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Risk Factors for Poor Attendance in a Family-based Pediatric Obesity Intervention Program for Young Children

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Abstract

Objective—This study examined the role of demographic characteristics, psychological factors, and family functioning on attendance in a randomized controlled trial of a family-based pediatric obesity program.

Method—Participants included 155 children between the ages of 4 and 7 years (*M* age = 5.77, 57.4% female, 73.6% African-American, *M*BMI = 25.5) and their primary caregivers who were randomized to the treatment group. Three groups of participants were created based on their patterns of attendance during the program: 1) noncompleters, 2) partial completers, and 3) completers.

Results—Results indicated no differences among the attendance groups in child gender, child BMI, or child psychological functioning. Significant group differences were found with respect to race/ethnicity, parent marital status, and family income, such that noncompleters were more likely to be racial/ethnic minorities, to living in single parent households, and to have lower incomes than partial completers and completers. After controlling for the effects these socio-demographic risk factors, noncompleters and partial completers reported more family dysfunction characterized by high levels of disengagement than completers.

Conclusion—Adapting existing weight management programs to include a focus on family engagement in the early stages of treatment may help to improve participation in family-based obesity interventions targeting high risk, socio-economically disadvantaged youth.

Keywords

Childhood obesity; family-based intervention

Childhood obesity is a prominent worldwide public health concern. The prevalence of obesity has doubled among children and tripled among adolescents since 1980 and recent estimates indicate that nearly 19% of children ages 6 to 11 years are considered overweight.¹ Obesity in children and adolescents is consistently associated with a variety of serious medical problems, including adult obesity, high blood pressure, diabetes mellitus, atherosclerotic cerebrovascular disease, as well as some forms of cancer.^{2,3} Adverse psychosocial and economic outcomes (e.g., lower educational attainment, poorer self-image, depression, peer relationship problems, and poverty) have also been linked with obesity.^{4,5}

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A variety of social and environmental factors contribute to obesity in youth. These factors are frequently addressed in child and adolescent intervention programs, yet successful treatments for childhood obesity remain elusive. In a recent meta-analysis of obesity prevention programs for children and adolescents, significant intervention effects were found for only 21% of programs seeking to reduce weight gain.⁶ In general, behavioral treatment programs appear to produce larger and more long lasting effects compared to those without a behavioral modification component.⁷ There is also growing evidence that parental involvement in the treatment of childhood obesity may improve children's weight-related outcomes. This has led to an increase in the development of behavioral family-based treatment programs, most of which seek to address influences on weight such as how parents structure the child's home environment, reinforcement of eating behaviors and attitudes towards food, and perceptions of physical appearance.

Although the development of family-based programs is encouraging, poor attendance has been cited as a common challenge to successful obesity treatment in both research and clinical settings. Studies examining predictors of program attendance in adult populations suggest that demographic factors (e.g., gender, age, race) as well as psychosocial characteristics (e.g., depressive symptoms, low self-concept, stress) increase the risk for treatment drop out.⁸⁻¹⁰ Investigation of attendance in family-based programs has received less attention and is potentially even more complex, as participation is influenced by characteristics of the parent and family in addition to the obese child. Zeller and colleagues examined risk factors for drop out in a 16-week hospital-based pediatric obesity program and found that noncompleters were older, more likely to live in a single parent household, be Black, receive Medicaid, and to report greater child depressive symptomatology and lower self-concept.¹¹ Lower socioeconomic status and Black ethnicity have been found to predict attendance in other pediatric weight management programs.^{12,13} However, these demographic variables, as well as child psychological factors, have failed to differentiate between treatment completers and noncompleters in other studies.^{14,15}

Another factor of potential relevance to attendance in family-based pediatric obesity treatment programs is family functioning. Family relationships and interactional patterns affect not only how family members respond to the diagnosis of a child's health condition, but also influence subsequent health outcomes through their impact on disease management.¹⁶⁻¹⁸ Although family contextual factors have been found to be associated with the development and maintenance of childhood obesity, we are aware of no studies that have examined how modifiable family risk factors such as rigidity and disengagement relate to risk for poor attendance in the context of childhood obesity intervention. Consideration of the influence of family functioning represents an important yet understudied topic, given that programs that include parents and/or other family members appear to be particularly efficacious.^{7,19}

The present study was designed to add to the literature exploring predictors of program attendance in childhood obesity treatment by identifying demographic, psychological, and family factors that differentiate among participants based on their patterns of attendance in a structured face-to-face family-based pediatric obesity intervention program. Consistent with the literature, we hypothesized that participants who dropped out of treatment and those who did not attend sessions regularly would be more likely than treatment completers to be racial/ethnic minorities, to have lower family incomes, to be single parent households, and to report greater child internalizing (e.g., symptoms of anxiety and depression) symptoms and more child disruptive behavioral problems. Further, we predicted that family dysfunction would play a significant role in attendance beyond that accounted for by these demographic factors and child characteristics. Specifically, we expected that participants

who dropped out of treatment and those who did not attend sessions regularly would report greater family dysfunction than treatment completers.

METHODS

Participants

Data for the current study were drawn from an ongoing randomized controlled trial conducted at the University of Tennessee Health Science Center investigating the effectiveness of a family-based childhood obesity intervention program. For this larger study, children and their primary caregivers were recruited from private pediatric practices and community pediatric health care clinics and were randomized to intervention or control groups following protocols approved by the university Institutional Review Board. Eligibility criteria specified that children were between 4 and 7 years of age at screening, were English-speaking, had a BMI 85th percentile for age and sex norms, and did not have a disease or disability that would affect their ability to lose weight or participate in physical activity. Out of the 512 families referred for enrollment, 259 (51%) agreed to participate and completed a screening visit at which parents/legal guardians signed an informed consent. Of those screened, 9 did not meet eligibility criteria and 46 withdrew before their baseline (randomization) visit, leaving 204 participants that were enrolled and randomized in the study.

Given a randomization scheme of 3 intervention to 1 control participant, the current study included 155 children and their primary caregivers who were randomized to the intervention arm of the RCT. Parents of children in the control condition (N = 49) were provided an individualized diet and activity plan at their baseline visit (BV) based on the information they provided at the screening visit (SV), but did not attend intervention sessions. Sample characteristics are presented in Table 1. Participants were primarily African-American (73.55%) and approximately half were low SES (46.5% of families reported a total family income < \$30,000). Children were on average 5.77 years (SD = 1.12), and the majority (89.68%) had a BMI 97th percentile for their age and sex norms.

Procedure

Recruitment for this study was primarily thorough referral from private and community pediatric practices in the mid-south. Families wishing to participate were scheduled for a SV. The purpose of the SV was to obtain informed consent, reassess and confirm eligibility, obtain anthropometric measures and demographic, medical, nutritional, and psychosocial information. Approximately 2 weeks following the completion of the SV, participants completed a BV which included a physical exam, a Dual Energy Absorptiometry scan, collection of parental anthropometrics, provision of an accelerometer and instructions upon its use, and orientation to group assignment. All participants, regardless of group assignment, were scheduled to have follow-up clinic visits at 6, 12, 18, and 24 months that included the measures described above.

The six month intervention was presented in a 14-session (60 minutes each) curriculum, called Team PLAY (Positive Lifestyles for Active Youngsters) (see Table 2). The frequency of the sessions varied from weekly during the most intensive phase (sessions 1–8), to biweekly (sessions 9–12) and then monthly (sessions 13 and 14). While parents were being taught techniques that would promote healthy eating and increased physical activity, children participated in complementary physical activity sessions. The physical activity sessions were designed to be safe, fun and developmentally appropriate for young children. Equipment used in the physical activity sessions such as hoola hoops or bean bags were given to the child to take home in an effort to promote continued physically activity at home.

During the last 15 minutes of each group session, the parent/child pair came together for a session review and closure. To enhance the experience of the participants and increase the efficacy of the intervention, classes were developed to be culturally-sensitive and consider the participants' access to the program, environmental, financial, and cognitive barriers to diet and physical activity, and parental levels of literacy.

Measures

Height and Weight—Study staff trained in methods of obtaining accurate anthropometric measures obtained height and weight data. Participants were weighed and measured in street clothing without shoes. Height was measured in centimeters using a stadiometer as the distance from the soles of the feet to the top of the head with the person standing erect and looking straight ahead. Weight was measured in kilograms on a Detecto Balance Beam Scale, which was calibrated with fixed known standard weights weekly and certified annually by the local Bureau of Weights and Measures. Using these data, BMI was calculated as weight in kilograms divided by height in meters squared. Sex-specific BMI percentile for age was calculated using the US Centers for Disease Control and Prevention 2000 reference standards.²⁰ Consistent with American Medical Association guidelines²¹, children between the 85th and 95th percentile were considered overweight, and those at or above the 95th percentile were considered obese. Because the majority of children in our sample had BMIs over the 99th percentile, a standardized BMI score (zBMI) was calculated for each participant and this variable was used for data analysis.

Socio-Demographics—Primary caregivers completed a brief questionnaire assessing child characteristics (e.g., age, gender, race/ethnicity) and family socio-demographic characteristics (e.g., parent marital status and family income).

Attendance—Families were divided into three groups based on their attendance over the 14 intervention sessions. Families who attended 2 or fewer of the total scheduled sessions were considered 'noncompleters' ($n = 50$). Those who remained in the program but attended less than 2/3 of the sessions were labeled 'partial completers' ($n = 56$), while families who attended over 2/3 of the intervention sessions were considered "completers" ($n = 49$).

Several other variables were created to allow for closer examination of patterns of attendance in the intervention program. *Overall attendance* was calculated as the total number of sessions attended during the 6 month long intervention program (total possible sessions = 14). *Intensive phase attendance* was calculated as the total number of sessions attended during the first eight weeks of the intervention (total possible sessions = 8). *Biweekly phase attendance* was calculated as the total number of sessions attended when sessions took place every two weeks (total possible sessions = 4). *Monthly phase attendance* was calculated as the total number of sessions attended during the last two months of the program (total possible sessions = 2).

Family Functioning—Family functioning was measured using the Family Adaptability and Cohesion Evaluation Scales (FACES-IV), a self-report instrument designed to assess dimensions of cohesion and flexibility as outlined by the Circumplex Model of Marital and Family Systems.²² Respondents are asked to rate the extent of their agreement with 42 statements using a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). Responses are used to create two balanced scales and four unbalanced scales tapping the extremes of cohesion and flexibility. The four scales indicating family dysfunction were used for the current study, and included: Disengaged (e.g., "Family members seem to avoid contact with each other when at home"), "Family members are on their own when there is a problem to be solved"), Enmeshed (e.g., "Family members are too dependent on each

other”, Family members have little need for friends outside the family”), Rigid (e.g., “It is important to follow the rules in our family”, “Once a task is assigned to member, there is little chance of changing it”), and Chaotic (e.g., “We never seem to get organized in our family”, “It is hard to know who the leader is in this family”). Higher scores on these scales are indicative of greater family dysfunction. Previous versions of the FACES have demonstrated acceptable reliability and validity, and available psychometric information for the FACES-IV suggests that this newer version has similar psychometric qualities.²² In the present sample, internal consistency estimates for the four family dysfunction scales were as follows: Chaotic $\alpha = .85$, Disengaged $\alpha = .83$, Enmeshed $\alpha = .65$, and Rigid $\alpha = .65$).

Child Emotional/Behavioral Problems—The MacArthur Health and Behavior Questionnaire (HBQ) was used to assess children’s psychosocial functioning.²³ The HBQ is a comprehensive parent-report questionnaire measuring parent perceptions of children’s functioning across multiple domains, including mental health, physical health, social behavior and peer relations, and academic competence. The HBQ symptom scales used in the current study contained 75 items scored on a 3-point Likert scale (0 = “rarely applies”, 1 = “applies somewhat”, 3 = “certainly applies”). These items provided three scales scores: Internalizing Symptoms (computed as the mean of scores on the Overanxious, Depression, and Separation Anxiety subscales); Externalizing Symptoms (computed as the mean of scores on the Oppositional Defiant, Conduct Problems, Overt Aggression, and Relational Aggression subscales); and Attention-Deficit/Hyperactivity Disorder (ADHD) Symptoms (computed as the mean of scores on the Inattention and Impulsivity subscales). Evaluation of the HBQ’s psychometric qualities revealed that this instrument has high test-retest reliability and cross-informant agreement, as well as strong discriminant validity.^{23,24} Internal consistency estimates in the current sample for the three symptom scales were acceptable (Internalizing $\alpha = .77$, Externalizing $\alpha = .79$, and ADHD symptoms $\alpha = .83$).

RESULTS

On average, participants attended less than half of the scheduled intervention sessions ($M = 5.64$ sessions, $SD = 4.40$). Fifty families (32.3% of the total sample) dropped out of the program, with 30 of these failing to attend a single intervention session. Among the families who remained in the program, 56 (36.1%) attended less than 2/3 of the total number of sessions. Although 49 families (31.6%) attended over 2/3 of the scheduled sessions and were considered treatment completers, it is noteworthy that only 2 families attended all 14 sessions. Comparison of attendance rates during the various phases of the intervention revealed that attendance rates were higher during the initial intensive phase of the program (49.0% during the first 8 weeks when sessions occurred on a weekly basis) than during the less intensive phases (27.8% for the biweekly sessions and 30.0% for the monthly sessions) (Figure 1). Attendance during the initial 8 weeks of the program was significantly associated with attendance during the sessions occurring biweekly and monthly ($r = .76$ and $.59$, respectively, $p < .001$).

Chi-square analyses were conducted to test for possible differences in attendance as a function of the categorical demographic variables (i.e., child gender, race/ethnicity, parent marital status). Because our sample was primarily Caucasian or African American with few other minority groups represented, race/ethnicity was recoded as a dichotomous variable, with 0 = racial/ethnic minority, 1 = Caucasian, non-Hispanic. Likewise, to avoid having too few participants in the individual cells, parent marital status was recoded so that 0 = single parent household, 1 = two adults in the home. Results indicated no differences among the three attendance groups in child gender ($\chi^2(2) = 1.82$, ns). Significant differences between the groups were observed in terms of race/ethnicity ($\chi^2(2) = 11.88$, $p < .01$) and parent marital status ($\chi^2(2) = 11.36$, $p < .01$). Probing of this finding revealed that noncompleters

were more likely to be racial/ethnic minorities and to live in single parent households than partial completers and completers. However, these variables did not differentiate between partial completers and completers.

One-way analysis of variance (ANOVA) was used to test for group differences in family income and child characteristics. Significant differences between the attendance groups were observed in terms of income ($F(2, 154) = 5.16, p < .01$), such that noncompleters had lower incomes than partial completers and completers. No differences in income were found between partial completers and completers. Contrary to our hypotheses, findings from one-way ANOVAs yielded no significant attendance group differences with respect to child BMI ($F(2, 154) = 2.93, ns$), internalizing symptoms ($F(2, 144) = 0.25, ns$), externalizing symptoms ($F(2, 143) = 3.23, ns$), or ADHD symptoms ($F(2, 145) = 0.22, ns$).

One-way analysis of covariance (ANCOVA) was used to test for differences in family functioning between the three attendance groups, controlling for race/ethnicity, parent marital status, and income. Findings yielded no group differences in levels of family chaos ($F(2, 154) = 2.16, ns$), enmeshment ($F(2, 154) = 1.47, ns$), or rigidity ($F(2, 154) = 0.35, ns$). Significant group differences were observed with respect to disengagement ($F(2, 154) = 5.29, p < .01$). Follow-up tests indicated that noncompleters and partial completers had higher levels of disengagement than completers (13.10 and 11.86 versus 9.98, respectively), but no differences were found between noncompleters and partial completers (Table 2).

DISCUSSION

The current study examined demographic, psychological, and family factors that affect attendance in a family-based pediatric obesity intervention program. Our findings echo results of previous research suggesting that poor program attendance is a significant concern for pediatric obesity intervention efforts. Despite efforts to make the intervention accessible and attractive to participants (e.g., providing children with activity equipment, at each session, limiting weekly meetings to one hour, holding sessions in a central location), the overall participation rate in the intervention was only 40% and a third of families did not complete the program. Attendance rates varied across during the various phases of the intervention. Somewhat surprisingly, the highest rate of attendance was observed during the initial intensive phase of the program, which was more demanding in terms of participant burden. Our data further suggested that more frequent attendance during the first 8 weeks was associated with better attendance later when sessions occurred less frequently. Thus, it appears that families who are not highly engaged in the program early on are unlikely to receive information presented during the latter portions of the intervention. One implication of this finding is that efforts to promote participant attendance in the early phases of treatment may improve overall attendance rates and decrease attrition in family-based childhood obesity intervention programs.

Socio-demographic factors appear to play a significant role determining the extent of families' participation. Lower family income and living in a single parent household were both associated with poorer session attendance. These influences represent structural factors that likely serve as barriers to regular attendance through their association with problems such as lack of transportation and child care. Racial/ethnic minority status also emerged as a risk factor for poor attendance. This finding is consistent with existing research, but it is particularly concerning given the substantial and widening health disparities between ethnic groups in the United States. Epidemiological data indicate that obesity prevalence is considerably higher in black (20.0%) and Hispanic (20.9%) youth compared with white children (15.3%), with a trend for these group differences become more evident with increasing age.¹ Understanding the mechanisms through which race/ethnicity is related to

attendance in family-based pediatric obesity intervention programs is a critical step in reducing obesity-related health disparities in adulthood. As others^{17,16} have suggested, one possibility is that current treatments do not adequately address important cultural factors that affect nutrition and physical activity habits. The resulting discordance between the prevailing approaches of most child obesity treatment programs and the perspectives of minority participants may lead these families to be less engaged in treatment and more likely to terminate prematurely. Investigation of attendance in new interventions and/or adaptations of existing family-based programs that address the specific cultural norms, values, and beliefs that contribute to the development and maintenance of pediatric obesity in minority populations are important directions for future research.

A unique contribution of the current study is that we examined the contribution of family functioning to attendance. After accounting for the effects of demographic and child risk factors associated with poorer attendance, only disengagement was related to families' participation in the intervention. Treatment completers had lower levels of disengagement than families who dropped out of the program and those who attended fewer than 2/3 of the scheduled sessions, but disengagement did not appear to influence whether families dropped out of the program or just exhibited poor attendance. Disengagement in families is marked by extreme emotional separateness, a high degree of functional independence among individuals, and an emphasis on self-interests over group interests. In this environment, family members are less able to rely on each other for support and assistance with problem-solving when they are faced with challenges. Disengagement, or extremely low levels of cohesion, among family members has been identified as a risk factor for poor treatment adherence in other pediatric chronic illness populations, including diabetes and cystic fibrosis.^{16,27} In relation to childhood obesity treatment, families who are highly disengaged may be more likely to drop out of programs because they are less aware of the severity of their child's weight problem, or alternatively, because they are not sufficiently motivated to address this health concern. In contrast, families whose members are appropriately connected, engaged, and invested in each others' well-being may exhibit better attendance. These families are likely to be more attuned to and concerned about their child's health needs, in addition to being more motivated to address these issues as a family.

Results of the current study also highlight a variety of child characteristics that were *not* related to intervention session attendance. Child age, gender, BMI, and psychological adjustment do not appear to be meaningful in the prediction of program attendance. Regarding child psychological adjustment, although externalizing behavior problems have not been found to affect attendance rates in other pediatric weight management programs^{11,15}, the lack of association between internalizing symptoms and attendance is in stark contrast to the adult obesity literature as well as some studies that have examined this influence in relation to attendance in programs targeting children.¹¹ One explanation for this unexpected finding is that we asked parent to report on their child's symptoms, rather than obtaining child self-reports. Research suggests that there is often a discrepancy between parent and child report of child internalizing symptoms, with children typically reporting more symptoms and greater impairment than parents.³⁰ This is not surprising, as symptoms of anxiety or depression in very young children often do not disrupt daily routines and thus are less apparent to outside observers (e.g., parents, teachers). Alternatively, the lack of association found between child internalizing symptoms and attendance may be due to the fact that our sample consisted of children between 4 and 7 years of age, whereas other studies examining the relation between program attendance and internalizing symptoms included primarily adolescents and adults. There are developmental differences in the types of internalizing problems manifested during early childhood (e.g., separation anxiety) compared with adolescence (e.g., major depression), and it is possible that some internalizing problems but not others may be related to adherence in obesity treatment

programs. Finally, given that parents are ultimately responsible for getting the family to the intervention sessions, attendance may have been more strongly related to parent than child psychological functioning. Although we did not assess for symptoms of depression and anxiety in parents, this is an important factor to consider in future studies examining adherence in family-based treatment programs.

A few additional limitations and suggestions for future research should be noted. First, although the current study examined a range of child and family factors that may influence attendance, other potentially important variables were not examined. Illustratively, factors such as weight loss expectations and actual weight loss during intervention are associated with retention in adult-focused programs and may also affect attendance in child and adolescent obesity intervention programs. Other barriers to regular attendance may have included lack of transportation or inconsistent access to transportation, caregivers being unable to take time off from work, or the presence of health problems that limited parents' ability to attend and/or actively participate in sessions. To engage families facing these limitations, it may be useful to provide shorter home-based intervention programs. Second, we used attendance as a marker for program adherence in the current study, but recognize that adherence is a complex construct that can be assessed in a variety of ways. Other indices of adherence, such as dietary change, physical activity habits, and decreases in weight or BMI, should be examined in future studies exploring how family influences and child factors negatively impact indicators of program adherence. Findings of consistent predictors of treatment outcomes could then be used to identify and differentially treat (e.g., recommending addressing child behavior problems prior to targeting child obesity) subgroups of obese children for whom traditional intervention programs may have limited effectiveness.

This study makes a significant contribution to the pediatric obesity treatment literature by demonstrating that family functioning, as well as socio-demographic factors, influence program attendance. Treatment programs targeting high risk, economically disadvantaged obese youth should consider cultural factors that affect participation as well as structural barriers to treatment participation. Screening for difficulties in family functioning and referral of families who are low in cohesion to family therapy and to community resources that can offer instrumental or tangible support prior to initiating obesity treatment may also help to improve retention outcomes. Alternatively, existing weight management programs could be adapted to include a focus on family engagement in the early stages of treatment. Incorporating aspects of evidence-based, time-limited therapeutic interventions designed to improve maladaptive family interaction patterns, such as Brief Strategic Family Therapy, may be particularly useful in this regard.

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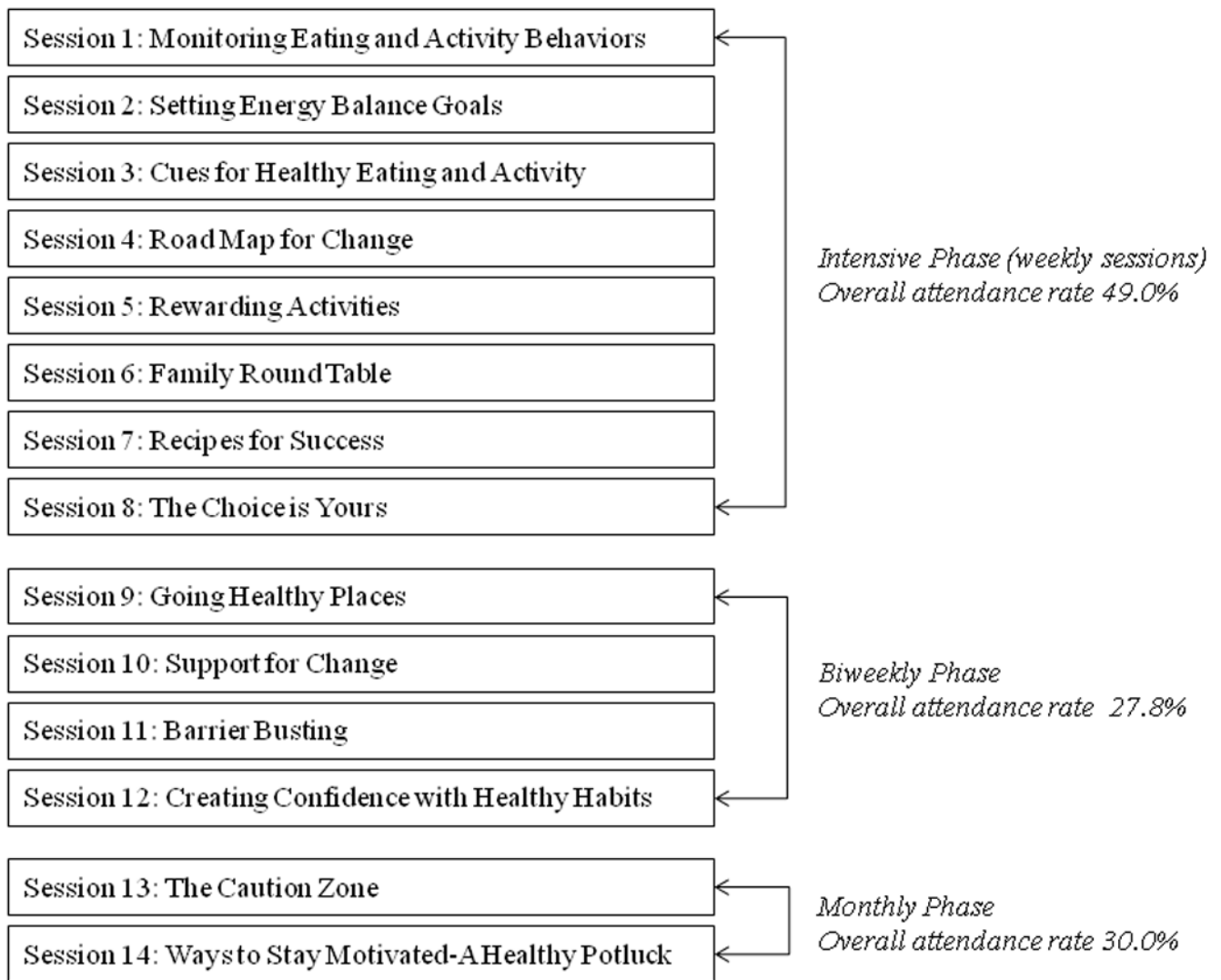


Figure 1.
Team PLAY session topics and overall attendance rates by intervention phase.

Table 1Sample characteristics ($n = 155$)

	<i>n (%)</i>	<i>M ± SD</i>	<i>Range</i>
Child age (years)		5.77 ± 1.12	4 – 7
Child gender			
Male	66 (42.58)		
Female	89 (57.42)		
Child BMI		25.50 (4.75)	17.0 – 38.5
Child BMI z-score		0.00 (1.00)	–1.76 – 2.84
Child BMI category			
Overweight	7 (3.87)		
Obese	148 (95.49)		
Race (%) ^a			
Caucasian	32 (20.65)		
African-American	114 (73.55)		
Asian	0		
Native American/Alaska native	0		
Native Hawaiian/Pacific Islander	1 (0.65)		
More than 1 race	7 (4.52)		
Ethnicity			
Hispanic or Latino	4 (2.58)		
Not Hispanic or Latino	151 (97.42)		
Total family annual income (\$)			
Less than 10,000	31 (20.00)		
10,000 – 19,999	20 (12.90)		
20,000 – 29,999	21 (13.55)		
30,000 – 39,999	13 (8.39)		
40,000 – 49,999	17 (10.97)		
More than 50,000	53 (34.19)		
Parent marital status			
Married	77 (49.68)		
Divorced	10 (6.45)		
Living with partner	9 (5.81)		
Widowed	1 (0.65)		
Separated	8 (5.16)		
Single	50 (32.26)		

Note.

^aTotal $n = 154$ due to missing data on item.

Table 2

Group differences in mean scores on FACES-IV family dysfunction scales.

	Noncompleters (<i>n</i> = 50)	Partial Completers (<i>n</i> = 56)	Completers (<i>n</i> = 49)	F
Disengaged	13.10 _a	11.86 _a	9.98 _b	5.29 ^{**}
Chaotic	14.56	13.13	12.35	2.16
Enmeshed	12.90	11.71	11.71	1.47
Rigid	17.94	17.93	17.24	0.35

Note. Results were obtained from ANCOVA analyses that controlled for race, marital status and income. Different subscripts denote significant differences in means at $p < .05$.

^{**}
 $p < .01$.