



## RESEARCH ARTICLE

# Family-reported barriers and predictors of short-term attendance in a multidisciplinary intervention for managing childhood obesity: A psycho-family-system based randomised controlled trial (ENTREN-F)

Marta Rojo<sup>1</sup>  | Tatiana Lacruz<sup>1</sup> | Santos Solano<sup>1</sup> | Ana Gutiérrez<sup>1</sup> |  
 Lucía Beltrán-Garrayo<sup>1</sup> | Oscar L. Veiga<sup>2</sup> | Montserrat Graell<sup>3,4</sup> |  
 Ana Rosa Sepúlveda<sup>1</sup> 

<sup>1</sup>Faculty of Psychology, Department of Biological and Health Psychology, Autonomous University of Madrid, Madrid, Spain

<sup>2</sup>Department of Physical Education, Sport & Human Motricity, Autonomous University of Madrid, Madrid, Spain

<sup>3</sup>Department of Child and Adolescent Psychiatry and Clinical Psychology, Niño Jesús Children's Hospital, Madrid, Spain

<sup>4</sup>Centro de Investigación Biomédica en Red de Salud Mental (CIBERSAM), Madrid, Spain

## Correspondence

Ana Rosa Sepúlveda and Marta Rojo, Faculty of Psychology, Department of Biological and Health Psychology, Autonomous University of Madrid, Madrid, Spain.

Email: [anarosa.sepulveda@uam.es](mailto:anarosa.sepulveda@uam.es) and [marta.rojo@uam.es](mailto:marta.rojo@uam.es)

## Abstract

**Objective:** This study was aimed to examine patient enrolment in the pre-intervention stage, family-reported barriers, attendance rates and underlying predictors of short-term attendance in a family-system-based randomised controlled trial for managing childhood obesity in children aged 8–12-years-old (ENTREN-F).

**Method:** Psychosocial and anthropometric measures were collected through primary health referral. The data were used for descriptive analyses of sample characteristics and linear regression analyses.

**Results:** Low enrolment rates and several family-reported barriers were observed in the pre-intervention stage. Logistical barriers were the most frequent family-reported reason for attrition in the different stages of the study. Having a first face-to-face orientation session with the families and the use of motivational interviewing helped to improve adherence in the initial phases of the study. After 6 months of intervention, family based treatments (FBTs) under consideration achieve greater adherence compared with the standard intervention. Moreover, family involvement was a predictor of success for better treatment adherence rates. By contrast, participants who attended a brief standard intervention, mothers with primary education,

**Abbreviations:** BDI-II, Beck Depression Inventory; BMI, body mass index; CBT, cognitive-behavioural treatment; CC, critical comments; CDI, children's depression inventory; CG, control group; ENTREN, labelled psychological programme; ENTREN-F, labelled psychological plus family module programme; EOI, emotional overinvolvement; FBTs, family based treatments; FQ, family questionnaire; K-SADS-PL, Kiddie-SADS-lifetime; MI, motivational interviewing; RCTs, randomised controlled trials; SCAS, spence children's anxiety scale; SES, socioeconomic status; SRSS, short recovery and stress scale; ULC, units of life change.

Level I of evidence: Evidence obtained from at least one properly designed randomised controlled trial; systematic reviews and meta-analyses; and experimental studies.

Clinical Trial Registration: [Clinicaltrials.gov](https://clinicaltrials.gov) ID: PRS NCT04465799.

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greater body mass index, higher levels of depressive symptomatology and more critical comments towards their children, children with higher weight status and lower levels of self-reported depressive symptoms at baseline attended interventions less frequently.

**Conclusions:** In future programmes a comprehensive screening of modifiable factors related to family and their setting characteristics is paramount prior to intervention, identifying key barriers related to drop-out, especially in the case of less-advantaged families.

**KEYWORDS**

adherence, attendance, family-based interventions, paediatric obesity, treatment programmes

**Key points**

- In FBT programmes, adherence is a relevant indicator of effectiveness. The programmes should prevent drop-out during the intervention delivery, but also, try to optimise participant enrolment during the recruitment and assessment stage.
- Participants allocated to family-based interventions showed a higher attendance rate compared to a standard behavioural intervention.
- Participants who attended a brief standard intervention, mothers with primary education, greater body mass index, higher levels of depressive symptomatology and more critical comments towards their children, children with higher weight status and lower levels of self-reported depressive symptoms at baseline attended interventions less frequently.
- Our study highlights the importance of examining family-reported barriers related to attrition and predictors of short-term attendance in the programmes for managing childhood obesity.

## 1 | INTRODUCTION AND AIMS

In the last decades, family based treatments (FBTs) have been highlighted as the gold standard for interventions in the clinical care for paediatric obesity, suggesting that direct parental involvement helps achieve beneficial weight-related outcomes in children in the short term (Berge & Everts, 2011; Chai et al., 2019). The success in previous weight-management programmes has been primarily defined by weight loss (i.e., body mass reduction) and, to a lesser extent, based on the adherence to treatment, generally measured using attrition and attendance rates (Leung et al., 2017). Although substantial progress has been made in addressing weight loss in children with obesity, the low adherence to treatment continues to be a common problem, with attrition rates of 50% in previous weight-management programmes (Dhaliwal et al., 2014; Sallinen Gaffka et al., 2013; Skelton & Beech, 2011). In this regard, it is important to examine adherence rates, especially of the FBTs, which are time-intensive and expensive, requiring several resources. On the one hand,

attendance is a requirement in examining intervention-related benefits (Jensen et al., 2012). On the second hand, attrition—defined as an extreme form of non-adherence, may challenge the validity of the data and threaten the accuracy of the analyses (Dhaliwal et al., 2014; Jensen et al., 2012). Moreover, it can lead to the potential misuse of healthcare resources, clinicians' frustration and families being discouraged to access other later obesity-management services (Skelton et al., 2011; Spence et al., 2020).

Despite its undoubted relevance, only a few randomised controlled trials (RCTs) have included the examination of adherence in different parts of a paediatric weight management programme (e.g., recruitment, pre-intervention, intervention delivery and follow-up) as part of evaluating the effectiveness of FBT programmes (Skelton et al., 2011; Spence et al., 2020). In this regard, it is remarkable that pre-intervention (i.e., screening, enrolment, assessment) is also considered a phenomenon with relevant implications in both research and clinical practice fields (Ball et al., 2021;

Morgan et al., 2016; Spence et al., 2020). However, information on recruitment and retention strategies on pre-intervention phases has been rarely reported compared to the intervention phase (Brown et al., 2020; Byrd-Bredbenner et al., 2017).

Overall, the barriers and predictors related to low adherence to the interventions for paediatric obesity are still poorly understood, posing an unsolved challenge for researchers and clinical practitioners (Brown et al., 2020; Morgan et al., 2016; Spence et al., 2017). To date, there is a growing number of studies in the literature that conclude that logistical barriers (e.g., lack of time, being busy, clashing work/academic schedules, transportation difficulties or financial burdens) are one of the main reasons behind the high attrition rates (Dhaliwal et al., 2014; Skelton & Beech, 2011; Staiano et al., 2017). In addition, unmet needs or expectations about the programme, lack of awareness in the family, parental misperception of the child's weight or high frustration due to prior unsuccessful weight-loss attempts are barriers to achieving good levels of family participation (Rhodes et al., 2017; Silver & Croning, 2019; Skelton & Beech, 2011; Staniford et al., 2019; Vittrup & McClure, 2018). By contrast, literature is less clear regarding the possible predictors of attrition, presenting only a few unreliable factors (Chai et al., 2019; Dhaliwal et al., 2014; Spence et al., 2017). In a previous integrative review, the child's age was the only consistent predictor of attrition; in particular, older children were at an increased risk of discontinuing care (Dhaliwal et al., 2014). However, the findings are inconsistent for other variables. For example, Dhaliwal et al. (2014) did not find the child's weight status at baseline to be a significant predictor of short-term attrition, while Skelton et al. (2011) reported that inactive children had significantly lower weight status (body mass index [BMI] z-scores) at baseline. Conversely, there is also a study that found no statistical differences between the sample characteristics of completers' and non-completers' groups (Rahelić et al., 2020). In this regard, some experts pointed out that using a categorical variable for assessing adherence (e.g., completers vs. non-completers) may mask the effect of the different doses of treatment received and increase the risk of data bias. Correspondingly, using a continuous outcome (i.e., the percent of attendance) may reflect the clinical reality more accurately and increase statistical power for the analyses to detect significant associations (Jensen et al., 2012; Royston et al., 2006). In a recent programme for parents of primary school-aged children with excess weight, the percent of attendance was lower among disadvantaged families (vs. advantaged families), un-partnered (vs. partnered), less-educated parents (vs. high-educated

parents) and those referred by professional sources (vs. self-referral method) (Williams et al., 2017). Furthermore, an association between low-income families and youth with self-reported depressive symptoms and a low percentage of attendance has been found (Jensen et al., 2012). For all these reasons, further research on the role of parents and the effect of underlying child-, parent- and family-related factors on adherence is warranted. The current study will investigate parent engagement and short-term adherence regarding a clinical controlled trial for managing childhood obesity. The objectives of this study include the following: (a) to describe the levels of enrolment and family-reported barriers in the pre-intervention period; (b) to assess the efficacy in terms of the attendance/attrition rates of the ENTREN-F programme (a cognitive-behavioural programme with an extensive family system-based intervention), compared to a similar programme with only two educational sessions for parents (i.e., ENTREN) and a control group (CG) (treatment as usual); (c) to explore the socio-demographic child, parent and family predictors of attendance in our sample; and (d) to provide practical recommendations to improve parent engagement based on the evidence obtained in this study and available in the existing literature.

## 2 | METHOD

### 2.1 | Design and participants

This study is included in the ENTREN-F project (RETOS PSI-2016-79471R), a clinical RCT designed to assess the efficacy of a cognitive-behavioural family system-based intervention (i.e., ENTREN-F) on anthropometric, behavioural, psychological and family factors linked to childhood obesity, compared to a similar psychological intervention that does not focus on family-system intervention (ENTREN) and a CG that received a less-structured standard behavioural intervention (CG) ([Clinicaltrials.gov](https://clinicaltrials.gov/ct2/show/study?term=ENTREN-F&rank=1) ID: PRS NCT04465799). Please find below for a specific description of the three interventions. The participants were referred from several primary healthcare centres in Madrid (Spain) between January 2017 and March 2020 through response flyers provided by their child's paediatricians or nurses at a routine check-up. Once their consent was obtained, a member of the research team contacted the families for an initial eligibility screening (child's age, weight/height and medical history) by phone. Those who were out of the age range (8–12-years-old), did not present overweight or obesity (BMI z-scores < 85th percentile), presented secondary obesity, did not have

an adequate oral/written command over Spanish, or suffered from a developmental disorder (e.g., autism spectrum disorders or intellectual disability) were excluded from the study. Eligible families were given an appointment at their referral hospital/health centre. An informed assent (participants under 16) and a written informed consent were obtained from parents on behalf of their children. The semi-structured clinical diagnostic interview 'Kiddie-SADS-lifetime' (K-SADS-PL, De la Peña et al., 2018) with the child and at least one of the parents was conducted separately. The child and both parents were asked to complete a battery of questionnaires (available in paper and online format). Data were collected in five intervals ( $T_0$ —at baseline;  $T_1$ —end of the intervention;  $T_2$ —at 12 months from baseline;  $T_3$ —at 18 months from baseline; and at a 24-month follow-up after baseline— $T_4$ ). In this study, the data of two waves ( $T_0$  and  $T_1$ ) will be analysed. Participation was voluntary and free of charge for all participants. Finally, a total of 165 participants were randomised into one of the three groups: (ENTREN-F— $n = 62$ ; ENTREN— $n = 52$ ; and CG— $n = 51$ ). On average, the enrolled participants were 57.76% male (42.24% female),  $10.32 \pm 1.42$ -years-old and had a mean initial z-BMI of  $3.13 \pm 1.37$ . The three intervention groups did not differ in terms of any child or family variables assessed at baseline ( $p > 0.05$ ). Sample size: power estimates were calculated using G\*Power, version 3.1.3 (Faul et al., 2009).

## 2.2 | The ENTREN-F programme

The ENTREN-F Programme is a multicomponent cognitive-behavioural family-based programme for children between 8 and 12-years-old with overweight or obesity from Madrid, Spain. It targeted children as well as their parent who are key agents of change. Both the mother and father were invited to attend the programme, but in this case, 95% of the attendees were mothers. As it can be seen in Figure 1, children allocated to both ENTREN and ENTREN-F family-based programmes went through the same psychological workshop, in addition to the standard treatment. It consisted of 12 biweekly (2 h) in-group sessions over 6 months focussing on awareness, motivation to change, behavioural techniques (e.g., goal setting), emotions and thoughts, body image, social skills, management of peer teasing, self-esteem and relapse prevention. In total, both the children and their mothers attended four sessions together: the welcome and closing session, and two educational workshops about nutrition and physical activity. A nutritionist and dietary coach (J. Adán) and an expert in physical activity (O.L. Veiga, co-author) conducted the educational workshops on nutrition and physical activity/sedentary habits, respectively. Overall, both family-based programmes include a session to achieve behavioural changes in the family's health habits and consequently in the child's weight status, by implementing parental strategies such as self-monitoring, goal

Group condition	Type and content of the intervention
CG	Brief standard behavioral treatment aimed at health behavioral changes (4 individual monitoring sessions) †
ENTREN	Cognitive-behavioral treatment (CBT), including: <ol style="list-style-type: none"> <li>a. Standard behavioral intervention (4 individual monitoring sessions) †</li> <li>b. Psychological workshop for children (10 sessions)</li> <li>c. Nutrition and physical activity educational sessions (2 sessions) †</li> </ol>
ENTREN-F	Family-based CBT <ol style="list-style-type: none"> <li>d. Standard behavioral intervention (4 individual monitoring sessions) †</li> <li>a. Psychological workshop for children (10 sessions)</li> <li>b. Nutrition and physical activity educational sessions (2 sessions) †</li> <li>c. Family workshop (6 sessions) †</li> </ol>

FIGURE 1 Description of the three interventions. † Sessions that involve the parents, with or without the child

setting, problem-solving, behavioural contracting or relapse intervention. On the other hand, specifically, the ENTREN-F programme included an additional family-system workshop of six sessions aimed at improving family awareness about their child's risk to develop obesity-related physical and psychological comorbidity, and family functioning (i.e., changes in family dynamics and parent-child communication) to achieve further changes in children's health outcomes (Skelton et al., 2020). Alternatively, the participants allocated to the CG received the standard intervention usually provided in paediatrics clinical care; this is a brief behavioural intervention aimed at promoting healthy habits (diet, physical activity, sedentary lifestyle, sleep, etc.). Children and their parents were invited to attend four sessions over 6 months. A follow-up was carried out in between the face-to-face appointments via email to monitor the changes. A team of psychologists specialised in eating disorders and obesity (A.R. Sepúlveda, T. Lacruz, S. Solano, M. Rojo, L. Beltrán, co-authors) carried out both psychological and family workshops. In the current study, paediatricians, nurses, psychologists, psychiatrists, a nutritionist and an expert in physical activity constituted a multidisciplinary team. Strategies of motivational interviewing (MI) (Miller & Rollnick, 2004) and approaches of cognitive behavioural therapy (cognitive-behavioural treatment [CBT] based on the LEARN programme) (Brownell, 2004) were used to increase commitment to change the behaviours of both the parents and their children. Sepúlveda et al. (2020) have published specific details of the intervention's content in the pilot study.

## 2.3 | Variables and instruments

### 2.3.1 | Short-term adherence

The percentage of attendance was the main outcome of this study. It was a continuous variable, defined by the average of the individual proportion of attendance (attended sessions/total sessions, e.g., 5/12; 41.6%). In all cases, only the data of participants who attended at least one session were included as the majority who did not attend any sessions did not provide consent or baseline data. In the ENTREN-F intervention, attendance indicated that both the child and at least one parent attended the session. In addition, we created a dichotomised variable (non-completers—ref: 0; completers—ref: 1), classifying the participants who attended  $\geq 66.7\%$  of the sessions ('completers', ref: 1) or those who did not complete minimum attendance ('non-completers', ref: 0), following a previously adherence-related set clinical cut-off point of

two-thirds for the intervention (Sepúlveda et al., 2020). In this study, the attrition rate (secondary adherence indicator) refers to the percentage of non-completers participants group (average attendance < 66.7%).

### 2.3.2 | Reasons for not enrolling in the pre-intervention period

A team member (AG) recorded, in a database, the qualitative family responses or reasons for not enrolling during the recruitment and assessment process. First, at the recruitment stage, the reasons were categorised into the following variables: (a) lack of interest in the study, with responses such as 'we do not consider it necessary', 'we do not want to try more treatments' or 'we are already taking other measures for managing our child's excess weight'; (b) incompatibility (e.g., due to extracurricular hours, working hours, transportation difficulties); (c) exclusion criteria; (d) inability to reach participants; and (e) opposition from a family member. In the baseline assessment, the reported reasons were classified into the following categories: (a) lack of interest/unmet family expectations or needs; (b) logistical barriers; (c) exclusion criteria; and (d) lack of response.

### 2.3.3 | Reasons for attrition at the intervention stage

The family-reported reasons for drop-outs once the programme had started were organised into the following categories: (a) logistical barriers (transportation difficulties, incompatibility with work schedules and/or studies of the child, absence of a person to accompany the child, change of residence, etc.); (b) families' unwillingness to continue (e.g., due to loss of interest, lack of improvement in their child's wellbeing, etc.); (c) familial problems and ensuing medical causes; (d) child's opposition; and (e) lack/absence of response.

### 2.3.4 | Sociodemographic variables

Trained staff carried out a structured psychosocial interview with the primary parent to collect the following data about the children and their parents: gender (female/male), date of birth, mother's educational level (primary/secondary/university), occupation and marital status ('un-partnered families' = 0, or 'married/living-together families' = 1). Families' socioeconomic status (SES) was calculated using the Hollingshead index (Hollingshead, 1975).

### 2.3.5 | Anthropometrics

Nurses measured the children's and mothers' height and weight using a digitally calibrated scale (Type SECA 799 and 769) and a tallimeter at primary health centres or hospitals. Both the mothers' and children's BMIs were then calculated ( $\text{kg}/\text{m}^2$ ). The participant children's BMI z-scores were calculated according to their age and sex, the median and standard deviation scores, based on the data collected in the growth tables of the Orbegozo Foundation (Sobradillo et al., 2004).

### 2.3.6 | Child's emotional well-being

Depression was assessed using the children's depression inventory (CDI; Kovacs, 1992). The inventory is composed of 27 items with a three-point Likert scale response option, with a higher score indicating higher levels of depressive symptoms. The internal reliability of the Spanish version was 0.69 (Davanzo et al., 2004). In the current sample, Cronbach's alpha was 0.82. Anxiety symptomatology was assessed with the spence children's anxiety scale (SCAS; Spence et al., 2003). The inventory consists of 38 items with a four-point Likert-scale response, with higher scores indicating a greater level of anxiety symptoms. The internal reliability of the Spanish version was 0.92, and the reliability in the current sample was 0.90.

### 2.3.7 | Maternal depression symptoms

The Beck depression inventory (BDI; Beck et al., 1996) evaluated depressive symptomatology. The scale comprised 21 items with a four-point Likert scale, with higher scores indicating higher levels of depression. BDI-II demonstrated high internal consistency in Spanish validation ( $\alpha = 0.87$ ; Sanz et al., 2003). In the current study, the internal consistency was  $\alpha = 0.92$ .

### 2.3.8 | Maternal stress

Maternal stress was measured by the validation of the short recovery and stress scale (SRSS; Blasco-Fontecilla, et al., 2012). The scale included 43 life events, each scored from 0 to 100 units of life change (ULC); a higher score is considered a major stress and higher chances of illness. For the current study, Cronbach's alpha was  $\alpha = 0.70$ .

### 2.3.9 | Family functioning

Family functioning was assessed using the family questionnaire (FQ; Wiedemann et al., 2002). This is a 20-item self-report questionnaire examining maternal levels of expressed emotion, defined by the levels of critical comments (CC) and emotional overinvolvement (EOI) in the communication between the mother and child. High scores for the expressed emotion are considered a factor of risk. Cronbach's alpha for the CC subscale was 0.83 and 0.72 for the EOI subscale for the Spanish version (Sepúlveda et al., 2014). In the current study, Cronbach's alpha ( $\alpha$ ) for the CC subscale was 0.82 and 0.75 for the EOI subscale.

### 2.3.10 | Level of importance and self-perceived readiness

On a scale of 0–10, the mothers had to answer two questions about (a) how important the issue of the excess weight of their children was for them, and (b) what the level of their own perceived readiness to manage it is.

## 2.4 | Data analysis

Descriptive analyses (means, standard deviations and frequencies) were performed. ANOVA tests for independent samples were used to compare the groups on quantitative variables and Chi-squared tests for categorical variables. A multiple linear regression 'backward' analysis was carried out, including the attendance average as the dependent variable. Relevant predictors were selected a priori according to the previous literature, reducing the risk of overfitting and bias of estimated coefficients. All categorical variables were dichotomised before they were included in the model. The categorical variable 'group condition' was entered in the regression model (Table 1) after dichotomising the data. Thus, we categorised as 'intervention condition' all participants who received the ENTREN-F or the ENTREN programme (1), and as 'usual treatment' (0), patients who were allocated to the CG. For the educational level, we dichotomised the variable 'high education level' (primary/secondary = 0; university = 1) and 'low education level' (primary = 1; secondary/university = 0) before entered it in the regression model. The multilevel linear regression model is presented and tested using the omnibus *F* test to assess the statistical significance of the independent variables as a group in predicting the dependent variable. The intercept, unstandardised

Variable	<i>b</i>	s.e. <i>b</i>	$\beta$	<i>t</i> ( <i>p</i> )
Treatment (ref: control group)	22.02	6.89	0.37	<b>3.2**</b>
Educational level (ref: primary education)	-21.69	9.18	-0.28	<b>-2.36*</b>
CDI	1.76	0.74	0.29	<b>2.39*</b>
BDI	-0.76	0.35	-0.27	<b>-2.17*</b>
FQ_CC	-2.34	0.75	-0.38	<b>-3.14**</b>
zBMI score	-7.65	2.49	-0.38	<b>-3.08**</b>
Mother BMI	1.04	0.46	0.26	<b>2.27*</b>

Note: The point of statistical significance was assigned at  $p < 0.05$ . B/Beta; In bold.

Abbreviations: *b*/ $\beta$ , unstandardized and standardized regression coefficients; BDI, maternal depression; BMI, maternal body mass index; CDI, child depression; FQ\_CC, critical comments; SE, standard error; zBMI score, child weight status.

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$  values.

TABLE 1 Multivariate linear regression predicting treatment attendance ( $N = 165$ )

(B) and standardised (b) regression coefficients, the precision of regression coefficients, with 95% confidence intervals (CIs), and semi-partial squared correlations ( $sr^2$ ) are presented. The effect size of the model is shown as  $R^2$  and adjusted  $R^2$ . The point of statistical significance was assigned at  $p < 0.05$ . All statistical analyses were conducted using the SPSS 24.0 programme for Windows.

### 3 | RESULTS

#### 3.1 | Level of engagement and family-reported barriers in the pre-intervention period

The flow of participants in the study is shown in the CONSORT diagram (see Figure 2). In the recruitment stage, 215 participants out of the 447 potential candidates referred were not assessed. This led to an initial sample loss of 48%. More specifically, 51 families (23.72%) could not be reached by phone, and 43 participants (20%) did not meet the eligibility criteria. In addition, 117 families (54.42%) declined to participate in the screening for eligibility. Among their reasons, 49 families (41.88%) were not interested in the study, considering their children not to have overweight or the treatment unnecessary. Another 49 families (41.88%) declined to participate in the study due to logistical barriers (e.g., lack of time, schedule issues, etc.). To a lesser extent, in 16 cases (13.68%), the child did not want to attend the interview and three families (2.56%) reported medical reasons (e.g., planned surgery and treatment for specific illness or injury). In the second stage, 232 participants (55.9% male) completed the baseline assessment. In this case, 67 participants were lost after seeking consent and completing the assessment process during the first face-

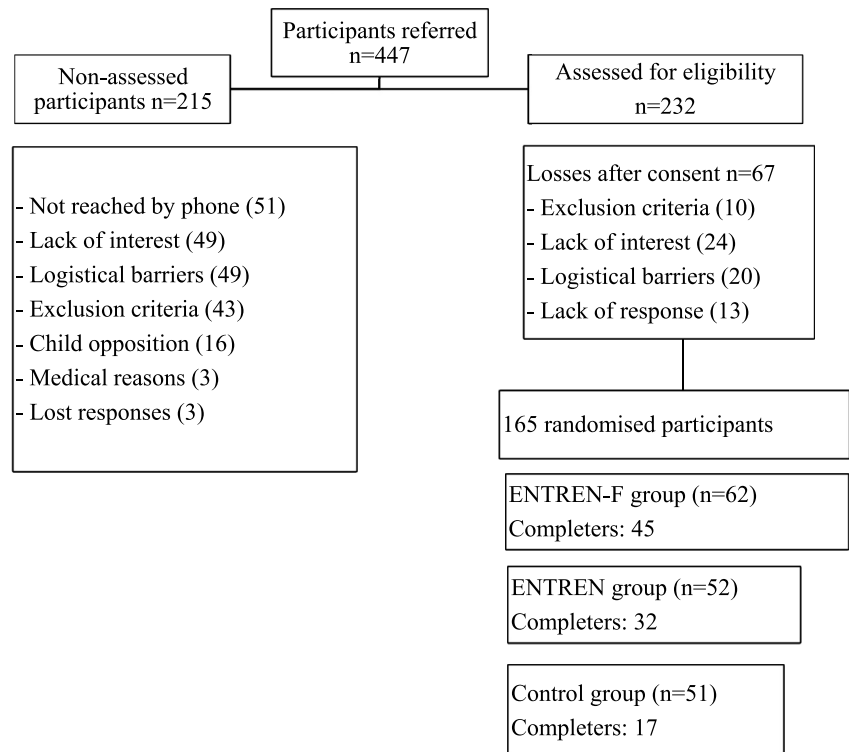
to-face interaction (sample loss of 28.9%). 35.82% of the families ( $n = 24$ ) reported lack of interest or unmet expectations regarding the programme, and 29.85% refused to participate due to logistical barriers ( $n = 20$ ). In addition, 10 participants did not meet the inclusion criteria (14.93%), and 13 families (19.40%) did not provide reasons before leaving the study.

The remaining sample comprising 165 participants were randomised into one of the three conditions of the RCT programme for managing childhood obesity: (a) ENTREN-F ( $n = 62$ ; 54.8% male); (b) ENTREN ( $n = 52$ ; 55.8% male); and (c) CG ( $n = 51$ ; 62.7% male). All participants attended the initial enrolment session. The three intervention groups did not differ in terms of any child or family variables assessed at baseline ( $p > 0.05$ ).

#### 3.2 | Short-term treatment adherence

Initially, the average attendance percentage was calculated separately for each intervention condition. First, in the ENTREN-F group, the average of attended sessions was 72.4% ( $\pm 21.7$ ). In other words, the children together with their families attended 9 out of 12 sessions on average. Second, the ENTREN group attended an average of  $68.2 \pm 23.9$  of the total sessions, with 8 completed sessions out of 12. Last, the average for the CG was  $54.9 \pm 26.9$ , equivalent to approximately two out of the four follow-up sessions offered to the families (Figure 2). Significant differences were observed between the groups ( $F = 7.28$ ;  $p = 0.001$ ). Post hoc subgroup analyses revealed that the CG had significantly lower attendance compared with the 'ENTREN' group ( $p = 0.017$ ) and the 'ENTREN-F' group ( $p = 0.001$ ). By contrast, there were no significant differences between the ENTREN and ENTREN-F groups ( $p > 0.05$ ). On the other hand, the attrition rate for each

**FIGURE 2** CONSORT diagram of the study



intervention was 27.4% in the ENTREN-F group, 38.5% in the ENTREN group and 66.7% in the CG. The number of non-completers per group can be seen in Figure 2. Within the full sample, reasons for attrition once the programme had started were examined. Logistical barriers were the reason most reported by the families (47.9%), followed by the lack of interest or perceived lack of results (14.1%), family difficulties/ensuing medical causes (9.9%) and child's opposition (7.2%). Several families (18.3%) did not report reasons before dropping out. Of the initial baseline sample, 23 families (13.9%) fully completed the intervention.

### 3.3 | Analysis of predictors of intervention attendance

A backward multivariate linear regression analysis on the whole sample was conducted to identify predictive factors of attendance from an a priori set of hypothesised predictors: group condition, child's gender and age, mother's educational level, marital status, family SES, child depression (CDI), child's anxiety symptoms (SCAS), maternal depression (BDI) and stress (SRSS), family functioning (FQ\_CC and FQ\_EOI), BMI z-scores, maternal BMI, mother's level of perceived importance of her child's obesity and self-perceived readiness to manage it. The results revealed several significant factors associated with attendance (i.e., intervention condition,

mother's educational level, baseline BMI z-score, child depressive symptomatology, maternal depression symptoms, CCs received in the family environment and maternal BMI; Table 1). More specifically, the 'intervention condition: ENTREN-F and ENTREN' (1) (i.e., CG = 0), child depression symptomatology and maternal BMI were positive predictors. In this case, the CG was the worst predictor of higher attendance rates, compared with the other two experimental conditions. Moreover, the children with lower self-reported depressive symptoms at baseline and mothers with a higher BMI attended intervention sessions less frequently. By contrast, children with lower BMI z-scores and mothers with high levels of depression attended sessions less frequently, compared with children with higher BMI z-scores and undepressed mothers at baseline. Lower attendance was also related to less education among mothers and disharmonious family functioning (i.e., higher levels of CCs received). Coefficients for all the other factors, that is, child's age and gender, child's anxiety (SCAS), dichotomised intervention condition (ref: ENTREN-F condition (1); ENTREN and CG = 0), SES, marital status, maternal stress (SRSS), maternal level of importance and self-perceived readiness regarding the management of their children's excess weight, emotional over-involvement (FQ\_EOI) were all non-significant (with all their  $p > 0.05$ ; Table 1). The complete model accounted for  $R^2 = 54.7%$  ( $R^2$ ) and 47.2% (adjusted  $R$ -squared) variance in short-term attendance ( $F = 7.25$ ;  $p = 0.001$ ).



## 4 | DISCUSSION

The findings of this research enable a deeper understanding of the adherence to interventions for paediatric obesity based on a well-controlled study design (Ref. Trial PRS NCT04465799). In the first place, this study examines the percentage of sample loss and the family-reported barriers encountered in the pre-intervention non-intensive therapeutic stage (i.e., recruitment and assessment). This stage comprised the first interaction between the family and the nurse/paediatrician at a primary care centre, followed by the first interaction with the research team (providing a detailed explanation about the ENTREN-F programme) and the assessment process. Accordingly, this stage has been considered costly and time-consuming for the families (Spence et al., 2020), however, it has been less studied compared with the intervention stage (Brown et al., 2020). Among the most remarkable results of our study, during the pre-intervention stage, we found great difficulties to recruit the participants, losing nearly 50% of the participants referred from primary healthcare centres. Accordingly, Morgan et al. (2016) pointed out that recruiting and engaging parents in obesity interventions is an important challenge for researchers and clinical practitioners. These results are important since the idea is that the ENTREN-F programme can be administered in primary health settings. In our study, many families did not enrol because they were not interested in the intervention programme. Moreover, we found a considerable percentage of families who underestimated their children's weight status. These results are consistent with previous studies in which families of children with obesity were more likely to underestimate their child's weight, compared with families who have children with normal weight (Lundahl et al., 2014; Newson et al., 2013; Vittrup & McClure, 2018). This is important because parents' misperception of their children's weight may decrease the likelihood of implementing lifestyle changes and seeking treatment (Parkinson et al., 2017; Rhee et al., 2005). In addition, logistical barriers (e.g., schedule clashes or mobility difficulties) were not only a recurrent reason for families not enrolling in the programme but also were the most frequent reason for dropping out once the programme had started. Moreover, some families reported unmet expectations or needs regarding the programme. These results are in line with other recent studies (Dhaliwal et al., 2014; Rhodes et al., 2017; Silver & Croning, 2019; Skelton & Beech, 2011; Spence et al., 2017; Staiano et al., 2017). By contrast, it should be noted that a possible alternative explanation for our findings of reasons given by parents for dropping out of the

programme (e.g. logistical barriers) is that it may have been the least confrontational excuse.

Although the percentage of sample loss at initial stages and the difficulties encountered when recruiting the participants may be somewhat discouraging for researchers and clinical practitioners, these findings underline evident difficulties in addressing childhood obesity as well as several family-related variables that should be considered for the design and implementation of future treatment interventions. In this regard, it could be useful to conduct a comprehensive screening of modifiable factors (e.g., conveniently timed sessions, transportation burden, preferences for setting, cost of the activities, family awareness about obesity as a risky health condition) before the intervention. This measure may help align the services with family needs/expectations from the beginning and therefore bring about and sustain a commitment to the treatment process (Sallinen Gaffka et al., 2013; Spence et al., 2020; Staniford et al., 2019). In fact, the minimisation of programme components that are likely to disrupt established family routines is one of the practicalities and research considerations for conducting family-based childhood obesity programmes, proposed by Morgan et al. (2016). However, it is also probable that the effects of screening are not yet known and could introduce bias in future research. In this manner, it is important to ensure that the people in charge of contact with the families in this preliminary screening phase do not participate later in the intervention. Moreover, it is also interesting to note that the paediatricians and nurses from primary healthcare services were those who referred 95% of the participants in our sample. Although we have not been able to make comparisons with a self-referred group in our case, recent studies have reported that professional recruitment methods are less effective in enrolling participants at initial stages, compared with other active self-referrals (e.g., advertising posters; McGeown et al., 2021; Williams et al., 2017).

Regarding the latter idea, some interesting conclusions have been also drawn from the assessment. After the first face-to-face interaction with the psychologists of the research team, the percentage of sample loss decreased by almost half, compared with that at the recruitment stage. This result is probably partly explained due to the increased interest of the families who agreed to attend at least the evaluation interview. Nevertheless, it is also remarkable that during this appointment all families had the chance to share their doubts and preferences, which gave a great opportunity for the psychologists to prevent timely possible barriers associated with discontinuing intervention or early dropout (e.g., unmet expectations of family). In that sense, Ball et al. (2021)

also suggested including an orientation session as an effective strategy to reduce attrition in managing paediatric obesity. Moreover, all the psychologists were trained on MI, ensuring, as other professionals have previously recommended, health-related professional skills regarding sensitivity and non-judgemental and supportive attitude when discussing weight-related issues (Ball et al., 2021; Farnesi et al., 2012; Spence et al., 2020; Staiano et al., 2017). In line with these results, we highly recommend providing specific training on motivational techniques to paediatricians and nurses, who are well-positioned in the primary care setting to detect childhood obesity and initiate interventions. In this regard, MI has shown promising results as a key facilitator in promoting the involvement of the participants, raising their levels of awareness and motivation to change, rather than simply providing guidelines on health behaviours (Borrello et al., 2015; Luque et al., 2019; Martínez Rubio & Gil Barcenilla, 2013; Skelton et al., 2011).

Regarding our second objective of the study, we examine the short-term adherence after 6 months of intervention in an extensive cognitive-behavioural family system-based programme (ENTREN-F), compared to a similar psychological workshop that does not involve an extensive family-based intervention (ENTREN) and a CG. We hypothesised that the ENTREN-F group would be the best condition to ensure the engagement of the participants, considering that families had to attend more sessions than the remaining two groups. According to our results, our hypothesis was partially confirmed. At a descriptive level, ENTREN-F obtained the greatest adherence (i.e., the highest percentage of attendance and the lowest attrition rate), followed by the ENTREN and the CG. Comparing the three groups, there were significant differences between the CG and the two experimental conditions, but to be allocated to the ENTREN-F group was not a better predictor of attendance than the ENTREN group. According to these results, we can conclude that, in our study, a brief individual programme based on a standard intervention was not as effective as the family-based programmes in terms of engaging participants. Indeed, only 3 out of 10 participants achieved the minimum attendance in the CG, and therefore 66.7% dropped out the programme. These results show a low adherence rate that invites us to reflect on the cost-effectiveness of this type of intervention even if it contributes to weight loss. By contrast, in spite of the high demands and challenges that usually characterise FBT (Spence et al., 2020), in our study, the inclusion of the family—which does not necessarily have to be ensured through their participation in a greater number of sessions, was important to achieve better engagement to the programme. These results are

in line with other recent studies (Sepúlveda et al., 2020; Spence et al., 2017; Staiano et al., 2017). More specifically, both the family-based conditions achieved a considerable attendance average of over 70%. Moreover, the attrition rate in our FBT group varied from 27% to 39%, these percentages are in line with the results included in a previous integrative review (Dhaliwal et al., 2014). Finally, regarding our third objective, we analyse a wide range of child-, parent- and family-based possible predictors of attendance. Children growing up in vulnerable environments (characterised by less educated mothers, high levels of maternal depressive symptoms, frequent CCs between the mother and child) were more likely to attend intervention infrequently, suggesting that increased efforts and effective methods to retain these families in treatment may be necessary. In addition, in our study, the child's age was not a significant predictor of attendance, but the child weight status at baseline was negatively associated with attendance rates, differing from the previous research (Dhaliwal et al., 2014; Skelton et al., 2011). An aspect that could have probably favoured this result is that, on average, most of our participants had obesity. Participants with severe levels of obesity may have made previous attempts to lose weight, which may increase levels of frustration and be a possible explanation for a greater dropout from the programme. Furthermore, contrary to earlier findings (Jensen et al., 2012), in our sample, high scores of self-reported child depressive symptoms were positively associated with high attendance rates. This can be a positive outcome as this programme manages to retain these at-risk participants. In this regard, both FBTs programmes included an extensive module for children focussed on working on psychological aspects (e.g., emotions, social skills, self-esteem) in a group with other children. Similarly, Salas et al. (2010) found that providing psychological support for children in a weight management programme may help promote better compliance to treatment. Taking into account the limitations in previous FBT programmes, these findings are important so as to minimise commonly occurring possible negative outcome predictors as well as the high-cost of carrying out these intensive interventions.

Although results are promising, achieved conclusions should be interpreted with caution considering there is great heterogeneity between studies of family-based paediatric clinical weight management programmes (Sacher et al., 2010; Skelton et al., 2011; Williams et al., 2017). Indeed, it is difficult to understand the reasons behind differences in programme attendance, as most participants who actively or passively drop out of studies do not provide data on outcomes.

Overall, this study emphasises the importance of investing efforts in finding feasible and sustainable strategies for ensuring adherence to paediatric obesity programmes. In turn, the efficacy of the interventions should not only be evaluated in terms of weight loss but also on the ability to ensure adherence to the intervention. In this sense, for future research, more RCTs in which adherence is addressed as a primary outcome are needed, as well as the examination of long-term follow-up adherence, which is also largely unknown (Spence et al., 2017). In conclusion, low adherence to intervention for paediatric obesity continues to be an important challenge. The complexity of factors associated with adherence identified in this study points to the challenges associated with reducing the likelihood of drop-out in childhood obesity programmes.

#### 4.1 | Strength and limits

The strengths of this study include the examination of adherence in both the 'pre-intervention phase' and 'intervention stage', the inclusion of a wide range of potential child participant, parent and family predictors of attendance. In addition, we have used a continuous variable instead of a dichotomised variable for the linear regression model, with the former reflecting more accurately the clinical reality of variable intervention attendance, providing increased power to detect significant associations and accounts for treatment dose in statistical analyses. Overall, this study presents a robust design, based on an RCT for managing childhood obesity in a clinical context, providing new findings with important implications for the design and implementation of future programme trials focussing on childhood obesity in both research and academic fields. However, this study is not without limitations. Power calculations for our sample size were not premised on short-term adherence as the primary outcome. Lastly, our objective was to include data from both fathers and mothers; however, the data from fathers presented low statistical power that could negatively affect the quality of the analyses in the study.

#### 4.2 | What is already known on this subject?

Family-based interventions are the gold standard intervention for achieving positive health-related outcomes. However, low adherence continues to be a common problem in paediatric obesity programmes, which is not

as well-documented as it is on adulthood (Jensen et al., 2012; Leung et al., 2017). Over the last decades, researchers and clinicians have referred to the poor record of enrolment of families and children affected by paediatric obesity in intervention programmes, and to the similarly disheartening statistics on the attrition of those who actually make it past the enrolment stage. Concretely, little is known about the underlying factors of this unsolved challenge, and further research is required. Consequently, it is necessary to advance the field, both academically and clinically.

#### 4.3 | What does this study add?

This study aims to contribute to the field of inquiry of adherence in clinical paediatric weight-management, based on a well-controlled study design, an RCT of a clinical paediatric weight-management (Level of evidence: I). This study provides practical strategies to encourage modifiable dropout barriers and optimise engagement in both the pre-intervention and intervention phases of clinical childhood obesity programmes. Methodologically, following the recommendations of experts, attendance has been assessed as a continuous variable since using dichotomous predictors in multiple regression has important limitations (Jensen et al., 2012; Royston et al., 2006). We believe this study provides practical considerations regarding the design and implementation of future paediatric obesity interventions to mitigate the impact of attrition in paediatric weight management interventions.

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## CONFLICT OF INTEREST

The authors have no competing interests to declare relevant to this article's content.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

## ORCID

Marta Rojo  <https://orcid.org/0000-0001-9729-724X>

Ana Rosa Sepúlveda  <https://orcid.org/0000-0002-6041-2889>

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