated in the breakfast experiment. Tables 2 and 3 display the results of the logistic regression analyzing breakfast menu choice as the primary outcome variable, and of the ANCOVA analyzing quantity (grams) of healthy (optimal array) food consumed as the secondary outcome, respectively. Default condition, but not priming condition or the interaction between default and priming, significantly predicted menu choice (healthier vs. less healthy option). Specifically, of the 28 participant sets randomized to the suboptimal breakfast, 23 (82%) parents remained with the less healthy breakfast for their child. Of the 34 participants randomized to the optimal breakfast, 33 (97%) remained with their assigned food array, with only one actively selecting the less healthy choice (see Table 1 and Fig. 2).

There was also a significant main effect for default condition on grams of healthier (optimal array) food consumed in the full breakfast experiment sample (Table 3), in the expected direction. Table 4 reports the descriptive macronutrient breakdown of fat, carbohydrates, and protein eaten, as well as total grams and calories consumed, by randomized default condition (not by final selection). Examining the final breakfast array selections, among the subset of participants whose parents remained with or actively selected the optimal breakfast array ($n = 38$), all children consumed some amount of the food and beverage served ($M = 263.87$, $SD = 128.12$, range 30.60–533.00 g), and in no instances was this exclusively accounted for by beverage (bottled water) intake. Overall, children presented with the optimal breakfast array ($n = 38$) ate an average of 36.43% of these healthier foods, similar to the amount children ate when their parents passively or actively selected the suboptimal array (40.12%; $n = 24$). Among the children ultimately presented with the optimal breakfast array ($n = 38$), the percent of these healthier foods eaten by those randomized to and remaining with the optimal menu (i.e., those children who never

Table 1
Sample demographic characteristics by experiment.

Variable	Breakfast study			Activity study		
	N	Range	Mean ± SD	N	Range	Mean ± SD
Parent/Guardian age (years)	62	23.00–62.00	35.58 ± 8.13	58	22.00–51.00	35.60 ± 6.97
Parent/Guardian BMI	61	19.83–49.74	27.91 ± 6.20	58	19.03–41.65	26.78 ± 4.69
Child age (years)	62	3.00–8.92	5.47 ± 1.64	58	3.33–8.58	5.42 ± 1.33
Child BMI	61	12.77–22.06	16.88 ± 2.04	58	12.92–26.84	16.87 ± 2.72
Child BMI Z-Score	61	−3.14–3.10	0.67 ± 1.10	58	−2.27–3.85	0.60 ± 1.22
Child BMI Percentile	61	<1.00 – > 99.00	68.41 ± 26.81	58	1.00 – > 99.00	66.47 ± 30.12

Variable	Breakfast study		Activity study	
	N	Percentage (%)	N	Percentage (%)
Parent/Guardian Gender				
Male	3	4.84	7	12.07
Female	59	95.16	51	87.93
Child Gender				
Male	35	56.45	23	39.66
Female	27	43.55	35	60.34
Child Ethnicity				
American Indian/Alaska Native	5	8.20	2	3.45
Asian	2	3.28	5	8.62
Black	13	21.31	12	20.69
White	34	55.74	13	22.41
Latino	7	11.48	26	44.83
Income				
Less than $10,000	20	32.79	11	18.97
$10,000 to $20,000	19	31.15	15	25.86
$20,000 to $30,000	5	8.20	13	22.41
$30,000 to $40,000	5	8.20	6	10.34
Greater than $40,000	12	19.67	13	22.41

Table 2
Logistic regression results for breakfast choice by default and priming conditions, with child age as covariate.

Variable	B	SE	Wald	p
Child Age	−0.392	0.378	1.078	0.299
Default Condition	−5.176	1.506	11.814	0.001
Priming	18.095	12355.472	0.000	0.999
Default * Priming	−17.922	12355.472	0.000	0.999

Note. Cox & Snell $R^2 = 0.546$, Nagelkerke $R^2 = 0.741$.

Table 3
ANCOVA results for healthier breakfast quantity consumed (grams), by default and priming conditions, with child age and BMI as covariates.

Source	SS	df	MS	F	p
Child Age	423.85	1	423.85	0.027	0.871
Child BMI	3914.296	1	3914.296	0.246	0.622
Default Condition	737592.738	1	737592.738	46.349	<0.001
Priming	45233.024	1	45233.024	2.842	0.097
Default * Priming	53636.778	1	53636.778	3.37	0.072
Error	875255.558	55	15913.737		

Note. $R^2 = 0.461$, Adj. $R^2 = 0.412$.

saw the suboptimal menu, n = 33, minus 1 case where the post-meal measurements were compromised by the participant mixing multiple food items together) was 36.75%. The percent of optimal foods eaten by those randomized to the suboptimal menu whose parents then switched to the optimal breakfast array (n = 5, minus 2 cases of highly mixed foods) was 50.74%. Neither of these comparisons was statistically significant.

Study Two: Activity Optimal Default Experiment: Table 1 shows the demographic characteristics of the parents and children who participated in the activity experiment. Table 5 displays the results of the logistic regression analyzing activity choice as the primary outcome variable. Like in the breakfast experiment, default condition, but not priming condition or the interaction between default and priming, significantly predicted activity choice (healthier vs. less healthy option). Specifically, of the 22 participant sets randomized to the suboptimal activity, 16 (73%) parents remained with the sedentary video-viewing choice for their child. Of the 36 participants randomized to the optimal activity, 33 (92%) remained with the assigned "Fun Fitness" program for their child (see Fig. 2).

4. Discussion

We predicted that making the default option more optimal will lead to more frequent selection of healthy choices, and that this effect will be more pronounced when parents are not just educated about the nature and benefits of healthy foods and physical activity, but are also presented with empowerment primes to implement optimal defaults for their children. In both proof-of-concept experiments, results showed that overwhelmingly, parents remained with the default option presented for their children. For the food study, this translated to a greater overall quantity of healthier items consumed by children in the optimal default group, and, descriptively, a better macronutrient meal profile. Moreover, for the breakfast study, passive or active parental selection of the optimal menu array for the child yielded consumption of healthier breakfast items; all children ate at least some of the food presented to them, similar to quantities consumed in the suboptimal breakfast array. In addition, among children presented with the optimal

[1] For the suboptimal condition, the presentation of options on the default breakfast menu and activity flyer was reversed such that the less healthy option was presented in the larger, centered text, and the healthy option was presented in the smaller text. To ensure readability of the figure in this paper, font sizes are disproportionate to the text of the menus and flyers presented to parents. Actual text was displayed in 26-point font with alternative options listed in 11-point font. Original menus and flyers were also in color.

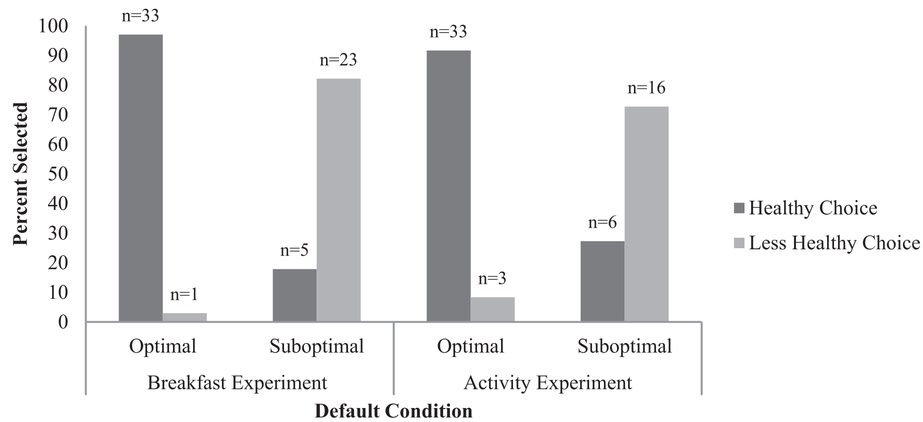

Fig. 2. Parent selections for breakfast and activity optimal default experiments.

Table 4
Nutrient breakdown of breakfast food consumed by default condition.

Consumed	Optimal condition (n = 33)		Suboptimal condition (n = 26)	
	Mean	SD	Mean	SD
Fat (grams)	1.71	1.12	5.93	4.46
Carbohydrates (grams)	56.94	30.53	68.48	37.60
Protein (grams)	10.45	6.03	7.98	5.43
Total (grams)	200.93	96.93	218.18	97.97
Total (kilocalories)	296.72	156.34	361.08	206.19

Note. Nutrient data reflect foods consumed from the final breakfast selections (optimal or suboptimal) within each randomized breakfast condition, and thus, each condition column in this table includes items consumed from the alternative array. Total grams in optimal and suboptimal conditions includes both food and beverages consumed.

Table 5
Logistic regression results for Activity choice by default and priming conditions, with child age as covariate.

Variable	B	SE	Wald	p
Child Age	−0.178	0.309	0.331	0.565
Default Condition	−3.659	1.133	10.433	0.001
Priming	0.744	1.299	0.327	0.567
Default * Priming	0.165	1.636	0.01	0.92

Note. Cox & Snell $R^2 = 0.390$, Nagelkerke $R^2 = 0.544$.

breakfast, there were no differences in consumption between those who were randomized to the optimal menu (i.e., who never viewed the suboptimal choices) and those who switched from the suboptimal to the optimal breakfast (although the latter group was quite small). These are important eating behavior observations in that they refute the popular idea that serving children healthier options will result in food refusal.

Contrary to our hypothesis, parent-empowerment priming embedded in health-based education did not potentiate the effect of defaults. We had predicted that there would be dialogue between parent and child surrounding the menu selections in the breakfast and activity experiments, and that the active prime would embolden parents to insist on remaining with or actively opting for the healthier choice. Anecdotally, little such discussion was observed among the parent-child dyads. The default effect appears to be independently and sufficiently powerful in shaping choice behavior, in both optimal and suboptimal directions, possibly masking any effects of educational material designed to prompt more authoritative parenting strategies. While the main effect for default reflected limited variability in the data (i.e., the vast majority of participants remained with the default option, regardless of its health valence or the type of priming received), the study was underpowered to adequately detect a small interaction effect.

Limitations to the study include the smaller sample size than planned, as well as the single-exposure study design. In addition, the majority (88%) of experimental sessions were run in small groups, and group effects on parent choice are possible and were not accounted for in the planned analyses. However, there were attempts to mitigate this by seating dyads at separate tables with distance between them. Finally, the conditions in this study generalize only to pre-selected choice contexts, not free-array paradigms in which all choices are visible and accessible simultaneously. Fixed-choice optimal arrays may be particularly health advantageous, as research with adults indicates that when optimal defaults are embedded within broader free-array options, individuals compensate for a healthier main-dish default with poorer choices from available side dishes and beverages (Wisdom et al., 2010). However, in one study of changes in children's meal combos, the reduction in quantity of a suboptimal default side dish did not increase the caloric value of other within-meal selections (Wansink & Hanks, 2014). Future research should test the application of defaults longitudinally to observe whether choice effects persist or degrade over time. Future studies should also investigate the effects of defaults on youth health choices within a wider developmental range and within more real-world settings to verify the model's ecological validity. Further examining the effects of defaults on child eating behavior outside of direct parental influence is also critical, as two small studies have shown that when default food options (French fries versus apple slices) are presented directly to children, preference appears to override defaults (Just & Wansink, 2009; Wansink & Just, 2016). Moreover, a large study in which fruits and vegetables were served directly to elementary-school children on their lunch trays suggests that consumption of these foods will be increased (and waste reduced) when defaults are combined with a rewards system (Just & Price, 2013).

Demand effects, which can also compromise external validity, must additionally be considered. Optimal defaults may be particularly vulnerable to this effect (or may in fact capitalize on this effect), as one hypothesized mechanism of defaults is implied endorsement or sanctioning of that choice by an authority (Dinner et al., 2011; Johnson & Goldstein, 2003; McKenzie et al., 2006). In these experiments, the default options were clearly presented on paper as such — by virtue of visual positioning and size - and could have signaled a demand, i.e., that the experimenters favored one choice over the other. Interestingly, an aspect of the experiments that could have more robustly triggered demand effects were the 15-min educational videos viewed prior to the default presentation. The core content of these videos, held constant across the empowerment versus neutral priming manipulations, were unequivocally health-promoting, and presented by a psychologist who introduced herself using the “doctor” title to lend credibility to the information presented. For example, the educational video about childhood nutrition and eating included topics such as the importance of feeding children nutritious foods including fruits and vegetables. The educational video about childhood activity reviewed, among other topics, the positive effects of physical activity, compensating for reduced physical activity in the school system, and reducing sedentary behaviors like watching television and playing video games. Nevertheless, once the menus were presented, the majority of parents selected the default, regardless of whether it was consistent with the videos' information. This suggests that conservation of effort may have been more operative in shaping the studies' results than assumed endorsement of the more salient and accessible choice.

Our default condition findings are consistent with the literature on the effects of defaults in the broader public health sphere (Abadie & Gay, 2006; Chapman et al., 2010; Choi et al., 2003a, 2003b; Johnson & Goldstein, 2003; Pichert & Katsikopoulos, 2008; Probst et al., 2013), as well as the theoretical writings on the application of optimal defaults to childhood obesity prevention (Brownell et al., 2009, 2010; Katz, 2014; Liu et al., 2014; Radnitz et al., 2013; Roberto et al., 2015; Schwartz & Brownell, 2007) and the early research supporting its feasibility and impact (Anzman-Frasca et al., 2015; Cravener et al., 2014; DiMatteo, Radnitz, & Loeb, 2016; Loeb et al., 2016; Peters et al., 2016). These pilot studies demonstrate that optimal defaults can be practicably implemented under experimental conditions to improve parents' food and activity choices for young children. This research is potentially generalizable to default conditions that can be engineered in restaurants with children's menus per other recent research (Anzman-Frasca et al., 2015; Peters et al., 2016), in school lunch programs where parents pre-select menu options for their children (Loeb et al., 2016), and in after-school physical activity enrollment processes, as well as to parental influence around food and activity choices in the home environment (Cravener et al., 2014).

Acknowledgements/Disclosure of conflicts

This work was supported by a grant from the National Institute of Food and Agriculture's (NIFA) Agriculture and Food Research Initiative's (AFRI) program on Childhood Obesity Prevention: Methodological Research to Assess the Effectiveness of Obesity Prevention Strategies (Program Code: A213; Grant/Award Number: 2011-67002-30086).

Katharine Loeb receives royalties from Routledge, and is a faculty member of and consultant for the Training Institute for Child and Adolescent Eating Disorders.

The authors thank Kathryn Huryk and Lauren Todd for their assistance with this manuscript.

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