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Parent Choice in a Pediatric Obesity Prevention Intervention

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Abstract

Background: There is value in having parents choose which behaviors to address in obesity interventions, but it is unknown whether they choose behaviors that will effectively impact healthy growth. This study assessed whether child behaviors or parent intention to change behaviors were associated with behaviors parents chose to discuss.

Methods: Parent intention to change specific behaviors and time spent discussing behaviors was coded during intervention sessions.

Results: Child activity, screen-time, energy intake, breakfast, and family meals were associated with time spent discussing these behaviors. Fewer associations were seen between parent intention and time spent discussing these behaviors.

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Human Subjects Approval Statement

All procedures were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008 and were approved by the HealthPartners Institute IRB and the University of Minnesota IRB. All subjects provided written informed consent.

Conflict of Interest Declaration

All authors of this article declare they have no conflicts of interest.

Conclusions: Results suggest that in interventions allow choice, parents may choose to discuss the weight-related behaviors their children need to address.

Keywords

Behavioral interventions; prevention; health behavior

Parent-targeted pediatric obesity prevention interventions are a public health priority, but have shown inconsistent results thus far.^{1,2} A possible reason for this limited success is the challenge of addressing obesity's complex etiology within a single intervention. Many behaviors contribute to energy imbalance (eg, screen time, fruit and vegetable intake, physical activity, sugary beverage intake)^{3,4} and these behaviors can vary greatly in at-risk pediatric populations.^{5,6} Thus, interventions must target several behaviors in tandem and with differential emphasis on the behaviors that pose the greatest risk for any given child.^{4,7,8} To allow for this flexibility, interventions based on self-determination theory⁹ or motivational interviewing¹⁰ often allow parents to choose which specific weight-related behaviors are discussed.¹¹ There is evidence in the general health literature that this type of choice is effective in keeping subjects engaged and motivated.^{12,13} However, in order for this approach to be effective in preventing unhealthy weight gain, parents must be able to identify and address the behaviors that will positively impact their child's weight status.

It is not known whether parents in obesity prevention interventions choose to discuss the weight-related behaviors that put their child at highest risk for unhealthy weight gain. The association between child weight-related behaviors at the start of an obesity prevention intervention and the topics parents chose to discuss during the intervention has not yet been examined. In other interventions targeting multiple behaviors, subjects were more likely to choose health behaviors for which they were at higher risk.¹⁴ Validated measures of parent-reported child behaviors (eg, dietary intake) indicate that parents are able to report the absolute value or amount of certain weight-related behaviors. However, some research suggests parents may not be able to accurately assess the relative healthfulness of these weight-related behaviors.^{15, 16} While parents may accurately report certain child weight-related behaviors, they may be inaccurate in their judgment of whether their child is meeting recommended guidelines for a give weight-related behavior. Inaccurate parent assessment of child risk may be a barrier to selecting appropriate topics to work on as part of obesity prevention interventions.

Parent intention to change specific behaviors may also influence parent choice of weight-related behavioral targets in obesity prevention interventions. Research has shown that parent concern about certain weight-related behaviors (a construct similar to intention) is influenced by factors other than their child's level of these behaviors, for example demographic characteristics.¹⁷ However, little is known about the association between parent intention to change weight-related behaviors and the weight-related behaviors themselves. It is unclear whether parents intend to change the weight-related behaviors that would have greater impact on their children's weight. Further, the relationship between parent intention to change specific behaviors and parent choice of weight-related behaviors to discuss in behavioral interventions is not known.

Understanding the relationships between child weight-related behaviors, parent intention to change these behaviors, and subsequent time spent discussing weight-related behaviors during interventions may help us understand why obesity prevention interventions have had limited success. The purpose of this study is to describe associations between these variables in subjects in the intervention arm of the Healthy Homes/Healthy Kids 5–10 (HHHK 5–10), a randomized controlled trial testing the efficacy of a parent-targeted phone intervention to prevent obesity in children ages 5 to 10.¹⁸ It was hypothesized that (1) a child's level of a given weight-related behavior at baseline would be associated with the amount of intervention time spent talking about that weight-related behavior, such that the parents of children who were engaging in low levels of a healthy behavior or high levels of an unhealthy behavior would spend more time talking about those specific weight-related behaviors; (2) a child's level of a given weight-related behavior at baseline would be associated with parent intention to change that behavior; and (3) that parent intention to change specific behaviors would also be associated with *subsequent* time spent discussing those behaviors during the intervention.

METHODS

Population/Sample

This study included 100 randomly selected parent/child dyads from the intervention arm of HHHK 5–10, a randomized controlled trial testing the efficacy of a phone-based obesity prevention intervention for parents of 5- to 10-year-old children. Recruitment and enrollment into the trial has been described in detail elsewhere.¹⁸ Four hundred twenty-one parent/child dyads were recruited from a large clinic system in the Minneapolis/St Paul metro area. Eligible children had a body mass index (BMI) between the 70th and 95th percentile, did not use steroid medications, and had no medical conditions effecting growth. Both the child and the participating parent spoke English. One hundred dyads were randomly selected from the 181 dyads randomized to the intervention that had complete height and weight measurements at 12 months. Random selection was conducted using a random number generating function in SAS version 9.3 (SAS Institute, Cary, NC), with a proportional sample drawn from each interventionist. All procedures were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008 and were approved by the HealthPartners Institute institutional review board (IRB) and the University of Minnesota IRB. All subjects provided written informed consent.

Intervention Description

The HHHK 5–10 intervention consisted of 14 phone sessions with a trained interventionist delivered over a one-year period. All interventionists held graduate degrees in counseling or health-related fields and had previous experience working as research-based interventionists. Sessions focused on modifying specific child weight-related behaviors such as fruit and vegetable intake, physical activity, and screen time. The intended session length for the first intervention session was 45 minutes and 15 to 30 minutes for the remaining sessions. The intervention approach was influenced by motivational interviewing¹⁰ which stresses the importance of subject self-determination. Subjects were encouraged to select a specific child

weight-related behavior to discuss during a given session (see Table 1 for a list of target behaviors). The interventionist helped subjects select relevant topics based on guided parent evaluations of current child and family behaviors.

Baseline Child Behavior Measures

The following child behavior measures were collected at baseline during home visits by trained and certified research staff prior to randomization.

Child physical activity.—Child physical activity was assessed with ActiGraph GT1M accelerometers (ActiGraph LLC, Pensacola, FL). Children were asked to wear the accelerometers for 1 full week during waking hours, excluding water activities. Devices were worn on the right hip with a fitted elastic belt and initialized to record data in 15-second epochs. Data were included in analyses if the child wore the device for at least 3 days of 10 hours or more. Non-wear time was defined as a 60-minute or more string of zero-counts, allowing for a 2-minute interruption interval of up to 100 counts. Daily physical activity was estimated using the average accelerometer counts per minute of wear time.

Child dietary intake.—Child dietary intake was measured using a single day, multi-pass 24-hour recall with a 2-dimensional food amounts booklet and 3-dimensional glasses and bowls to estimate portion sizes. Recalls were administered to parent/child dyads by staff trained and certified in the Nutrition Data System for Research (NDSR, Nutrition Coordinating Center, University of Minnesota, Minneapolis, MN). Recalls were analyzed using NDSR 2011 software to estimate total daily energy intake in kcals, servings of fruits and vegetables and servings of sugary beverages.

Child screen time.—Child screen time was measured via parent report of the amount of time children spent watching television (TV) and playing video games or using a computer for purposes other than schoolwork on an average weekday and weekend day.¹⁹ Item response options were 0, <1, 1, 2, 3, 4, and 5 or more hours per day. A screen-time score was created by summing time watching TV and other screen time. Then a daily average was computed by multiplying weekday estimates by 5, multiplying weekend estimates by 2, adding these together, and dividing the total by 7.

Breakfast, restaurant, and family meal frequency.—Parents also reported frequency of child breakfast and restaurant meals and family meal frequency. One item was used to measure breakfast frequency: the number of times the child ate breakfast during the past week. Three items were used to measure restaurant frequency.²⁰ These items asked the number of times during the past week the child ate something from 3 types of restaurants: fast food, fast casual, and casual/full table service. One adapted item assessed family meal frequency: the number of times all, or most, of the family living at home ate dinner together during the past week.²¹

Coding Protocol Overview

Intervention sessions were audio-recorded by interventionists and subsequently coded by independent staff who participated in a standardized training and certification process. All

coders had a health-related background or were currently obtaining a health-related degree. A subset of subjects ($N = 20$) was randomly selected for double-coding to evaluate inter-rater reliability.

Parent intention to change child weight-related behaviors.—Parent intention to change their child’s weight related behaviors was coded by independent coders from audio recordings of the first intervention session. Prior to the first intervention session, parents completed a mailed workbook activity that asked them to assess their family’s current weight-related behaviors and asked about changes they wanted to make related to these behaviors over the course of the intervention. During the first session, interventionists reviewed the activity and recorded parent responses in the session notes. Coders listened to audio recordings of the first session to code parents’ open-ended responses for each behavior as “yes” or “no” intention to change. If a parent listed a specific change they wanted to make, a change they had begun, or that they wanted to work on maintaining current healthy behaviors the response was coded as “yes” intention. If the parent responded by stating they were “doing well” in an area or no change was needed, this was coded as “no” intention. Sample responses are shown in Table 2. The average inter-rater reliability of these items as measured by Cohen’s kappa was 0.83. A subset of first sessions had missing audio recordings ($N = 27$), preventing the direct coding of parents’ intention to change child weight-related behaviors. In these cases, parents’ responses to the self-assessment items were instead coded from the interventionist’s written session notes. Analyses were run including and excluding sessions coded from intervention notes rather than audio recording to ensure findings were not impacted.

Time spent discussing weight-related behaviors.—Coders listened to all recorded audio sessions for a subject and noted the time parents and interventionists spent discussing each of the 8 weight-related behaviors. Discussions covering 2 or more behaviors (eg, replacing screen time with active play) were split evenly between the behaviors. Minutes of time spent discussing each target behavior was summed across all completed sessions to compute a single estimate per subject. The average inter-rater reliability for these items as measured by Pearson correlation coefficient was 0.79. The reliability for one item, time spent discussing restaurant frequency, was low ($r=0.20$), and thus was excluded from these analyses.

Statistical Analysis

Descriptive statistics are presented as means and standard deviations or frequencies for each of the described variables. Individual general linear regression models were used to test associations between (1) baseline levels of a given child weight-related behavior (eg, daily physical activity) and time spent discussing that child weight-related behavior (eg, time spent discussing physical activity) and (2) parent intention to change a given behavior and time spent discussing that behavior during intervention sessions. The univariate associations between baseline levels of weight-related behaviors and parent intention to change those behaviors were computed. Lastly, combined bivariate models comparing the relative impact of baseline levels of a weight-related behavior and parent intention to change that weight-related behavior on subsequent time spent discussing the behavior were also evaluated. In all

models, baseline levels of weight-related behaviors were standardized and mean-centered for ease of interpretation and comparison across behaviors. The potential confounding effects of child age and sex were also examined in each of the models described. If these variables did not substantially impact the regression coefficient ($>10\%$) or change significance with alpha at 0.05 then raw models are presented. Child BMI percentile was not evaluated as a potential confounder as it may be on the causal pathways examined here. Additionally, there was a highly restricted range of BMI percentile in this sample (70th to 95th).

RESULTS

Descriptive Characteristics

Parents were primarily female (91%), 37.4 (SD=6.0) years old, non-Hispanic/white (88%), and had an average BMI of 27.0 (SD=6.2). Children were 49% female, 6.7 (SD=1.7) years old, and had an average BMI percentile of 84.7 (SD=7.0). The majority of children were also non-Hispanic/white (79%). Baseline levels of child weight-related behaviors, parent intention to change weight-related behaviors, and time spent discussing weight-related behaviors are presented in Table 3. At baseline, children ate breakfast and family meals frequently (3.9 ± 0.5 meals per week and 3.2 ± 0.9 meals per week, respectively). They had on average 3 servings of fruits or vegetables a day and 1 serving of sugary beverages or juice a day. They were relatively active and watched about 2 hours of TV per day. Most parents (90%) reported intention to make a physical activity related change. The majority of parents (72%) intended to make a screen time related change at the beginning of the intervention. Parents reported intention to make dietary changes related to fruits and vegetables (80%) and unhealthy snacks (73%) more commonly than dietary changes related to sugary beverages (45%), family meals (44%) or breakfast (33%). On average, parents and interventionists spent more time discussing physical activity than screen time. Energy intake (avoiding unhealthy meals and snacks or portion control) and fruits and vegetables were discussed more often than other diet-related behaviors such as breakfast frequency and family meals.

General linear regression model results examining the relationship between baseline levels of weight-related behaviors and time spent discussing those behaviors during intervention sessions are presented in Figure 1. Baseline levels for 5 out of the 8 targeted behaviors were significantly associated with time spent discussing those behaviors (physical activity, screen time, energy intake, breakfast and family meal frequency). The magnitude of the effect was greatest for physical activity and smallest for breakfast and family meal frequency. These results remained significant after controlling for child age and sex, though the magnitude of effects were slightly attenuated (results not presented).

Table 4 shows the association between parent intention to change child weight-related behaviors (yes/no) and time spent discussing each child weight-related behavior. Only parent intentions to change child screen time behaviors and family meals were associated with the amount of time spent discussing those behaviors during intervention sessions. Models including age and sex were also run, but did not significantly affect results and are not presented here.

Examination of associations between baseline levels of child weight-related behaviors and parent intentions to change specific behaviors show that only baseline level of child screen time was significantly associated with parent intention to change that behavior. Parents of children with higher levels of screen time at baseline were more likely to report the intention to change screen time-related behaviors at the start of the intervention (odds ratio, OR=1.77, $p = .02$).

Table 5 presents results from multivariate models examining the association between both baseline levels of child behavior and parent intention to change that behavior and subsequent time spent discussing the specific weight-related behaviors. In each of these models, there were no significant interactions between baseline level of child behavior and parent intention to change, thus the interaction terms were removed and main effects are presented. In the multivariate model predicting time spent discussing physical activity, child's baseline level of physical activity, but not parent intention to change physical activity, was statistically significant. Parents of children with lower levels of baseline physical activity were more likely to spend time discussing physical activity during intervention sessions regardless of their intention to change this behavior at the start of the intervention. A similar pattern was seen for breakfast frequency and energy intake, though the association between baseline energy intake and time spent discussing unhealthy snacks was only marginally significant when including parent intention in the model ($b=5.75$, $p = .06$). In contrast, for models predicting time spent discussing screen time and family meals, both child baseline levels and parent intention to change these behaviors were statistically significant; however, the association between family meals at baseline was only marginally associated with time spent discussing family meals ($\beta=-1.05$, $p = .06$).

DISCUSSION

Pediatric obesity prevention interventions have achieved only modest results.¹ One possible reason is how interventionists and parents make decisions about which weight-related behaviors should be addressed during intervention sessions. Greater concordance between behavioral targets particularly important for a given child and the time spent addressing such behaviors during intervention sessions could improve intervention efficacy. To date, however, little is known about the relationship between child weight-related behaviors, parent intentions to change specific weight-related behaviors, and time spent during intervention sessions on specific weight-related behaviors. Results of the present study show that baseline level of child weight-related behaviors was a strong correlate of the amount of time the parent and interventionist spent discussing the behavior in intervention sessions, while parent intention to change weight-related behaviors may be less influential.

Child physical activity, energy intake, and breakfast frequency at baseline were all significantly associated with the amount of time parents chose to spend discussing these topics. The magnitude was largest for the association between baseline physical activity and time spent discussing physical activity during intervention sessions. It should be noted that a strength of these analyses is the use of accelerometry to objectively measure child physical activity. These relationships remained significant, though slightly attenuated, after controlling for child age and sex. These findings suggest that some of the appropriate

behaviors are being targeted when parents are allowed to choose the topics discussed. However, the lack of association between child levels of behaviors, such as sugary beverage intake and subsequent time spent discussing these behaviors, suggests that improvements to the parent-driven intervention approach may be needed.

It is important to interpret these results alongside analyses including parent intention to change specific weight-related behaviors at intervention onset. Only parent intention to change screen time and parent intention to change family meal frequency were associated with subsequent time spent discussing these behaviors. Similarly, when simultaneously assessing baseline behaviors and parent intention to change these behaviors in relationship to time spent discussing behaviors during the intervention, only parent intention to change screen time was associated with time spent discussing screen time during the intervention. It appears that parent intention is not a strong correlate of subsequent time spent discussing specific behaviors. One interpretation of this finding is that interventionists should have a stronger guiding role in obesity prevention interventions. Skilled interventionists may be able to direct parents towards discussing appropriate weight-related behaviors, while still gaining the potential benefits of parent choice. However, this finding should be interpreted cautiously as the role of the interventionist was not directly tested. Future research should directly compare guided intervention approaches and more prescriptive approaches in terms of parent engagement and child outcomes.

This research is the first to explore correlates of time spent discussing various weight-related behaviors in obesity prevention interventions. A strength of the present study is the use of independent coding to evaluate time spent discussing weight-related behaviors and parent intention to change weight related behaviors, both of which demonstrated strong inter-rater reliability. There are several limitations of the present study. Though this work focused on child's baseline levels of these behaviors and parent intention, it is a noted limitation that other important variables likely influence the topics discussed during these interventions (eg, parent concern, interventionist skills, and intervention design). In addition, this is a cross-sectional secondary analysis of a larger trial; it is possible that other variables cause time spent discussing weight-related behaviors, parent intention to change the behaviors *and* baseline levels of those behaviors. There also may be other underlying factors that influence both the child's behavior and the parent's choice of what behaviors are discussed. Future work could extend these findings to include additional theoretical constructs, such as parent motivation to change various weight-related behaviors. The sample for this analysis was also limited in terms of a restricted BMI range (children defined as "at risk for becoming overweight or obese") and was relatively homogenous with regards to race and ethnicity. Future research should examine these questions in more diverse populations. Similar parent-targeted obesity prevention trials that are currently being conducted in ethnically diverse, underserved communities could replicate these analyses. Intervention methods to guide parents towards specific topics while still promoting self-determination and subject engagement must also be a focus of future research. Finally, this work should also be expanded by examining whether baseline levels, parent intention, or time spent discussing various weight-related behaviors predict changes in those behaviors and ultimately, whether these changes lead to the prevention of unhealthy weight gain in children.

IMPLICATIONS FOR HEALTH BEHAVIOR OR POLICY

The results suggest a number of concrete implications for practitioners and researchers. Those delivering obesity prevention interventions in practice should carefully consider whether or not parents choose the weight-related behaviors discussed. Interventionists should be trained to guide parents in identifying the behaviors that will most effectively impact their child's health growth. Researchers should study the specific impact of offering parent choice by testing the effectiveness of interventions with or without this component.

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Figure 1.
Univariate Models Comparing Baseline Levels to Time Spent Discussing Weight-related Behavior, N = 96 subjects.

Table 1

Target Weight-related Behaviors in the HHHK 5–10 Intervention

↑ Fruit and vegetable intake	↓ Energy intake
↑ Physical activity	↓ Sugary beverages
↑ Breakfasts	↓ TV and other screen time
↓ Eating at restaurants	↑ Family meals

Table 2

Sample Statements Coded as Intention to Change Weight-related Behaviors

Sample excerpt coded as “Yes” intention	
<i>Breakfast frequency</i>	Make sure our sitter is feeding the kids breakfast while my husband and I are at work.
<i>Fruit and vegetable intake</i>	Set out vegetables at snack time rather than crackers and cheese.
<i>Physical activity</i>	Give him more opportunities to be active. He’s done t-ball, soccer, and swimming lessons in the past. We could do more of that.
<i>Restaurant frequency</i>	Like to get it down to one time a week. We need to figure out how to say no or find other social activities rather than eating out.
<i>Unhealthy snacks</i>	Want to decrease these to only ‘special occasions’ by not having them in our house. Just not buying them.
<i>Sugary beverages</i>	Want me and my husband to be better role models. Go more to water and get the kids each a water bottle to use daily.
<i>TV and other screen time</i>	Would like to watch less TV during daytime hours, especially in the morning.
<i>Family meal frequency</i>	Would like to eat lunch with my daughter during the week and would like to do lunch together as a family on the weekends.

Table 3

Baseline Levels, Parent Intention, and Time Spent Discussing Weight-related Behaviors, N = 96 Subjects.

	M (SD) or N (%)
<i>Child baseline weight-related behaviors and practices</i>	
Child physical activity (min/day)	51 (28)
Child screen time (hrs/day)	2.1 (1.2)
Child energy intake (kcal/day)	1762 (497)
Child sugary beverage intake (servings/day)	1.2 (1.1)
Child fruit/vegetable intake (servings/day)	3.0 (2.6)
Breakfast frequency (times/wk)	3.9 (0.5)
Family meal frequency (dinners/wk)	3.2 (0.9)
<i>Intention to change weight-related behaviors, % "Yes"</i>	
Physical activity	86 (90%)
Screen time	69 (72%)
Energy intake	70 (73%)
Sugary beverages	43 (45%)
Fruit/vegetables	77 (80%)
Breakfast	30 (33%)
Family meals	42 (44%)
<i>Time spent discussing weight-related behavior, minutes</i>	
Physical activity	48.8 (30.6)
Screen time	18.2 (21.5)
Energy intake	35.8 (28.4)
Sugary beverages	5.2 (8.6)
Fruit/vegetables	25.8 (24.1)
Breakfast	4.6 (7.8)
Family meals	4.4 (5.6)

Table 4Univariate Models Predicting Time Spent Discussing Weight-related Behavior, N = 96 Subjects[/]

	b	SE	p-value
<i>Intention to change weight-related behaviors</i>			
Physical activity	−2.65	10.27	.80
Screen time	14.13	4.69	<.01
Energy intake	8.17	6.51	.21
Sugary beverages	0.54	1.77	.76
Fruit/vegetables	10.59	6.10	.09
Breakfast	−0.20	0.59	.74
Family meals	3.73	1.09	<.01

[/] These results represent raw models, as adjusting for child age and sex did not substantially impact regression estimates (results not shown).

Table 5Multivariate Models Predicting Time Spent Discussing Weight-related Behavior, N = 96 Subjects¹

		b	SE	p-value
<i>Physical activity</i>	Child Baseline Behavior	−8.39	3.36	.01
	Parent Intention to Change Behavior	−5.51	10.47	.60
<i>Screen time</i>	Child Baseline Behavior	4.44	2.29	.05
	Parent Intention to Change Behavior	11.88	4.77	.01
<i>Unhealthy snacks</i>	Child Baseline Behavior	5.75	3.01	.06
	Parent Intention to Change Behavior	8.03	6.67	.23
<i>Sugary beverages</i>	Child Baseline Behavior	−0.02	0.95	.98
	Parent Intention to Change Behavior	0.59	1.88	.75
<i>Fruit/vegetables</i>	Child Baseline Behavior	−3.94	2.57	.13
	Parent Intention to Change Behavior	10.43	6.38	.11
<i>Breakfast</i>	Child Baseline Behavior	−1.21	0.26	<.01
	Parent Intention to Change Behavior	−0.40	0.54	.46
<i>Family meals</i>	Child Baseline Behavior	−1.05	−1.94	.06
	Parent Intention to Change Behavior	3.34	3.05	<.01

¹These results represent raw models, as adjusting for child age and sex did not substantially impact regression estimates (results not shown).