



Parent-child interaction therapy as a prevention model for childhood obesity: A novel application for high-risk families

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ABSTRACT

Childhood obesity is a formidable public health issue in the United States. Although childhood obesity risk is complex and influenced by multiple systems and individual domains, there is increasing appreciation for the impact of the family environment generally, and parent-child interactions specifically, on children's levels of risk. Longitudinal research has identified parenting style and quality of parent-child interactions as important targets for reducing child obesity risk. Although, obesity prevention programs have attempted to change general parenting practices to prevent obesity (Haines et al., 2016; Harvey-Berino & Rourke, 2003; Østbye et al., 2012), no prevention efforts, to date, have attempted to change the parent-child relationship to reduce young children's obesity risk. In this paper, we describe the rationale for and development of an innovative prevention program: Parent-Child Interaction Therapy-Health (PCIT-Health). First, we review the risk factors for the onset of obesity during childhood and assess current approaches to preventing child obesity, including limitations. Next, we articulate the theoretical links and empirical evidence that make PCIT a logical model to reduce the risk for childhood obesity. Finally, we describe the adaptation of the standard PCIT model into the PCIT-Health model and conclude with next steps for evaluating the adaptation.

1. Introduction

Childhood obesity is a formidable public health issue in the United States (Ogden, Carroll, Kit, & Flegal, 2012, 2014; Wang & Beydoun, 2007), disproportionately affecting children from lower socioeconomic status households (Ogden et al., 2014; Wang & Beydoun, 2007). Recent estimates (2013–2014) indicate that 25% of children ages two- to five-years are overweight or obese (≥ 85 th percentile for age- and sex-specific Body Mass Index, or BMI) and approximately 1 in 3 children between the ages of 6 and 11 years are overweight or obese (Skinner, Perrin, & Skelton, 2016). Children living in communities with the highest economic hardship have more than double the rate of obesity compared to children living in more affluent communities (i.e., communities with the lowest economic hardship; (Shih, Dumke, Goran, & Simon, 2013).

Once developed, child obesity is difficult to treat (Ebbeling, Pawlak, & Ludwig, 2002). Indeed, early onset of obesity predicts obesity and other cardiometabolic risks into adulthood (Baidal & Taveras, 2012; Baird et al., 2005; Berenson, 2002; Freedman et al., 2005; Freedman, Khan, Dietz, Srinivasan, & Berenson, 2001). Of the children who met criteria for obesity during childhood, over 75% continued to meet

criteria for obesity as adults (Freedman et al., 2001). Thus, effective and early prevention of childhood obesity is critical (Baidal & Taveras, 2012; Birch & Ventura, 2009; Fuemmeler et al., 2016; Lumeng, Taveras, Birch, & Yanovski, 2015). In this paper, we describe the rationale for and development of an innovative prevention program: Parent-Child Interaction Therapy-Health (PCIT-Health). First, we review the risk factors for the onset of obesity during childhood and assess current approaches to preventing child obesity, including limitations. Next, we articulate the theoretical links and empirical evidence that make PCIT a logical model to reduce the risk for childhood obesity. Finally, we describe the adaptation of the standard PCIT model into the PCIT-Health model and conclude with next steps for evaluating the adaptation.

2. Childhood obesity: risk factors and buffers

Perhaps the most commonly studied risk factors for child obesity are child eating behaviors, dietary quality, and sedentary behaviors. In young children, there is a particular focus on parental feeding style, feeding practices, and media parenting practices as notable risk factors. Parental feeding style is the emotional climate in which a parent feeds a child (Blissett, 2011), parallels the typology of general parenting styles,

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and is distinct from a parent's feeding practices.

2.1. Parental feeding styles

Baumrind (1971) identified three general parenting styles—authoritarian, authoritative, and permissive—that impact children's behavioral functioning and have since been seen to relate to the manner in which parents feed their children as well. Authoritative feeding styles have been found to be protective against child obesity risk, while permissive feeding styles are associated with higher weight in children (Shloim, Edelson, Martin, & Hetherington, 2015). Specifically, permissive feeding styles are associated with lower dietary intake of nutrient-dense foods, such as fruits and vegetables (Hoerr et al., 2009). Findings related to authoritarian feeding styles (e.g., in which a parent is overcontrolling of children's food choices) are mixed, where some evidence suggests that authoritarian parenting may yield positive outcomes (e.g., Hoerr et al., 2009).

2.2. Parental feeding practices

Different from the feeding style, parents' feeding practices are the behaviors that seek to increase or decrease a child's food consumption (Blissett, 2011). Examples of feeding practices are restriction (e.g., preventing children from eating), emotional feeding (e.g., using food to regulate child behavior), coercive feeding (e.g., pushing a child to “clean their plate”), and instrumental feeding (using food as a reward). Support has been found linking each of these types of feeding practices to child obesity risk, with most evidence supporting restrictive feeding as a correlate of child obesity (Shloim et al., 2015).

2.3. Media parenting practices

In addition to parental feeding styles and practices, media parenting practices—also sometimes referred to as parental mediation of media—are an important risk factor for child obesity. Media parenting practices include the parents' specific behaviors related to children's consumption of screen media (e.g., television, video games, computers, smart phones). Children's screen-based sedentary time is highly predictive of later obesity risk. Over 60% of the incidence in childhood overweight can be attributed to television (TV) viewing (Gortmaker et al., 1996). Children who watch three or more hours of TV per day have the highest BMI when they reach adolescence compared to those who watch less TV (Proctor et al., 2003). These relations remain even after controlling for parental body fat, child's dietary quality, and child's physical activity levels (Proctor et al., 2003). Effective media parenting practices can reduce the impact of TV viewing on child health outcomes. For example, parental monitoring of children's screen time is related to more sleep, and in turn, a lower BMI (Gentile, Reimer, Nathanson, Walsh, & Eisenmann, 2014). Additionally, when parents restrict a child's exposure to commercial screen time (which consists of advertisements of nutrient poor and high calorie and high fat foods) and communicate about the purpose of advertisements, young children have lower energy-dense food consumption (Buijzen, 2009). Finally, maternal monitoring of children's media exposure at age five years predicts lower obesity risk at child age seven years, as well as smaller increases in child BMI at age nine years (Tiberio et al., 2014). Thus, promoting media parenting practices is an important component of child obesity prevention.

2.4. Parent-child relationship quality

Although childhood obesity risk is complex and influenced by multiple systems and individual domains, there is increasing appreciation for the impact of the family environment generally, and parent-child interactions specifically, on children's levels of risk (Saltzman, Fiese, Bost, & McBride, 2017). It has been established that parents are

pivotal to establishing healthy eating and activity behaviors in their children, which in turn help to prevent obesity (Birch & Ventura, 2009). Separate from a parent's feeding style is a parent's general parenting style. Parenting style is more strongly and more consistently linked to a child's BMI in longitudinal research, compared to feeding style and feeding practices (Shloim et al., 2015). Indeed, it has been posited that the link between parents' feeding practices and children's eating behaviors is moderated by parenting style (Gerards & Kremers, 2015); for a comprehensive review of the differences between parenting style, feeding style, and feeding practices on child obesity risk, see also Shloim et al., 2015). Consistent, responsive, and warm parenting (i.e., authoritative parenting) is associated with a lower prevalence of child obesity (Anderson, Gooze, Lemeshow, & Whitaker, 2012; Connell & Francis, 2014; Rhee, Lumeng, Appugliese, Kaciroti, & Bradley, 2006). Longitudinal research has identified an association between the quality of parent-child interactions and child obesity (Anderson et al., 2012; Rhee et al., 2006; Wu, Dixon, Dalton, Tudiver, & Liu, 2011). Children whose parents were authoritarian in their parenting (i.e., exhibited low sensitivity and high demandingness) in early childhood were at the highest risk for being overweight during middle childhood (Rhee et al., 2006). Similarly, the odds of obesity at age 15 years is 2.45 times higher for children experiencing lower maternal sensitivity during early childhood (Anderson et al., 2012).

The impact of the parent-child relationship on health outcomes such as obesity in high-risk families has been posited to occur through at least three mechanisms. In the first, fostering a nurturing parent-child relationship leads to increased positive parent-child interactions broadly, which in turn fosters the development of adaptive social and emotional functioning, such as self regulation, in the child (Morris et al., 2017). The development of adaptive biobehavioral responses to stress may protect children from the insidious effects of poverty. In other words, a healthy parent-child relationship may thereby buffer some of the negative impact of environmental stressors on children's health outcomes through the fostering of self-regulation. In addition to this link, a second mechanism has been proposed by Saltzman et al. (2017) in their seminal Pathways to Appetite Self-Regulation Model. Saltzman et al. posit that an additional mechanism linking high parent-child attachment security to reduced obesity risk is through feeding-specific parenting practices and appetite-specific self-regulation. In other words, secure parent-child attachment predicts responsive feeding practices and therefore fosters appetite self-regulation in children. It is not yet known whether appetite self-regulation is distinct from a child's overall self-regulation capacities. Based on the work of Morris et al. (2017) and Saltzman et al. (2017), addressing parenting influences on both self-regulation and appetite self-regulation is warranted.

Finally, it has been posited that specific health-related parenting practices (i.e., limiting sugar-sweetened beverages, limiting screen time, promoting physical activity) may have differential impact on child obesity risk depending on the parent-child relationship dynamics (Zeller, Boles, & Reiter-Purtill, 2008). That is, children may not be receptive to changing or adhering to parent requests for health-promoting behaviors if the parent has a history of harsh or inconsistent parenting (Zeller et al., 2008). Conflict between parents and children can be higher in stressed families, such as those who experience greater economic disadvantage (O'Connor et al., 2015), and therefore may contribute to differential obesity risk in these populations. Similarly, child temperament is linked to effectiveness of certain parenting practices; children with difficult temperaments are at greater risk for obesity (Tate, Trofholz, Rudasill, Neumark-Sztainer, & Berge, 2016). Thus, given the role that parenting style seems to have on reducing child obesity risk, it has been recommended that prevention efforts include a focus on increasing warm, responsive, and consistent parenting (Anderson & Keim, 2016; Bergmeier, Skouteris, Horwood, Hooley, & Richardson, 2014a; Bergmeier, Skouteris, Horwood, Hooley, & Richardson, 2014b; Skouteris et al., 2011; Skouteris et al., 2012;

Sleddens, Gerards, Thijs, de Vries, & Kremers, 2011). Prevention efforts that improve the parent-child relationship and parenting are critical for children from impoverished backgrounds.

3. Child obesity prevention to date

Few prevention interventions demonstrate success in changing obesogenic behaviors in children (Wang et al., 2015), and none have yet to evidence a lasting prevention of excess weight gain (Yavuz, Ijzendoorn, Mesman, & Veek, 2015). The few *treatment* interventions that have been successful in *reducing* weight in obese children have high parental involvement and target child behavior management (i.e., general parenting strategies; Magarey et al., 2011; Robertson et al., 2008; Stark et al., 2011; West, Sanders, Cleghorn, & Davies, 2010). Over the past decade, prevention programs have attempted to change general parenting practices to prevent child obesity (Haines et al., 2016; Harvey-Berino & Rourke, 2003; Østbye et al., 2012). Despite parental participation in such efforts, there is limited evidence that obesity prevention programs are effective. A potential reason for the limited efficacy is *which* aspects of parenting are addressed in the intervention. Child obesity prevention programs have attempted to change parental *knowledge* of dietary and physical activity guidelines (Skouteris et al., 2011); a small number of prevention efforts have targeted general parenting practices (Gerards, Sleddens, Dagnelie, de Vries, & Kremers, 2011), but none, to date, have explicitly targeted improving the parent-child relationship via increasing responsive and warm parent-child interactions to prevent child obesity. This is despite the compelling rationale that the quality of the parent-child relationship plays a role in the prevention of obesity, and that parenting style, more so than feeding practices, is predictive of child BMI in longitudinal research (Shloim et al., 2015).

There have been intervention trials that seek to address parent *feeding responsiveness* (i.e., feeding style) to prevent child obesity. These prevention efforts (e.g., Aboud, Shafique, & Akhter, 2009; Daniels et al., 2012; Savage, Birch, Marini, Anzman-Frasca, & Paul, 2016) have focused on infant feeding but did not target general parenting responsiveness—which is distinct from feeding responsiveness. In a study of parent-child dyads from low-income households who received a family intervention to promote effective (non-feeding specific) parenting (Brotman et al., 2012), even though obesity was not addressed in the intervention and child height and weight were not assessed at baseline, an unintended effect was found on child obesity: in two separate RCT studies, children in the intervention conditions had significantly lower BMI at follow-up (three to five years after the intervention) compared to children in the control condition (Brotman et al., 2012). These findings, taken together with the literature on the associations between parenting and child obesity, strongly support improving parent-child interactions in general and feeding-specific contexts to prevent obesity in young children.

Few interventions exist that attempt to reduce screen time in children under age six years (Schmidt et al., 2012). The screen time reduction interventions that have been developed either did not measure child BMI as the outcome or did not reduce obesity risk, with one exception. Epstein, Roemmich, Robinson, et al. (2008) used electronic monitors to automatically track families' television use and shut off televisions. Children four to seven-years-old were also incentivized to reduce their own screen time. Though successful in reducing screen time and children's BMI z-scores, it is unclear how feasible or sustainable using electronic television monitors would be on a large scale. To date, no screen time reduction interventions have attempted to change parenting style or general parenting practices as a way to reduce young children's obesity risk.

4. Parent-child interaction therapy

Parent-Child Interaction Therapy (PCIT) is an evidence-based

behavioral family intervention designed to improve the behavior regulation of children ages thirty months to seven years, enhance parenting effectiveness, and improve the quality of the parent-child relationship. Numerous studies have demonstrated the clinical efficacy of PCIT (Niec, Barnett, Prewett, & Shanley Chatham, 2016; Nixon, Sweeney, Erickson, & Touyz, 2003; Schuhmann, Foote, Eyberg, Boggs, & Algina, 1998) and maintenance of treatment gains as far as six years after treatment completion (Hood & Eyberg, 2003). Attachment theory and social learning theory underlie the PCIT approach, which is implemented in two phases (Eyberg & Funderburk, 2011; Niec, *in press*). During the first phase, Child-directed Interaction (CDI), parents learn child-centered interaction skills to enhance the parent-child relationship. During the second phase, Parent-directed Interaction (PDI), parents learn developmentally appropriate discipline skills. PCIT uses *in vivo* coaching in both CDI and PDI phases to facilitate parents' behavior change. That is, therapists provide live, immediate feedback to parents while they practice the skills during play interactions with their children. Therapists use behavioral principles such as modeling, reinforcement, and differential attention in their coaching to shape parents' behaviors (Shanley & Niec, 2010). Standardized, validated behavior observation measures are used throughout PCIT in order for treatment to be tailored to the needs of each parent-child dyad. Through behavioral assessment and personalized coaching, parents learn to use effective strategies to manage their children's behaviors and promote self-regulation. Because PCIT was designed specifically to be tailored to individual families, PCIT flexibly addresses differences not only in parenting styles but also in children's temperaments (Eyberg, 2005). One of the primary goals of PCIT is to help parents to develop an authoritative parenting style, using warm, responsive parenting in the context of developmentally appropriate limits. PCIT has been implemented in a variety of abbreviated formats while maintaining its positive outcomes for children and parents (Berkovits, O'Brien, Carter, & Eyberg, 2010; Niec et al., 2016; Nixon et al., 2003).

5. PCIT and childhood obesity prevention

To address the existing gap in the literature regarding obesity prevention, we adapted our prevention format of the model (PCIT-Selective Prevention; Acevedo-Polakovich et al., 2014; Niec et al., 2014) to create an intervention that would target (1) the parent-child relationship and (2) parenting efficacy both in general daily contexts and specifically in the context of obesity risk-related behaviors (e.g., child feeding, family mealtime, and child screen time). PCIT is specifically suited to addressing childhood obesity risk in a number of important ways. It is assessment driven, using actual standardized observation of parent and child behavior to tailor treatment to a specific family's needs; it targets specific factors related to obesity risk; and it includes therapeutic techniques that have demonstrated successful and lasting change in parents' and children's behaviors.

Our adapted prevention intervention, PCIT-Health, maintains all the core components of PCIT (e.g., behavioral assessment, *in vivo* coaching, relationship enhancement, and discipline skills), and adds an intervention module (Health Directed Interaction; HDI) to specifically target obesity risk in children ages two up to seven years of age (see Table 1). During the first two phases of the intervention (CDI & PDI), while parents are learning effective parenting strategies with a primary focus on general behavior problems, therapeutic coaching begins to help parents to identify children's health-related behaviors and to shape healthy choices (e.g., praising children's activity and selection of healthy food toys).

Consistent with the first two phases of PCIT, the HDI module consists of one teaching session followed by coaching sessions. In the HDI teaching session, therapists provide psychoeducation about positive parenting in domains specific to children's weight-related behaviors: parental feeding style and feeding practices and parenting around screen time (i.e., media parenting). For example, parents learn about

Table 1
Overview of the PCIT-Health Model.

Intervention Phase	Sessions	Primary Target	Behavioral Objectives	Session activities		
Assessment	1. Assessment 1	Understanding of parent-child relationship quality and family-related risks for obesity	Obtain measures of parent and child functioning and child obesity risk	During Assessment 1, a clinical interview and administration of parent-report measures is recommended. These measures include: Behavior Assessment System for Children (BASC-3; Kamphaus & Reynolds, 2015), PSI-IV-SF (Abidin, 2012), and Eyberg Child Behavior Inventory (ECBI; Eyberg & Pincus, 1999). During Assessment 2, observational assessments should occur, using the Dyadic Parent-Child Interaction Coding System (DPICS; Eyberg, Nelson, Ginn, Bhuiyan, & Boggs, 2014).		
	2. Assessment 2					
CDI	3. CDI Teach	Parent-child relationship quality	Parents acquire skills in child-centered interaction and differential attention	Comparable to PCIT CDI sessions, in terms of activities. One notable difference is that during the CDI coach sessions, children have access to a wider range of toys that permit opportunities to reinforce healthy eating (e.g., plastic fruits and vegetables) and physical activity (more animals and dolls that can move large body parts).		
	4. CDI Coach Session					
	5. CDI Coach Session					
	6. CDI Coach Session					
	7. PDI Teach					
	8. PDI Coach Session					
PDI	9. PDI Coach Session	Parents' healthy limit-setting	Parents acquire developmentally appropriate, consistent, and effective discipline skills	As with CDI, PDI is identical to the PDI phase of PCIT-Selective Prevention (Niec et al., 2014).		
	10. PDI Coach Session					
	11. HDI Teach					
	12. HDI Coach Session					
HDI	13. HDI Coach Session	Generalization of parents' child-centered and behavior management skills to obesity-risk contexts	Parents consolidate skills and apply them to contexts salient to obesity risk (e.g., meal times, media use)	Parents receive psychoeducation about positive parenting practices in domains specific to children's weight-related behaviors: parental feeding practices and parenting around screen time (i.e., media parenting) in HDI Teach. Three coaching sessions will focus on two primary contexts where children are socialized around eating and activity: (1) family mealtime (in the clinic) and (2) unstructured child play/free time (in the clinic). A final coach session will coach parents in practicing HDI skills in the community (e.g., at a restaurant).		
	14. HDI Coach Session					
	15. Graduation				Review of treatment gains, discussion of approaches to future behavior problems, celebration of successes.	Prepare parents for future behavioral challenges

Note. CDI = Child-directed Interaction, PDI = Parent-directed Interaction, HDI = Health-directed Interaction.

the importance of using an authoritative feeding style (versus a permissive feeding style; Vollmer & Mobley, 2013) and of avoiding restrictive feeding practices (Hoerr et al., 2009) to foster healthy child eating behaviors and reduce obesity risk.

Additionally, parents are trained to use healthy and adaptive screen media (e.g., TV, tablet/mobile device use) parenting practices, such as active mediation and restrictive mediation. Active mediation consists of actively processing the content of TV shows and other preferred screen media with the child, whereas restrictive mediation consists of setting limits on when the child watches TV or other screen media (e.g., during mealtime), where the child has screen media (e.g., in the bedroom) and the content that the child is exposed to (e.g., commercials; Nathanson, 2001; Valkenburg, Krmar, Peeters, & Marseille, 1999). Targeting parental mediation is especially important given that watching commercial TV, having a TV in the child's bedroom and using TV during mealtime all have been associated with greater child obesity risk (Strasburger, 2011). The three HDI coaching sessions focus on reinforcing these parenting skills and practices in two primary contexts where children are socialized around eating and activity: (1) family mealtime and (2) unstructured child play/free time. In the final session, parents are coached to use their new HDI skills in the community (e.g., at a restaurant).

PCIT-Health aims to intervene on an obesity risk factor that has yet to be targeted in obesity prevention efforts with low-income families: parent-child relationship quality. Child obesity prevention strategies typically pursue a “uni-directional and top-down approach” to address the influence of parents (i.e., targeting specific parent practices or their beliefs) on child weight-related behaviors. The dyadic level of influence has yet to be the focus of prevention (Skouteris et al., 2012). Although recent prevention efforts have drawn from or adapted parent training programs, the PCIT treatment model differs from those by giving equal focus to the improvement of the parent-child relationship and the development of parents' behavior management skills (Eyberg & Funderburk, 2011). Preliminary evidence suggests that both of these targets are associated with obesity (Anderson & Keim, 2016; Brotman et al., 2012), and thus should be included in a prevention intervention. PCIT also includes the child in treatment, both in session and during daily homework assignments. In contrast to parenting interventions that focus on didactic, video review, or role play as the primary techniques to bring about change, in PCIT, parents rehearse new skills weekly in session through live interactions with their children (Niec et al., 2016). This active practice facilitates parents' skill development and influences the parent-child dyad. Active practice is one of the key components that has been found to increase effect sizes in the acquisition of parenting skills (Kaminski, Valle, Filene, & Boyle, 2008).

PCIT-Health is also innovative in its application of a highly effective therapeutic technique—in vivo coaching—to obesity prevention. During PCIT-Health parent-child interactions, the therapist coaches the parent either within the interaction room (quietly from behind the parent's shoulder) or from an observation room with a one-way mirror, while the parent wears a radio frequency earphone. This provides the opportunity for parents to receive immediate therapeutic feedback on interactions with their child. Coaching has been shown to be a powerful mechanism in the development of parents' skills (Shanley & Niec, 2010) and PCIT has fostered parenting change in low-income and racially/ethnically diverse families (Capage, Bennett, & McNeil, 2001; Matos, Bauermeister, & Bernal, 2009; McCabe, Yeh, Lau, & Argote, 2012). During PCIT-Health, parents also receive live coaching in obesity-relevant contexts, such as family mealtime and child screen time. Parents are coached to generalize their child-centered skills and to use an authoritative feeding style wherein the parent is responsive to the child and to his/her satiety cues. Parents are coached in avoiding the use of feeding practices associated with obesity risk such as instrumental feeding, emotional feeding, and coercive feeding, or pressuring the child to consume more food. To give an example of coaching around feeding, a parent may say something such as, “You can't leave the table

until you eat two more bites.” In that case, the PCIT-Health therapist would use behavioral principles to help shape the parent's healthy feeding practices.

As with promoting responsive feeding practices in the HDI Teach session, parents are also provided with guidance on parenting around screen time. Parents learn about the importance of setting content restrictions (i.e., how to limit exposure to advertising) and restrictions on screen time in the bedroom and during mealtime. Additionally, during the HDI-Teach session, parents are informed about the importance of parent-child interaction during screen time (i.e., actively mediating content) and in ending screen time (which can be quite conflictual in media-saturated homes). During the HDI coaching sessions involving child screen media use, parents are coached to actively mediate children's media use and restrict access to unhealthy media content (e.g., commercials). Parents are also coached to successfully transition children away from screen time to other non-screen based activities (e.g., those that involve physical activity or movement), which is particularly important given the links between screen time and child obesity (Strasburger, 2011). Utilizing these techniques to facilitate behavior change of general and obesity-specific parenting practices has yet to be pursued in obesity prevention.

It is important to note that one obesity *treatment* intervention has used in vivo coaching—but not the PCIT model—to help parents increase healthy feeding practices. As part of the Family Mealtime Coaching program (Shinn, Timmer, & Sandoz, 2017) parents are coached to be responsive in their feeding during mealtime. The Family Mealtime Coaching (FMC) program did not focus on obesity prevention (only treatment) and did not include the PCIT two-phase model in which parents learn both child-centered interaction strategies and healthy, developmentally appropriate limit setting. Further, the FMC model focuses on feeding practices and children's physical activity and does not include coaching around children's screen time use. However, the FMC's success in reducing BMI percentiles (in children with BMI percentiles greater than 97th percentile at baseline) indicates that coaching may be a beneficial component to obesity prevention via PCIT-Health.

6. Health versus weight

The focus of the PCIT-Health intervention is on increasing children's healthy behaviors (e.g., eating nutrient-dense foods). At no point in the protocol are therapists directed to tell parents their children are at risk for obesity nor do therapists share children's BMI or BMI category. In accord with the recommendations of the Health at Every Size movement (HAES; Bacon & Aphramor, 2011), the focus of PCIT-Health is not weight loss, but rather, fostering healthy parent-child interactions outside of, and during, mealtime as well as a child's screen time. It has been argued that focusing on weight loss can be stigmatizing, and there should be a shift from a focus on weight to a focus on increasing health behaviors (e.g., reducing sedentary behaviors; Dollar, Berman, & Adachi-Mejia, 2017), which is consistent with the PCIT-Health model.

7. Future directions

The theoretical links between childhood obesity risk factors and the mechanisms addressed through PCIT suggest that PCIT-Health has the potential to reduce children's risk for obesity. The next steps in the development of PCIT-Health include an evaluation of the model for children with significant risk for developing childhood obesity. Children at significant risk are those at or below the federal poverty line (adjusted for family size), with BMI between the 85th and 95th percentile (i.e., overweight but not obese), and whose parents report elevated parenting stress (measured by Parenting Stress Index-Short Form-IV, PSI-IV-SF > 85th percentile; Abidin, 2012). To test the efficacy of PCIT-Health a randomized controlled trial is necessary. Given the long-term health consequences of obesity and the current lack of a robustly

effective prevention intervention, a wait-list control is suggested. Both immediate and long-term (over several years) follow-up measurement of target outcome variables is imperative. In addition to the primary dependent variable of child BMI z-score, secondary outcome variables are important to assess. For example, given the goal of changing obesogenic parenting practices via PCIT-Health, we recommend that parents are administered the Child Feeding Questionnaire (Birch et al., 2001), to assess whether parents are using coercive or restrictive feeding practices. We also recommend that researchers assess changes in media parenting practices, using a measure of parental mediation of television (e.g., Valkenburg et al., 1999) and a measure of other types of parenting practices around newer media (e.g., Wartella, Rideout, Lauricella, & Connell, 2013). It is also valuable for investigation to examine the differential effects of changing responsive parenting (i.e., general parenting style) versus feeding responsiveness (e.g., feeding style) on child health outcomes. To do so, a comparison of the standard PCIT model to the PCIT plus Health-directed Interaction module would be useful.

8. Potential challenges to testing PCIT-health

As with any intervention that seeks to change behaviors in high-risk families, the potential exists that parents will terminate treatment prematurely. However, attrition from parenting interventions tends to be lower than from general child psychotherapy, and attrition from PCIT is typical or lower than other parenting interventions (e.g., Niec et al., 2016; Niec, Hemme, Yopp, & Brestan, 2005). To foster enrollment and retention in PCIT-Health, we would recommend strategies implemented in evaluations of standard PCIT such as offering free child care and reducing barriers to transportation. It is also recommended that investigators address barriers that are specific to an intervention for families with obesity risk such as parents' own eating behaviors and screen time. For example, parents' modeling the consumption of nutrient-rich foods and limited screen time use (including phone use) for their children may impact children's behaviors. In the HDI teach session, the concept of modeling is reviewed, but parents may struggle with changing their own behaviors. It will be important for PCIT-Health interventionists to validate parents' struggles with making their own behavior change, but also problem solve around ways to make small changes to their diet and activity.

9. Conclusion

Childhood obesity is a serious public health problem that disparately impacts children from economically disadvantaged backgrounds. To date, prevention efforts have not demonstrated lasting success at reducing childhood obesity risk. Increasing evidence supports the link between the quality of the parent-child relationship and the level of childhood obesity risk. Mechanisms that have been posited to play a role in this link include parent responsiveness, parent behavior management skills, and child behavioral and emotional regulation. Given these mechanisms, the logical place to delve the literature for a potential prevention model for childhood obesity is the parenting intervention literature. Our exploration led to parent-child interaction therapy, an evidence-based behavioral family intervention that not only effectively targets these key risk mechanisms for childhood obesity, but also uses an innovative strategy for behavior change—therapist in vivo coaching—that has demonstrated lasting impact on parenting behavior. Our adaptation of PCIT into a childhood obesity prevention intervention (PCIT-Health) addresses the empirically based links between parent-child relationship quality and obesity risk. This assessment-driven intervention is designed not only to build parents' general behavior management skills and to improve the parent-child relationship, but also to help parents to shape their children's health behaviors in contexts relevant to obesity risk. An intervention with demonstrated success at making long-term improvement in both children's and

parents' behaviors is a promising place to begin making significant change in children's risk for obesity.

Conflicts of interest

There are no conflicts of interest to report.

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