Feasibility of Standardized Methods to Specify Behavioral Pediatric Obesity Prevention Interventions

Abstract

Background: Standardized methods are needed to evaluate what occurs within the 'black box' of behavioral interventions to prevent pediatric obesity. The purpose of this research is to evaluate methods to specify the behavior change techniques used and the amount of time spent discussing target weight-related behaviors in an intervention for parents of children at risk for becoming overweight or obese. Methods: Independent coders were trained to identify behavior change techniques and time spent discussing weight-related behaviors in audio recordings and transcripts of intervention sessions from 100 randomly selected participants. The Behavior Change Technique Taxonomy (BCTTv1) was used to code techniques present in sessions. A newly-developed tool was used to code time spent discussing each target weight-related behavior (e.g., physical activity, screen time). Sessions from a subset of these participants (N=20) were double coded to evaluate inter-rater reliability. Results: After revisions to coding protocols, coders reliably coded behavior change techniques used and time spent discussing target weight-related behaviors in sessions from the subset of 20 participants. The most commonly discussed target weight-related behavior was physical activity followed by energy intake and fruit and vegetable intake. On average, 13.9 (SD=2.8) unique behavior change techniques were present across sessions for a given participant. Conclusions: These results offer reliable methods for systematically identifying behavior change techniques used and time spent discussing weight-related behaviors in a pediatric obesity prevention intervention. This work paves the way for future research to identify which specific target behaviors and techniques are most associated with the prevention of unhealthy weight gain in children.

Background

One third of pediatric populations are overweight or obese and this number jumps to over 60% in adult populations (Ogden et al., 2014). Once obesity develops, it is notoriously challenging to reverse (Dombrowski et al., 2014). There is a need for effective interventions to prevent unhealthy weight gain at an early age. Current pediatric obesity prevention interventions target a number of behaviors associated with obesity: physical activity, screen time, fruit and vegetable intake, and so on (Kamath et al., 2008). They also encourage behavior change through a number of theory-based techniques: goal setting, self-monitoring, social support, and others (Martin et al., 2013). This focus on multiple techniques and multiple target behaviors contributes to the complexity of these interventions. The efficacy of these interventions has been modest with few leading to the successful prevention of unhealthy weight gain in children (Kamath et al., 2008) and the reasons for these less-than-desired results are unknown. Researchers need to know more about what happens inside the 'black box' of pediatric obesity prevention interventions in order to design more effective interventions. The time participants actually spend in intervention sessions overall and time spent on specific topics within sessions is rarely reported (JaKa et al., 2016). It is even less common to find detailed information on the content or behavior change techniques used during sessions published in behavioral pediatric obesity intervention reports (JaKa et al., 2016). Perhaps the greatest barrier to collecting these details is researchers' lack of familiarity with available tools to rigorously and objectively specify behavioral interventions. Objectively specifying behavioral interventions is critical as it will allow intervention designers to quantify how specific intervention elements are being

implemented. These data can then be used to link the use of specific techniques with intervention outcomes. The use of such frameworks in the field of obesity prevention allows researchers to identify which behavior change techniques and weight-related behaviors should be targeted (Branscum et al., 2013) and to design more effective interventions in the future.

Frameworks for characterizing behavior change techniques have been developed and used successfully in other contexts such as smoking cessation (Lorencatto et al., 2014; Lorencatto et al., 2013a; Lorencatto et al., 2013b; Resnick et al., 2005), but have yet to be consistently applied to pediatric obesity prevention interventions as delivered. One promising tool is the Behavior Change Technique Taxonomy (BCTTv1). It is a comprehensive set of standardized definitions for 93 unique behavior change techniques delineated by a team of leaders in the field (Michie et al., 2013). It is accompanied by an intensive online training to assist researchers in identifying the techniques used in behavioral interventions (Wood et al., 2015). The BCTTv1 has primarily been used to measure intervention content by coding treatment manuals and manuscripts (Avery et al., 2012; Bennett & Sothern, 2009; Bird et al., 2013; Hardeman et al., 2000; Lau et al., 2011; Michie et al., 2009). However, similar taxonomies have successfully been used to code techniques present in transcripts of one-on-one smoking cessation sessions (Gainforth et al., 2016b; Lorencatto et al., 2014; Lorencatto et al., 2013a; Lorencatto et al., 2013b; Michie et al., 2008). This approach has not been consistently used with pediatric obesity prevention interventions. Using the BCTTv1 to characterize the techniques used during obesity prevention interventions could help identify those that are most effective in preventing unhealthy weight gain among children.

It is also important to specify the amount of time spent discussing each target weight-related behavior (e.g., physical activity, screen time) within obesity prevention interventions.

This information can be used to determine whether or not spending more time on a specific behavior is associated with changes in that behavior. If more time spent discussing a certain behavior is associated with greater change in that behavior, then researchers can have more confidence that the intervention is working through the intended pathways. Standardized definitions of these target weight-related behaviors are not widely used and detailed information about how much time is spent addressing a given target behavior relative to another target behavior is rarely reported (JaKa et al., 2016). The feasibility of a tool to measure time spent discussing specific target weight-related behaviors common in pediatric obesity prevention interventions has been piloted in a smaller sample, but inter-rater reliability has yet to be evaluated (JaKa et al., 2015).

Both of the tools discussed above use independent coders who were not involved in delivering the intervention, a recommended best practice for obtaining unbiased assessments (Abraham et al., 2014; Bellg et al., 2004). As mentioned, details of what happens during intervention sessions are rarely reported (Branscum et al., 2013; Estabrooks et al., 2003; Klesges et al., 2012) and when they are reported, they often rely on interventionist-completed checklists (Bellg et al., 2004). These checklists are subject to self-presentation and memory bias and may lead to misreporting of behavior change techniques or time spent discussing weight-related behaviors. Having independent coders measure directly from session recordings or transcripts addresses these potential biases. The purpose of this study is to (1) establish the reliability of tools to quantify behavior change techniques used and the amount of time spent discussing target weight-related behaviors in behavioral counseling sessions and (2) use these tools to describe a behavioral obesity prevention intervention. The application of rigorous coding tools such as these may allow researchers to better specify existing pediatric obesity prevention interventions

and identify which behavior change techniques are most strongly associated with successful prevention of unhealthy weight gain, thereby improving the efficacy of future interventions.

Methods

Population/Sample

Participants included in this study were 100 randomly selected parent/child dyads from the intervention arm of the Healthy Homes/Healthy Kids (HHHK 5-10) randomized controlled trial. The main trial enrolled 421 dyads, 212 of which were randomized to the intervention and 209 of which were randomized to the contact control group and excluded from this analysis. The latter received a 14-session phone intervention targeting safety and injury prevention topics rather than healthy eating and physical activity. Participants were recruited from 20 pediatric or family practice clinics within a single health care system in Minnesota. Inclusion criteria were: (1) child between the ages of 5 and 10, (2) child BMI between the 70th and 95th percentile, (3) dyads were English speaking, (4) child had no medical conditions affecting growth or precluding study participation, and (5) child was not using steroid medication. Additional trial details have been reported (Sherwood et al., 2013). Additional inclusion criteria were used for the current analysis: (1) randomized to the obesity prevention intervention arm and (2) had complete height and weight measurements at 12 months. Of the 212 participants randomized to the intervention arm, 15% (N=31) had missing height and weight data making them ineligible for this analysis. Of the remaining 181 participants, 100 were randomly selected for inclusion.

Intervention Description

Parents randomized to the intervention arm were asked to participate in a manualized 14-session phone-based intervention targeting 8 specific child weight-related behaviors (Table 1). Sessions were designed to last 15-30 minutes with the exception of the first session, which was

45 minutes. The intervention was informed by both Social Cognitive Theory (Bandura, 1986, 2004) and Motivational Interviewing (Miller & Rollnick, 2002) which highlight the importance of behavioral skills training, impacting environment to facilitate behavior change, and encouraging participant self-determination. Participants worked with interventionists to determine which weight-related behaviors to discuss during each session. Interventionists were instructed to guide parents toward the behaviors that were most relevant to each family, based on information gathered during sessions. Session structure was as follows: Session 1 included a rapport-building introduction, a detailed description of the program, an assessment of current weight-related behaviors, and a behavioral goal setting activity; Sessions 2-5 included a review of goal progress, a discussion of successes, barriers, and solutions followed by an in-depth guided assessment of a selected weight-related behavior and a detailed goal setting activity; Session 6 repeated the assessment of current weight-related behaviors and included a goal setting activity; Sessions 7-14 were similar to Sessions 2-5 with a focus on maintaining changes made previously (Levy & Feld, 1999).

Coding Protocol Overview

Behavior change techniques used and the time spent discussing target weight-related behaviors were coded by independent study staff in transcripts and audio recordings, respectively. Sessions were coded independently from other coders. Weekly meetings were held to prevent drift in coding. A random sample of sessions from 20 participants was double-coded to assess inter-rater reliability (IRR). All coders (N=5) had undergraduate or graduate degrees in health-related fields and completed training and certification in all coding protocols. Certification included coding 10 randomly selected audio sessions and transcripts and obtaining >90% IRR for all items.

Time Spent Discussing Target Weight-Related Behaviors

Time spent discussing each of the 8 target weight-related behaviors (Table 1) was coded in all audio-recorded sessions for selected participants. Coders listened to sessions and recorded the number of minutes the interventionist or the participant spent talking about each weight-related behavior. Specific topics coded with respect to each weight-related behavior are described in detail in Table S1. Start and end time of a discussion was noted and the difference recorded, rounding down to a full minute. If a discussion spanned 2 or more behaviors, for example replacing TV time with physical activity, the total discussion time was split evenly between the behaviors. Intermittent time spent off any behavior lasting more than 1 minute was subtracted from the time recorded. The total amount of time was summed within the 8 weight-related behaviors. These values were then averaged across all recorded sessions for a participant and multiplied by the total number of completed sessions to account for any missing sessions (e.g., poor audio quality or recorder malfunction). Coders received four hours of training to learn how to code time spent discussing target weight-related behaviors in the audio recordings.

Behavior Change Techniques Used

The presence of behavior change techniques was coded from session transcripts. Due to budgetary constraints and cost of transcription, a subset of 5 sessions was selected for each included participant. To capture behavior change technique use over time and differences in session types described above, the following 5 transcripts were selected for each participant: Session 1, two sessions randomly selected from Sessions 2-5, Session 6, and one session randomly selected from Sessions 7-14. Each transcript was read one time to get a general sense of the conversation and a second time to code sentence-by-sentence the behavior change techniques present during the session. Text was coded in "statements" which could encompass

multiple sentences by an interventionist or participant, representing a single topic. If the topic switched, a new statement began. Each statement was coded based on the definitions provided by the BCTTv1 (Michie et al., 2013). The BCTTv1 provides definitions and examples of 93 behavior change techniques used across behavior change interventions. The definitions are phrased in terms of what occurs during the session (either in interventionist speech or participant speech). For example, the behavior change technique "1.1 Goal Setting (Behavior)" is defined as, "sets or agrees on a goal defined in terms of the behavior to be achieved."

Training for coding of behavior change techniques included (1) completing the online training (www.bct-taxonomy.com), (2) coding the HHHK 5-10 design manuscript (Sherwood et al., 2013), interventionist manual, and participant workbooks, and (3) 8 hours of study-specific training meetings. Study-specific training included coding specific excerpts from transcripts, coding 5-10 practice sessions, and discussions about specific coding decisions. During initial training for the behavior change techniques, adequate reliability could not be obtained, thus a number of adaptations were made to the coding protocol and training was re-conducted. The first change to the protocol was to reduce the total number of behavior change techniques coded from the full 93 to only those identified at least once in the intervention manuscript, manual, workbooks, or practice sessions (N=22 techniques). The second change was to re-arrange how the techniques were organized within the coding sheet to mirror the order typically delivered within a session, (e.g., reviewing goal progress and enactment techniques occurring first, followed by problem solving and goal setting.) Similarly, certain techniques were only displayed as code-able if other techniques were first coded, (e.g., habit formation was only available for coding once behavioral practice/rehearsal was coded.) Selected techniques were split into their components to improve ease of coding, (e.g., problem solving was split into identifying barrier

and identifying solutions.) One behavior change technique, framing/reframing was excluded as adequate reliability could not be obtained.

Lastly, one new technique was added: "Information Gathering" defined as statements in which the interventionist asked participants questions regarding their current behaviors. This technique was added because it captured a large amount of what occurred in each session but did not meet a formal definition of any of the existing 93 behavior change techniques. Many of the existing techniques contain some part of information gathering for specific purposes or a specific type of information gathering (e.g., problem solving includes gathering information about barriers). In a previously published smoking cessation taxonomy, "Information Gathering and Assessment" was included as a technique. It was classified as a technique that supports the delivery of other techniques (Lorencatto et al., 2013b; Michie et al., 2011). In other words, it is necessary but not sufficient for behavior change. The intended purpose of gathering information about the participant's current behavior in this intervention was to help interventionists understand which behaviors should be targeted for change, not necessarily to induce change.

Table 2 provides examples of coded transcript statements and the associated behavior change techniques. After coding, data were summarized by counting the number of unique techniques that were present anywhere during the intervention sessions. To estimate frequency of use, distinct technique statements were also summed across a session and averaged across all coded sessions for a given participant.

Statistical Analysis

Descriptive statistics including means, standard deviations, and frequencies are presented at the participant level for time spent discussing each of the 8 weight-related target behaviors and for the behavior change techniques used during intervention sessions. Inter-rater reliability was

calculated for the randomly selected 20 participants whose sessions were double-coded. Reliability for minutes spent discussing weight-related behaviors was calculated via Pearson correlation (r). Reliability for presence/absence of specific behavior change techniques was calculated using multiple methods (Kottner et al., 2011) including (1) percent agreement, (2) standard Cohen's kappa (K) which adjusts for chance agreement, and (3) the prevalence- and bias-adjusted kappa (PABAK) which accounts for potential low prevalence of certain techniques across sessions, but does not adjust for chance agreement (Byrt et al., 1993).

Results

Baseline Characteristics

Table 3 presents baseline characteristics of the parent-child dyads selected for inclusion in the current coding analysis. Approximately half of the participating children were female. Almost all of the participating parents were female. Children had a mean BMI percentile just below the cutoff for overweight, a mean age under 7 years old, and the majority were non-Hispanic/white. Parents completed an average of 12 of the 14 intended sessions and the average session length was just over 20 minutes. Dyads not eligible (N=31) or not randomly selected (N=81) for inclusion were similar to those selected (N=100) with regards to child age, sex, and BMI percentile and parent age, sex and employment. Slight differences were seen in race/ethnicity (55% non-Hispanic/white vs. 73% respectively) and parent BMI (29.8 kg/m^2 vs. 27.9 kg/m^2 respectively).

Coder Reliability

Reliability for time spent discussing each target weight-related behavior and behavior change techniques used in the N=20 randomly selected participants is presented in Table 4. When measuring time spent discussing target weight-related behaviors, coders had strong

agreement (0.80 to 1.00) for 5 behaviors, substantial agreement (0.60 to 0.79) for 2 behaviors, and weak agreement (<0.40) for one behavior: time spent discussing restaurant frequency. The low reliability associated with discussions of the latter target behavior was driven by two sessions where a conversation was coded as energy intake by one coder and restaurant frequency by the other. The reliability of behavior change techniques used was high across all measures of reliability. A complete list of the reliabilities for each behavior change technique and target behavior is provided in Table S1.

Time Spent Discussing Target Weight-Related Behaviors

Of the 100 participants randomly selected for inclusion, N=96 had at least one recorded session. The average number of recorded sessions was 8.8 (SD = 3.6) out of the average 12 completed (max = 14 sessions). Figure 1 shows average time spent discussing each of the 8 target weight-related behaviors across all sessions for a given participant. Participants spent the most amount of time discussing physical activity, followed by energy intake, fruit/vegetable intake, and screen time. Relatively little time was spent discussing other target behaviors.

Behavior Change Techniques Used

An average of 13.9 (SD=2.8) unique behavior change techniques were used during sessions out of a possible 22 techniques. Figure 2 shows the frequency of each technique in average number of statements per session. The most common technique was the newly added "Information Gathering", which was used in an average of 10 (SD=5) statements per session. This was followed by the identifying barriers portion of 1.2 Problem Solving, (averaging 7±5 statements per session.) The latter was used more frequently than the identifying solutions portion of 1.2 Problem Solving, (averaging 2±2 statements per session.) The next most common behavior change technique present in the sessions was 1.1 Goal Setting, Behavior, which was

present in 4 (SD=3) statements per session. The remaining behavior change techniques were used less frequently, with 2 or fewer statements on average per session.

Discussion

The results of this work offer a reliable method for systematically identifying time spent discussing target weight-related behaviors and behavior change techniques use in a pediatric obesity prevention intervention. This work paves the way for future research to elucidate which parent or child factors may influence these variables and identify which specific target behaviors and techniques are most associated with the prevention of unhealthy weight gain in children. Objective methodology to rigorously evaluate these elements within behavioral pediatric obesity prevention interventions is necessary. These interventions have yet to prove effective for the prevention of unhealthy weight gain in at-risk children (Kamath et al., 2008). Reliably coding behavior change techniques used and time spent discussing target weight-related behaviors will allow researchers to identify which weight-related behaviors *should* be targeted and which behavior change techniques *should* be used. Researchers can test associations between the use of the techniques during intervention sessions and mediating variables (e.g., changes in targeted parenting behaviors) or study outcomes (e.g., changes in child weight-related behaviors or BMI percentile). This would ultimately lead to the development of more efficacious interventions. It should be noted that these methods are time- and cost-intensive which may prohibit researchers from doing this necessary work. Additional resources may be needed and should be considered by funders. Tools to measure time spent discussing specific target weight-related behaviors or specific behavior change techniques used have not been thoroughly evaluated in the field of obesity prevention. The approach outlined here offers an innovative and feasible way to specify interventions within the context of obesity prevention.

Total amount of time in obesity interventions is often measured and is a demonstrated predictor of change in outcomes in some studies(Kalarchian et al., 2009). However, no known studies have compared the relative amount of time spent discussing different components within an intervention and then compared that time to that component's intended outcomes. If 2 hours are spent discussing fruit and vegetable intake during an intervention and only 10 minutes are spent discussing physical activity, greater changes would be expected in fruit and vegetable intake than physical activity. If these changes are not observed, or are observed for some weight-related behaviors and not others, researchers can start to understand which components of an intervention are working as intended and which are not. This analysis demonstrated that coding of time spent discussing target weight-related behaviors was feasible and reliable. The use of coding such as this would allow researchers to begin identifying effective components within interventions. Adequate reliability was obtained for time spent discussing all but one target behavior. To ensure adequate reliability, a detailed operational definition for each of the behaviors was created (Table S1). In future studies, these operational definitions should be created during the design phase of an intervention. This would help delineate the specific topics to be discussed in relationship to each target weight-related behavior. For example, this study demonstrated that distinguishing between conversations discussing physical activity and screen time was more reliable than distinguishing between various diet-related conversations.

These results highlight the need to have clear diet-related study guidelines for interventionists (e.g., clearly distinguishing between a study target behavior of decreasing restaurant meal frequency and a study target behavior of improving diet quality when eating at restaurants). Experts across the field of obesity research should collaborate to refine controlled vocabularies around target weight-related behaviors, as is being done in other fields(Larsen et al.,

2016). In this study, there was variability in the amount of time spent discussing various behaviors, with physical activity being the most often discussed. Future research should determine whether or not the appropriate behaviors are being targeted for each family and if spending more time discussing these behaviors is associated with subsequent changes in those target behaviors.

The results of this study indicate that coding the behavior change techniques used during intervention sessions of a behavioral obesity prevention intervention using the BCTTv1 is also feasible. However, to obtain reliability in alignment with previous coding studies (Lorencatto et al., 2014), a number of intervention-specific adaptations were necessary. Modifications included limiting the number of techniques coded, re-organizing coding sheets, splitting some techniques into two parts, adding one new technique, and adding an intensive 2-day study-specific training. The added technique, termed "Information Gathering", may be particularly important in obesity interventions where there are multiple target behaviors in a given intervention (e.g., physical activity, diet, and screen time). An interventionist must work with the participant to determine which behaviors are most relevant for him or her. As discussed, this technique is not intended to directly change the participant's behavior, but rather to help the interventionist identify which behaviors to target for change. Others have coded similar non-active interactions during intervention sessions, such as the coined Social Smoothers which capture phrases like "yeah" and "okay"(Gainforth et al., 2016a). As more researchers begin using the BCTTv1 to code more diverse interventions, information about needed adaptations to the tool or training should be documented and shared. This information can then be aggregated across multiple fields to refine a method for using this framework to code intervention sessions. The evolving framework should

also be compared to existing coding frameworks that use other tools or with those used in other qualitative research fields.

In addition to refining coding methodology, this work enables future research to look at which specific techniques or combinations of techniques are associated with successful changes in study outcomes. Because this method gives participant-level estimates of technique use, it can be used to predict participant-level outcomes using standard regression analyses. If taking this approach, careful consideration should be paid to which variables may confound any associations observed. This type of detailed data can also be used to understand if the specific components of theoretical frameworks are working in the intended pathways. Researchers can use these types of data to understand typical patterns in technique use. For example, is problem solving typically used more frequently than goal setting? These patterns can be compared to theoretical frameworks guiding interventions or to intended patterns to assess treatment fidelity. Documentation of patterns in behavior change techniques use also can be used to more clearly describe interventions for replication or evaluation. This is particularly relevant for describing differences in types of sessions within an intervention and the intended purpose and timing of each. As an example, the discussed intervention had two types of sessions. The first type (Sessions 1 and 6) focused on participants reflecting on their current behaviors. The second type (Sessions 2-5 and 7-14) focused more heavily on changing or maintaining behaviors. Data about the techniques delivered could also be used to determine which *type* of sessions were more impactful within an intervention, leading to more effective design of interventions in the future.

The above method of coding is the gold-standard approach for objectively measuring intervention components (Abraham et al., 2014; Bellg et al., 2004) and reduces the risk of self-presentation or memory bias. However, because transcription and independent coding is labor-

intensive it may require researchers to select a sample of participants or sessions to code, which is a noted limitation to the current analysis. Although there were no demographic differences seen between randomly select dyads and those not selected in this analysis, other unmeasured bias may exist. Analysis of recorded audio is also hampered by missing data due to damaged or missing audio files. If there is a systematic reason for missing or damaged files, bias may be introduced when comparing these factors to study outcomes. These factors should be considered when designing these types of studies, and highlight the importance of conducting quality control checks throughout an intervention to ensure all sessions are recorded. Further, it should be noted that other potential factors of interest, such as the amount of *time* spent on various behavior change techniques, were not measured here. This work is a first step in being able to better understand the intricacies of complex, multifaceted behavior change interventions. Though this work has noted limitations, it offers a reliable approach to looking inside the 'black box' of behavioral interventions to prevent unhealthy weight gain in pediatric populations.

Conclusions

Interventions can be reliably described and specified using coded audio recordings and transcripts of intervention sessions in pediatric behavioral obesity prevention interventions. The number of techniques used across sessions was high, but there were quite a few techniques not commonly used during sessions. There was also variability in the time spent discussing each target weight-related behavior, with the most common being physical activity. In order to improve future obesity prevention interventions, researchers must understand what is currently being done within sessions. This study offers a feasible and reliable approach to characterizing obesity prevention interventions targeting multiple weight-related behaviors and using multiple

behavior change techniques. Future research should use tools such as these to understand the effectiveness of specific intervention elements.

Compliance with Ethical Standards

Informed consent was obtained from all individual participants included in the study prior to enrollment. All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments. This article does not contain any studies with animals performed by any of the authors.

Figure Caption List

Figure 1. Time spent discussing target weight-related behaviors as coded by independent coders for random sample of participants included in the HHHK 5-10 coding project (N=96).

Figure 2. Average number of statements coded by independent coders in transcripts of a session from a sample of participants included in the HHHK 5-10 coding project (N=96).

Supplemental Materials

Table S1- Specific topics included in time spent discussing weight-related behaviors

Table S2- Reliability for specific behavior change techniques

Table 1. Target weight-related behaviors discussed in the Healthy Homes, Healthy Kids intervention.

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

Table 2. Sample statements from HHHK 5-10 session transcripts and the coded behavior change techniques.

Behavior Change Technique	Sample Statements
1.5 Review Behavior Goal(s)	I: Last time we talked, you decided to do a family activity after dinner, like play Wii Fit, at least 2 times during the week. How did that go? [Parent Response] I: Is that something you want to continue next week?
2.3 Self-monitoring of Behavior	I: Is there a way you could track your progress? P: We have a large family calendar. I can write down how many shows she watches each day.
10.1 Material Incentive (Behavior)	I: Now, what could be the reward for your family if you can get this done? P: My kids are book lovers. They would love to each get a book for doing [the goal].
12.1 Restructuring the Physical Environment	P: Okay, the goal for this week is to organize the garage so she has a space to ride her bike when it is too cold to play outside.
13.1 Identification of Self as Role Model	I: Well that's really good. That's a positive example you're setting by being out there and showing them exercise is important. P: I think that probably keeps them outside longer too.

I: Interventionist's speech, P: Participant's speech

Table 3. Characteristics of eligible, randomly selected participants for the HHHK 5-10 coding project, *N = 100*.

	M (SD) or N (%)
Baseline characteristics	
Child age (years)	6.7 (1.7)
Child sex (% female)	49 (49%)
Child baseline BMI (percentile)	84.7 (7.0)
Child race/ethnicity (% non-Hispanic/white)	78 (78%)
Parent age (years)	37.4 (6.0)
Parent sex (% female)	91 (91%)
Parent BMI (kg/m^2)	27.9 (6.2)
Parent employment (% full-time)	58 (58%)
Intervention completion	
Intervention sessions completed	12.0 (3.9)
Average session length	24.7 (5.1)

Table 4. Reliability of coder-measured time spent discussing weight-related behaviors and behavior change techniques in a sample of 20 randomly selected participants.

	Pearson r		
Time spent discussing target weight-related behaviors, N = 179 sessions			
Physical activity	0.97		
Screen time	0.95		
Sugary beverage intake	0.95		
Fruit and vegetable intake	0.90		
Energy intake	0.86		
Family meal frequency	0.77		
Breakfast frequency	0.72		
Restaurant frequency	0.20		
	PABAK **M (SD)**	**Kappa** **M (SD)**	**% Agree** **M (SD)**
Behavior change techniques used, N = 76 sessions	0.96 (0.06)	0.91 (0.15)	0.98 (0.03)

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