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Comparative costs of a parent-only and parent and child treatment for children with overweight or obesity

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Abstract

OBJECTIVE: Models such as Family-based treatment (FBT), delivered to the parent and child, is considered the most efficacious intervention for children with obesity. However, recent research suggests that Parent-Based Treatment (PBT; parent-only treatment), is noninferior to FBT. The aim of this study was to evaluate the comparative costs of the FBT and PBT models.

METHODS: 150 children with overweight and obesity and their parent were randomized to one of two 6-month treatment programs (FBT or PBT). We collected data at baseline, during treatment, and post-treatment and conducted a trial-based analyses of the costs from a health care sector perspective and a limited societal perspective.

RESULTS: Results suggest that PBT, compared to FBT, had lower costs per parent-child dyad from the health care sector perspective (PBT=\$2,886; FBT=\$3,899) and from a limited societal perspective (PBT=\$3,231; FBT=\$4,279).

CONCLUSION: These findings suggest that a PBT intervention has lower costs and is non-inferior to an FBT intervention for both child and parent weight loss.

Table of Contents Summary:

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Author Contributions: Kerri Boutelle, had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. David Strong and June Liang conducted the analyses for this manuscript.

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- This study shows that a child weight loss program provided to the parent alone has lower overall costs than a program delivered to a parent and child.

Keywords

obesity; family-based treatment; child; cost-effectiveness

Introduction

Childhood obesity is a serious public health concern as one-third of children in the US have overweight or obesity¹ and the prevalence of obesity in children is expected to double by 2030.² Childhood obesity is associated with significant comorbidities across the lifespan and the majority of children with obesity will have obesity in adulthood.^{3–5} Studies show that compared to healthy weight children, children with obesity have higher health care costs and utilization.^{6–9} Since obesity affects millions of children, tracks from childhood to adulthood, and is associated with significant medical comorbidities and cost, the development of cost-effective interventions for children with overweight or obesity is imperative.

The U.S. Preventive Services Task Force recommends screening and referral for children with overweight and obesity to moderate- to high-intensity programs that involve >25 hours of contact focusing on three components; diet, physical activity, and behavioral counseling.^{10–13} Family-based therapy (FBT) is a model that is delivered to the parent and child and data suggests that 30% of the children are no longer overweight in adulthood.^{14, 15} FBT includes a combination of separate child and parent groups with individualized behavioral coaching.¹⁶ Implementing FBT requires multiple staff to lead groups and meet with families individually, which is most likely beyond the capacity of most clinics. To date, two studies have evaluated alternative formats for providing FBT in an effort to make it more cost-effective and to improve dissemination. In both of these studies, children attended treatment sessions, so it is unclear whether providing treatment to parents only would yield a more cost-effective intervention.

Emerging data on FBT programs for parents without their child (Parent-Based Therapy; PBT) suggest that PBT programs are as effective as or noninferior to FBT programs.^{17–19} Naturally, PBT programs would require less staff than FBT programs since only the parent attends treatment. To date, the only study that compares the program costs of PBT and FBT shows that a 4-month PBT program is more cost-effective than the same length FBT program.²⁰ In this study, only program costs were utilized, which included personnel, weekly supervision, materials, incentives, food, and travel. Total cost per child for the interventions in this study were \$521 (PBT) and \$872 (FBT), respectively. However, this study was conducted with only medically underserved rural families, included only treatment costs, and did not include the individualized meetings to enhance groups. There are many other costs associated with a family participating in treatment, such as childcare, time off of work, and travel costs. More data is needed from more diverse populations with larger samples to capture more of the costs associated with PBT and FBT programs.

Thus, the goal of this study was to evaluate the comparative cost of two protocols for the delivery of a 6-month treatment program for children with obesity and their parents: PBT and FBT. We conducted a trial-based analyses and present comparative costs from both a health care sector perspective and a limited societal perspective (health care sector+participant costs).

Methods

Study Design.

The Family, Responsibility, Education, Support and Health (FRESH) study was a randomized controlled noninferiority trial that compared two 6-month treatments for children with overweight or obesity: FBT (provided to parent + child) and PBT (provided to parent-only). The FRESH study was conducted in the greater San Diego, California area and details of the study design, sample and primary weight outcomes have been published elsewhere.^{18, 21} The institutional review boards of University of California, San Diego, and Rady Children's Hospital, San Diego, approved the study. Written consent was obtained from parents and written assent was obtained from the children.

Intervention.

Child-parent dyads were randomly assigned by gender of the child to PBT or FBT. The 6-month treatment programs were provided over 20 visits and included diet and physical activity recommendations, parenting skills, and behavior therapy components.²² Parents in both PBT and FBT attended a one-hour parent group and children in FBT attended a one-hour simultaneous child group. Parents in PBT and parents and children in FBT also attended 30-minute meetings with a behavioral coach on the same evening, either before or after group. Children in PBT did not attend any treatment visits.

Participants.

One hundred fifty children with overweight or obesity and their parent were recruited through primary care physicians, schools, listserves and advertisements.

Inclusion criteria included a child between 8–12 years of age with a BMI between the 85th and 99.9th percentiles and a parent with overweight or obesity (BMI>25) who could read English at a minimum of a fifth-grade level. Exclusion criteria included child diagnosis of a serious physical disease, child physical limitations, parent or child major psychiatric disorder or family with food restrictions. Demographics of the sample are presented in Table 1.

Anthropometric Measures.

Height and weight were measured in duplicate for both child and parent at baseline and post-treatment. The average of the two values was used to calculate Body Mass Index (BMI=[kg/m²]). For children, BMI, age-adjusted BMI percentile (BMI%) and standardized BMI (BMIz) were calculated.²³

Cost calculations.

The primary outcomes paper for the FRESH study showed that PBT was noninferior to FBT for children or parents.¹⁸ Thus, in these analyses, we focused on the comparative costs of each treatment. We used micro-costing methods,²⁴ including cost-capture of staffing time and overhead, and monthly surveys from families for the actual costs of attending treatment, including mileage, lost wages and child care costs.

Analysis

The comparative cost analysis was conducted from both a health care sector perspective and a limited social perspective. The focus of this study was on incremental cost of PBT, rather than cost-effectiveness ratios, since the effectiveness of PBT was demonstrated to be noninferior to FBT for children and parents.¹⁸ We compared estimated average costs of delivering the two treatments. We account for attendance by only including participant costs from the visits that were attended by each family.

Results

Health care sector costs (treatment).

Computed treatment costs included both overhead and staffing costs for the year 2013. Overhead costs included rent, laptop, projector, white screen, stadiometer and scale. PBT utilizes one conference room (510 sq ft) while FBT utilizes two conference rooms (510 sq ft each). Rent is calculated per square foot for conference rooms, offices (80 sq ft) and private weighing rooms (48 sq ft) for only the hours used by the treatment program (20 visits). Overhead costs also include cost of white screens, projector and laptop for presenting material (two for FBT, one for PBT), stadiometer and scales (two for FBT, one for PBT), self-monitoring booklets (one for each parent and child per week), and manuals (230 pages for parents, 87 for child for FBT, and 230 pages for parents in PBT).

Staffing costs included costs for leading groups, behavioral coaching, weighing participants, copying materials and setting up for groups, reviewing self-monitoring booklets and homework, supervision and training were included. Staffing costs for 15 child-parent dyads (for FBT) or 15 parents (PBT) were calculated from hourly salary and benefits using the Bureau of Labor Statistics 2013 Standard Occupational Classification System (psychologist 19–3030; masters in family therapy 21–1013; social science research assistant 19–4060), and include the mean salary as well as the 10–90% confidence limits. Costs were included for leading parent group for PBT and FBT, leading child group for FBT (two staff), 30 minute behavioral coaching for all families in both groups, 30 minutes of scoring self-monitoring booklets and emailing for all families in both groups, and weighing participants, copying materials and setting up for groups. Staffing for FBT included a psychologist and a masters level therapist to lead the parent group (1 hour) with time allotted for preparation (30 min), two masters level therapists to lead the child group (1 hour) with time allotted for preparation (30 min), four bachelor level behavioral coaches (30 min), 30 minutes for all staff (8 total) to score self-monitoring booklets and email families, and two bachelor level staff time to weigh participants, copy materials and set up for groups (60 min). Staffing for PBT included a psychologist and a masters level therapist to lead the parent group (1

hour) with time allotted for preparation (30 min), six bachelor level behavioral coaches (30 min), 30 minutes for all staff (8 total) to score self-monitoring booklets and email families, and one bachelor level staff to weigh participants, copy materials and set up for the parent group (60 min). Each group leader and coach in both PBT and FBT were allotted 30 minutes for preparation for treatment groups and review participant self-monitoring booklets and homework. Weekly 90 minute supervision meetings for FBT and 60 minute supervision meetings for PBT included all treatment staff. During these supervision meetings, the staff collectively reviewed the child's progress and parents' progress in the PBT or FBT program and problem solved any barriers to adherence to treatment. At each supervision meeting, material for the following week was also reviewed to maintain staff knowledge and fidelity. Finally, the costs for a single 8 hour training was included for both PBT and FBT and included all treatment staff and the senior psychologist (PI). Since this was a research study, there are research staffing costs associated with recruitment and assessment, including a 50% recruitment staff member and a 50% assessment staff member to recruit and assess prior to randomization (total = \$19,123.20). These costs are not included in this analyses as the majority of these costs were specifically focused on screening inclusion/exclusion criteria, orienting families to the study, and consenting. Recruitment costs occur prior to randomization and are not differentially associated with either group.

Limited societal costs.

Parents completed a questionnaire weekly in which they reported round-trip mileage, child care costs, travel time as well as time for missed work or household activities. Fuel cost was computed on the basis of mileage and the Internal Revenue Service standard rates (2013).²⁵ Lost wages were calculated based on average hourly wage rate of US adults from the Bureau of Labor Statistics. Childcare costs were calculated using 2013 average rates for San Diego. Treatment utilization was collected from study visit attendance records. Only costs for sessions attended were included. Participant costs and limited societal costs (participant+ health care sector costs) were computed.

Overhead and material costs, staffing costs, health care sector costs, participant costs, and limited societal costs per child-parent dyad are included in Table 2. Details regarding costs of overhead are included in Supplemental Table 1 and details regarding costs of staffing, including mean salary and 10–90% salary confidence limits are included in Supplemental Table 2. Attendance of more than 10 of 20 sessions was observed in 82% and 67% of families in FBT and PBT respectively.¹⁸ Results showed that the calculated costs for PBT per child-parent dyad were lower from both perspectives (health care sector PBT-FBT = -\$1,013; limited societal PBT-FBT = -\$1,048).

Discussion

To date, a number of studies have shown that PBT programs are similarly effective as or noninferior to FBT programs for children with overweight or obesity.^{17–19} In this study, FBT cost 26% more from the health care sector perspective and 24% more from the limited societal perspective compared to PBT. As PBT was found to be non-inferior to FBT on child

and parent weight loss,¹⁸ and less expensive from both the health care sector and limited societal perspectives, PBT should be considered one of the primary models moving forward.

In this study, PBT costs were based on parent treatment groups occurring in the evening, similar to the parent and child treatment groups in FBT. However, because the child does not attend treatment, it is possible that PBT groups can be offered at other times of the day or on the weekends, which may ultimately reduce PBT costs further. Additionally, PBT offers the flexibility for groups to be held in other settings, such as worksites, community centers, gyms or online. Families with 8–12 year-old children are often busy with school activities, sports and extracurricular activities for the target child and their siblings. FBT can be difficult for some families to attend, because groups are only offered at specific times and requires the coordination of both the parent and the child's schedule. Since this was a randomized controlled trial, we were unable to evaluate whether the added flexibility in scheduling PBT groups would be more cost-effective for families.

PBT and FBT costs were also based on the current gold-standard FBT program, which includes both group and individual behavioral coaching.²⁶ However, emerging data suggests that other less intensive models may be similarly effective. Preliminary data suggests that a guided self-help program (gshFBT) which provides only 5 hours of intervention, compared to the more than 30 hours of intervention in FBT, is a promising model to be considered. Future research is needed to compare the clinical and cost-effectiveness of gshFBT compared to PBT and FBT, and whether a parent-only model of gshFBT would be similarly effective. While FBT and PBT have been tested in group treatments, it is also possible to adapt the materials and provide these treatments to parent-child dyads individually, similar to how the treatment would be implemented in a primary care setting. In this case, it is possible that the costs of providing FBT and PBT would be more similar, but this needs to be researched further.

Although data suggests that PBT, compared to FBT, costs less and is noninferior to FBT for child and parent weight loss, it should be noted that two of our studies suggest that PBT could be less acceptable to families. Data from the primary paper shows that parents in PBT attended an average of 2 visits less than families in FBT and there was greater attrition in PBT compared to FBT during the early phases of treatment. However, similar number of parents in PBT and FBT reported that the program helped change their family and child's lifestyle, confirming that families perceived the effectiveness as similar. To address this differential drop out, we accounted for attendance in our analyses. Of course, the cost of treatment of families in groups should be relatively stable, however, the participant cost would vary based on attendance. Although clinical impact and the cost to treat a family are important, more research is needed to explore why PBT may be less acceptable to parents compared to FBT and if attendance would be similar if PBT was offered at more convenient sites or at more convenient times (e.g., in the workplace during the day).

Strengths of this study include the randomized design, micro-costing methods, evaluation of cost from both the health care sector and limited societal perspective, the diverse sample, the use of attendance in calculating cost-effectiveness, and the use of an efficacious treatment model. As in all studies, there are limitations that need to be considered. This study did

not collect medical utilization data for the child and parent, which might be salient as adult medical utilization for parents would likely be higher than that seen in children, offering prospect of more benefit from weight loss. This study did not assess the costs for the entire family, as there is most likely trickle down effects of the intervention to other family members at no additional cost. Also, average wage rates with 10–90% confidence limits and other clinical costs data were calculated, rather than collecting actual clinic cost data. This study was implemented with treatment seeking families with 8–12 year-old children with overweight and obesity with one parent who was overweight or obese, which limits generalizability, and did not include a control group which limits the understanding of the cost impact of both interventions.²⁷ We were unable to directly compare these interventions to other behavioral interventions, such as those in primary care. Since this was a research study, we did not include costs associated with pure clinical programs, such as attendance management strategies (automated reminders), front desk staff, and benefits staff. This study only calculated salary and benefits from the hours the staff worked, rather than yearly salaries and rent for the conference rooms and offices only during the hours used, rather than monthly. Finally, although the study examined some costs from the societal perspective, recent recommendations suggest that a full societal perspective analysis would strengthen future work in this area.²⁸

In summary, this study provides additional data suggesting that providing PBT has lower costs per parent-child dyad compared to a FBT treatment. Coupled with findings suggesting that PBT is noninferior to FBT, PBT should be considered one of the primary models to provide weight loss treatment for children and parents. Future studies should compare PBT to other behavioral insurance covered interventions, such as those in primary care, as well as medications and surgery, to identify the most cost-effective model, to ultimately inform insurance companies and policy makers.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Data Sharing Statement.

The authors support data sharing. All data summarized in this publication may be available in a deidentified format to other investigators for research purposes with the approval of the

principal investigators and the Institutional Review Board immediately after the publication of this article.

Abbreviations:

CHEAR	UCSD Center for Healthy Eating and Activity Research
BMI%	Body Mass Index percentile
FBT	Family-Based Treatment
FRESH	Family, Responsibility, Education, Support and Health
gshFBT	Guided self-help program
PBT	Parent-Based Treatment

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What's known about this subject:

- To date, only one study evaluated the program costs of a parent-only and a family-based treatment for children with obesity from medically underserved families in rural communities.

What this study adds:

- This is the first study to rigorously evaluate the comparative cost of a Parent Based Treatment and a Family Based Treatment for children with obesity from a health care sector perspective and a limited societal perspective.

Table 1:

Sample Characteristics

	PBT (n=75 child/parent dyads)	FBT (n=75 child/parent dyads)
	mean (SD)	mean (SD)
Child		
Age	10.43 (1.28)	10.39 (1.27)
<i>Gender(%)</i>		
Boys	33.3%	33.3%
Girls	66.7%	66.7%
<i>Ethnicity: (%)</i>		
Hispanic	42.5%	44.6%
Non-Hispanic Other	28.8%	20.3%
Non-Hispanic White	28.8%	35.1%
<i>Weight</i>		
BMI	26.56 (3.52)	26.13 (3.74)
BMIz	2.02 (0.36)	1.98 (0.32)
BMI%	97.11 (2.60)	97.02 (2.40)
Parent		
Age	43.21 (6.65)	42.59 (6.18)
<i>Gender (%)</i>		
Men	13.3%	12.0%
Women	86.7%	88.0%
<i>Ethnicity: (%)</i>		
Hispanic	30.7%	32.0%
Non-Hispanic Other	21.3%	18.7%
Non-Hispanic White	48.0%	49.3%
<i>Weight</i>		
BMI	32.11 (6.11)	31.70 (6.53)

Table 2.

Costs incurred during treatment per child-parent dyad in PBT and FBT

	FBT		PBT	
	Costs/Group (15 Families)	Cost/Child-Parent Dyad	Costs/Group (15 Families)	Cost/Child-Parent Dyad
Overhead & Material Costs/Group	\$28,960	\$1,930	\$17,823	\$1,188
Staffing Costs/Group *	\$29,522	\$1,968	\$25,471	\$1,698
Total Health Care Sector Costs	\$58,482	\$3,899	\$43,294	\$2,886
Average Participant Cost				
Total Mileage		\$73		\$53
Time Cost		\$290		\$251
Childcare Cost		\$17		\$41
Total Participant Cost		\$380		\$345
Limited Societal Cost (Payer + Participant Cost)/Child-Parent Dyad		\$4,279		\$3,231

* Mean salary

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