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Author(s): Wendy Robertson, Tim Friede, Jackie Blissett, Mary C.J. Rudolf, Maybelle Wallis, Sarah Stewart-Brown

Article Title: Pilot of 'Families for Health': community-based family intervention for obesity

Year of publication:2008

Link to published version: <http://dx.doi.org/10.1136/adc.2008.139162>

Publisher statement: None



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Arch. Dis. Child. published online 7 May 2008;
doi:10.1136/adc.2008.139162

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Pilot of 'Families for Health': community-based family intervention for obesity

Wendy Robertson¹, Tim Friede¹, Jackie Blissett², Mary C.J. Rudolf³, Maybelle Wallis⁴, Sarah Stewart-Brown¹

¹ Health Sciences Research Institute, Warwick Medical School, University of Warwick, Coventry, UK

² School of Psychology, University of Birmingham, Birmingham, UK

³ Leeds Primary Care Trust and University of Leeds, Leeds, UK

⁴ Children's Unit, Sandwell General Hospital, West Bromwich, UK

Corresponding Author:-

Wendy Robertson
Lecturer in Public Health
Health Sciences Research Institute
Warwick Medical School
University of Warwick
Coventry
CV4 7AL

W.Robertson@warwick.ac.uk

Tel: 024 76574660

Fax:- 024 76528375

Keywords:- childhood obesity, parenting, community programme, intervention, treatment

Abstract

Objective - To develop and evaluate 'Families for Health' - a new community based family intervention for childhood obesity.

Design – Programme development, pilot study and evaluation using intention-to-treat analysis.

Setting – Coventry, England

Participants – 27 overweight or obese children aged 7-13 years (18 girls, 9 boys) and their parents, from 21 families.

Intervention – 'Families for Health' is a 12 week programme with parallel groups for parents and children, addressing parenting, lifestyle change and social & emotional development.

Main Outcome Measures – Primary: change in baseline BMI z-score at end of programme (3 months) and 9 month follow-up. Attendance, drop-out, parents' perception of programme, child's quality of life and self esteem, parental mental health, parent-child relationships and lifestyle changes were also measured.

Results: Attendance rate was 62%, with 18 of the 27 (67%) children completing the programme. For the 22 children with follow-up data (including 4 drop-outs), BMI z-score was reduced by -0.18 (95%CI -0.30 to -0.05) at end of programme and by -0.21 (-0.35 to -0.07) at 9 months. Statistically significant improvements were observed in children's quality of life and lifestyle (reduced sedentary behaviour, increased steps and reduced exposure to unhealthy foods), child-parent relationships and parents' mental health. Fruit and vegetable consumption, participation in moderate/vigorous exercise and children's self-esteem did not change significantly. Topics on parenting skills, activity and food were rated as helpful and were used with confidence by the majority of parents.

Conclusions

Families for Health is a promising new childhood obesity intervention. Definitive evaluation of its clinical effectiveness by randomised controlled trial is now required.

Introduction

The prevalence of obesity in UK children continues to rise and its prevention and management is now a public health priority.[1,2] Childhood obesity increases the risk of type 2 diabetes, cardiovascular disease, cancer, and psychosocial problems such as low self esteem and stigma.[3] It predicts adult obesity in 40% to 70% of children, with concomitant risks to adult health.[4]

A current challenge is how best to manage children who are already obese or overweight. Systematic reviews have reported an inadequate evidence base with no studies from the UK.[5] They have highlighted the importance of family involvement.[6] The UK National Institute for Health and Clinical Excellence concluded that programmes incorporating behavioural treatment alongside physical activity and diet were effective, particularly if parents were given the responsibility for behaviour change.[7]

Primary research contributing to this field include Epstein's group from New York who showed that 'family based behavioural treatment' (FBBT) targeted at parent and child together was more effective in long term weight management than targeting the child alone.[8] Golan from Israel compared parents with children as the exclusive agents of change, finding a greater reduction in overweight for the parent group.[9] A further RCT by Israel *et al* demonstrated that a behavioural programme was more effective when run with a parent training course,[10] indicating that parenting skills help to sustain improvement.

These trials, though suggesting that family interventions are effective, were all carried out in clinical settings. There is a lack of evidence on community-based interventions. Recent UK research on community interventions to manage childhood obesity include pilot studies on the WATCH IT programme from Leeds [11] and MEND (mind, exercise, nutrition, Do it!) from London.[12]

The home environment is important in the aetiology of childhood obesity. Parenting style and skills have been shown to predict children's BMI, fruit and vegetable intake, healthier eating, physical activity and sedentary behaviours.[13-15] Therefore, it is important for programmes to address parenting skills as well as lifestyle.

The aim of the current project was to develop and pilot a new family based group intervention, 'Families for Health'. This differs from other programmes being researched in the UK in its emphasis on parenting, relationship skills and emotional and social development, which may enhance long-term sustainability. It is delivered in a community setting, with the potential to increase access. The model is one of training local facilitators in order to increase local capacity.

Methods

Development of the Families for Health Programme

The programme was developed to a specification by a practitioner experienced in the development and delivery of parenting programmes and in training facilitators, in conjunction with a multi-disciplinary professional and academic Advisory Group. It is a 12 week programme involving a 2½ hour weekly session, comprising parallel programmes for overweight/obese children aged 7 to 11 and their parents. Parents and children meet mid-session to share an activity and a healthy snack.

The sessions combine proven elements from parenting programmes, school-based emotional development programmes and family lifestyle programmes. Parenting aspects draw on the UK based Family Links Nurturing Programme,[16] which has received positive evaluations in qualitative research and 'pre-post' evaluation.[17,18] Healthy eating components draw on nutritional recommendations in the 'Balance of Good Health'.[19] Parents are encouraged to control the home eating environment and monitor children's food intake, known to be effective strategies.[20,21] Restriction of children's eating was not employed, as this may lead to weight gain.[22] The programme promotes a sustainable healthy approach to family-wide lifestyle change. Further details are in Appendix I.

Piloting of the Families for Health Programme

The programme was piloted twice in Coventry at a leisure centre, on Saturday mornings (10am-12:30pm) from September to December 2005; and Monday evenings (5pm-7:30pm) from January to March 2006. The parents' and children's groups were each led by two facilitators. The programme developer was one of the facilitators for the parents' groups and other facilitators were recruited from local services: a health visitor, school nurse, school lifestyle worker, nutritionist and mental health worker. The facilitators undertook a 3 day training course followed by weekly supervision during the programme, provided by the programme developer.

The sample size was pragmatic, selected to include the experience of a range of different families and to estimate effect sizes for sample size calculations in the design of a subsequent RCT, if indicated. We aimed to recruit 20 families.

Recruitment of Families

Families with children aged 7 to 11 years who were overweight ($BMI \geq 91^{st}$ to 98^{th} centile) or obese ($BMI \geq 98^{th}$ centile) according to UK 1990 BMI reference charts,[23] were eligible. They were excluded if they did not speak English or if the child had a medical cause of obesity.

Several recruitment strategies were piloted: A range of health professionals were asked to recruit families. When this strategy failed, press releases were sent from the University's Communications Office, resulting in articles in local newspapers and radio interviews. In the second pilot two primary schools distributed flyers.

Evaluation Design

Process evaluation examined the success of recruitment methods, type of families recruited, attendance and drop-out. Families who attended at least half of the sessions were considered to have completed the programme. Families who withdrew were asked for their reasons. At the end, parents completed a questionnaire giving their

perception of the programme and whether they were using the new skills and knowledge confidently (Likert scale, 1-5). 'Before and after' evaluation was undertaken to compare quantitative measures at baseline, with the end of the programme (3 months) and at 9 months follow-up.

Measures of Overweight - The primary outcome measure was change in the children's BMI z-score from baseline. One investigator (WR) measured weight to the nearest 0.1kg with Tanita scales (TBF-300MA) and height to the nearest 0.1cm (Leicester stadiometer). BMI (weight(kg)/height(m)²) was converted into z-scores using the Child Growth Foundation's programme based on UK 1990 data.[23] Waist was measured to the nearest 0.1cm and translated into z-scores.[24] Percentage fat was measured by the scales using bio-impedance.

Psycho-Social Measurements – Children's quality of life was measured using PedsQL 4.0 for ages 8-12.[25] Children completed the 23-item self-report and parents the parent-proxy version. Children's self-esteem was measured using the 36-item Self-Perception Profile for Children.[26] Parents completed the 15-item Child-Parent Relationship Scale[27] and the Short Depression-Happiness Scale.[28]

Eating and Activity Behaviour - Children completed a 24-hour food recall using the 'Day in the Life Questionnaire' to determine portions of fruit and vegetables.[29] Parents completed the Family Eating and Activity Questionnaire, with summary scores calculated for: activity/inactivity balance, stimulus exposure (e.g.unhealthy snacks at home), eating related to hunger, and eating style.[30]

Children's physical activity was measured using a 7-day recording with a uniaxial accelerometer with step function (GT1M Actigraph). A diary was completed alongside. Average minutes per day undertaking moderate to vigorous physical activity (MVPA) was calculated using Freedson's equation,[31] using 4 METS as a cut-off. Average daily steps were also calculated. To be included in the analysis, 4 days of monitoring were needed for a reliable measurement.[32]

Ethical Approval

The project was approved by Coventry Research Ethics Committee (NHS) and registered with Coventry Teaching PCT.

Statistical Analysis

Binary and categorical data were summarised by frequencies, percentages and descriptive statistics (means, standard deviations) are given for continuous outcomes. Six families enrolled more than one child. To account for the hierarchical nature of the data induced by family clustering we fitted linear mixed models with random family effects for differences in scores between both (i) baseline and end of programme (3 months), (ii) baseline and 9-month follow-up. Intention-to-treat analyses are presented for both groups combined. Differences between the two groups (Saturday and Monday) were investigated; results are presented separately where significant differences were identified. We refer to differences as statistically significant when the two-sided p-value is smaller than 0.05. Analyses were conducted using SAS version 9.

Results

Recruitment and Baseline Characteristics

21 families (27 children) were recruited and started the programme (Figure 1). Of these, five families were recruited via health professionals, 13 families self-referred following publicity in the local media, and three came via recommendations from family/friends. No families were recruited via the school flyer.

Table 1 shows demographics and baseline BMI for the participants. Two-thirds of the children were girls. The ethnic mix was typical of Coventry (84% white in 2001 Census). Most children were obese, with three overweight children being siblings of obese 'index' children. Three children were above the target age range of 7 to 11.

Table 1 – Baseline Characteristics of Families and their Children who started the Families for Health Programme

Families		n	21
Family Type	Two parent family - Single Mother Step Family	n (%)	9 (43%) 9 (43%) 3 (14%)
Socio-economic classification of families [33]	Managerial/professional Intermediate Routine & Manual Never worked/unemployed	n (%)	5 (24%) 5 (24%) 9 (43%) 2 (9%)
Parental BMI	Not overweight/obese At least 1 parent overweight At least 1 parent obese	n (%)	4 (19%) 5 (24%) 12 (57%)
Children		n	27 (6 families with 2 children)
Gender	Males Females	n (%)	9 (33%) 18 (67%)
Age (years)		Mean (SD) Range	9.3 (1.9) 7-13
Ethnicity	White Asian/mixed	n (%)	22 (82%) 5 (18%)
BMI Classification	Overweight (91 st to 98 th centile) Obese (\geq 98 th centile)	n (%)	3 (11%) 24 (89%)
BMI z-score		Mean (SD) Range	2.76 (0.59) 1.42 to 4.02

Attendance

Attendance was 62%. Of the 27 children who started the programme, 15 (56%) completed, three (11%) partially completed (attended half the sessions, but attended irregularly) and 9 (33%) withdrew (Figure 1). Four families cited practical reasons for dropping out (new baby, new job, domestic issue, demands of work), one disliked the programme, and three gave no reason.

Engagement with the programme was better on Saturday morning, with 75% attendance and only one family withdrawing. The Monday evening programme achieved only 52% attendance and seven families (8 children) withdrew.

Attrition

We sought follow-up data on all families. 22 of the 27 children (from 16 families) contributed data, including four who withdrew (Figure 1).

Perception of the Programme

16 parents completed the questionnaire. The percentage of parents rating the various components as helpful (scoring 4 or 5) was high for parenting skills (84%), activity (79%) and food (83%). These new skills and knowledge were being applied confidently by 63%, 57% and 73% of parents, respectively.

Change in BMI z-scores

The primary outcome, change in BMI z-score, was reduced from baseline by -0.18 (95%CI -0.30 to -0.05, $p=0.008$) at the end of the 3 month programme. This was maintained at the 9 month follow-up (-0.21, 95%CI -0.35 to -0.07, $p=0.007$) (Table 2). The fully engaged group ($n=15$) showed a slightly greater reduction in BMI z-score at 9 months (-0.26, 95%CI -0.40 to -0.12) than overall. Other measures of overweight - waist z-score, % body-fat – were also significantly reduced.

Psycho-Social Measurements

From the parents' perspective, each aspect of the child's quality of life improved at 3 months (end of programme), but not at 9 months follow-up compared to baseline (Table 2). Significant improvements in physical functioning were reported by children at 3 and 9 months, but other aspects of quality of life were unchanged. Children's self-esteem showed no change for the six domains (Table 2). The relationship between parents and children improved significantly at 3 months, though statistical significance was lost by 9 months (Table 3). Parents' mental health improved significantly at both time points.

Lifestyle Change

The Family Eating and Activity questionnaire showed that children were significantly less exposed to unhealthy foods in the home ('stimulus exposure') and had developed an improved eating style; both changes were maintained to 9 months. However, fruit and vegetable consumption had not changed significantly at the end of the programme or at 9 months (Table 3).

Children became significantly less sedentary at both time points, based on the balance of activity/inactivity reported by parents (Table 3).^[30] This is consistent with the significant increase in average steps per day of children at 9 month follow-up (Table 3). However, the average minutes per day doing MVPA was unchanged (Table 3), though the two groups differed in their response. Group 1 reduced their daily MVPA from 71 to 64 minutes (mean difference -8, 95%CI -22 to 5.9, $p=0.22$) from September to December, and Group 2 showed a significant increase from 40 to 55 minutes (mean difference 15.5, 95%CI 0.7 to 30.4, $p=0.042$) from January to April.

Completers vs Drop-outs

There was no differences in baseline BMI or gender between the 18 completers and 9 who withdrew, but there appears to be differences depending on how they were recruited. Only 2 of the 13 families who self-referred after publicity in the local media withdrew; whereas 3 of the 5 families referred by health professionals; and all 3 of the families who enrolled following recommendations by friends/family, withdrew.

Table 2 - Summary of body composition, quality of life and self-esteem scores at baseline (0 months), end of programme (3 months) and nine month follow-up in 22 children with data (intention to treat analysis)

	0 months Mean (SD)	3 months Mean (SD)	9 months Mean (SD)	0-3 month change		0-9 month change	
				Mean (95% CI)	p value	Mean (95% CI)	p value
Child's Body Composition							
BMI z-score	2.75(0.63)	2.58(0.73)	2.55(0.68)	-0.18 (-0.30 to -0.05)	0.008	-0.21 (-0.35 to -0.07)	0.007
BMI (kg/m ²)	26.0 (4.4)	25.6 (4.8)	25.9 (4.6)	-0.48 (-1.04 to 0.08)	0.090	-0.11 (-0.80 to 0.58)	0.737
Waist z-score	3.33(0.58)	3.16(0.67)	3.13(0.67)	-0.19 (-0.30 to -0.07)	0.003	-0.21 (-0.34 to -0.08)	0.004
Waist (cm)	86.4 (13.1)	84.9 (12.9)	86.3 (12.5)	-1.73 (-3.14 to -0.32)	0.02	-0.23 (-2.3 to 1.8)	0.813
% Body Fat	37.7 (5.5)	36.8 (6.1)	34.9 (6.0)	-1.03 (-2.72 to 0.66)	0.212	- 2.90 (-4.98 to -0.82)	0.01
Fat Free Mass (kg)	31.3 (8.3)	31.9 (8.4)	34.7 (8.7)	0.66 (0.11 to 1.21)	0.020	3.46 (2.72 to 4.21)	<0.001
Child's Quality of Life (PEDS QL) – from Parent's Perspective (Range 0-100)							
All 23 Qs	69.1 (11.8)	78.0 (9.2)	75.1 (12.9)	9.0 (4.9 to 13.0)	<0.001	6.7 (-0.9 to 14.4)	0.08
Physical Health	70.1 (14.8)	79.8 (12.1)	77.6 (17.1)	10.0 (2.9 to 17.1)	0.009	8.2 (-0.9 to 17.3)	0.075
Emotional/ Social/School	68.6 (13.3)	77.1 (10.3)	73.8 (12.2)	8.5 (3.8 to 13.2)	0.001	5.8 (-2.1 to 13.6)	0.138
Child's Quality of Life (PEDS QL) – from Child's Perspective (Range 0-100)							
All 23 Qs	64.9 (17.0)	70.2 (17.8)	71.6 (17.2)	5.1 (-2.8 to 13.0)	0.189	7.0 (-1.2 to 15.2)	0.087
Physical Health	63.6 (17.8)	73.7 (15.5)	74.1 (17.4)	9.7 (0.0 to 19.3)	0.049	11.1 (0.6 to 21.6)	0.04
Emotional/ Social/School	65.6 (18.1)	68.3 (21.7)	70.3 (18.9)	2.7 (-6.2 to 11.5)	0.534	4.8 (-3.1 to 12.8)	0.214
Child's Self-Esteem (Self-Perception Profile for Children) (Range 1-4)							
Scholastic	2.66 (0.88)	2.67 (0.60)	2.72 (0.84)	0.01 (-0.26 to 0.27)	0.953	0.06 (-0.22 to 0.34)	0.657
Social	2.54 (0.68)	2.55 (0.68)	2.58 (0.91)	0.01 (-0.24 to 0.26)	0.960	0.03 (-0.31 to 0.38)	0.851
Athletic	2.33 (0.77)	2.38 (0.56)	2.39 (0.62)	0.04 (-0.24 to 0.31)	0.781	0.06 (-0.34 to 0.46)	0.753
Physical Appearance	2.24 (0.85)	2.17 (0.85)	2.30 (0.92)	-0.08 (-0.46 to 0.31)	0.689	0.06 (-0.43 to 0.54)	0.810
Behaviour	2.89 (0.19)	2.89 (0.73)	3.06 (0.72)	0.0 (-0.38 to 0.38)	0.987	0.14 (-0.31 to 0.59)	0.512
Global Self Worth	2.62 (0.96)	2.68 (0.61)	2.76 (0.89)	0.06 (-0.25 to 0.37)	0.687	0.14 (-0.37 to 0.64)	0.578

Table 3 - Summary of lifestyle (dietary and activity) measures, relationship between parents and children, and parents mental health scores at baseline (0 months), end of programme (3 months) and nine month follow-up in 22 children with data (intention to treat analysis)

	0 months Mean (SD)	3 months Mean (SD)	9 months Mean (SD)	0-3 month change		0-9 month change	
				Mean (95% CI)	p value	Mean (95% CI)	p value
Child's Habitual Activity by Accelerometer (Actigraph) (NB Mean data only on 18 children who had at least 4 days of records at each time point, differences done on n=20 for 0 to 3 month change and n=19 for 0-9 month change)							
Moderate & vigorous physical activity (MVPA) (mins/day)	59.3 (34.8)	60.6 (30.7)	62.3 (33.7)	2.7 (n=20) (-9.1 to 14.6)	0.620	4.0 (n=19) (-8.8 to 16.8)	0.521
Step count (steps/day)	7361 (2743)	7871 (2171)	8859 (2140)	654 (n=20) (-630 to 1937)	0.292	1571 (n=19) (519 to 2623)	0.007
Child's Fruit & Veg Consumption (Day in the Life Questionnaire)							
Portions	1.7 (1.3)	1.8 (1.8)	2.4 (1.6)	0.1 (-0.7 to 0.9)	0.777	0.7 (-0.2 to 1.5)	0.119
Child's scores for Family Eating and Activity questionnaire (Golan) - (lower is better for all domains)							
Inactivity/Activity	14.1 (13.2)	7.4 (13.6)	8.8 (10.3)	-8.5 (-13.9 to -3.2)	0.004	-6.8 (-12.1 to -1.4)	0.017
Stimulus Exposure	9.7 (3.4)	6.8 (2.7)	6.8 (3.1)	-3.1 (-4.6 to -1.6)	0.001	-3.3 (-5.0 to -1.5)	0.001
Eating Related to Hunger	3.4 (1.4)	3.5 (1.5)	3.0 (1.9)	0.2 (-0.8 to 1.1)	0.672	-0.4 (-1.2 to 0.5)	0.364
Eating Style/Rites	23.8 (5.4)	18.1 (6.3)	17.8 (5.6)	-6.2 (-9.5 to -3.0)	0.001	-6.2 (-8.9 to -3.6)	0.000
Child-Parent Relationship Scale (higher is better) (Range 1-5)							
15 Q	3.85 (0.71)	4.15 (0.48)	4.08 (0.78)	0.31 (0.06 to 0.55)	0.018	0.22 (-0.07 to 0.52)	0.128
Parents Mental Health (Short Depression-Happiness Scale) (Range 0 to 3)							
Score (16 Parents)	1.81 (0.75)	2.25 (0.64)	2.21 (0.59)	0.44 (0.12 to 0.76)	0.011	0.40 (0.01 to 0.78)	0.045

Discussion

'Families for Health' differs from other childhood obesity programmes currently being researched in the UK in its emphasis on parenting and relationship skills. It is based in a community setting and the model is one of training local facilitators in order to increase local capacity and sustainability. This pilot study with 21 families suggests that the programme may reduce overweight and improve other health related outcomes.

The programme attracted families from diverse family types and socio-economic groups. Unpaid publicity in the local media proved to be the most effective recruitment strategy, and families recruited in this way were more likely to complete the programme; self-referral may indicate commitment to change.[34] The overall drop-out rate of 33% is within the range for other obesity management interventions.[7] Our pilot showed that timing of sessions influenced attendance and completion, with Saturday morning much better than Monday evening, largely due to practicalities of attending this 2½ hour programme after school. Parents indicated that the programme was helpful, with new skills and knowledge being used confidently.

The achievement of a significant reduction in BMI z-score of -0.21 at 9 month follow-up (6 months after completion of the intervention) is very encouraging. This may underestimate the benefit on obesity as children referred to hospital outpatient clinics may actually increase BMI by 0.2 z-score over this timescale.[11] Although benefits are difficult to assess without a control group, our results are similar to other UK based interventions aimed at this age group, notably MEND which showed a -0.24 difference in BMI z-score between randomised groups at a 6 month follow up.[35]

Quality of life scores (PedsQL) for the 28 overweight/obese children at baseline of 65.3 (self-report) and 67.7 (parent), are much lower than scores for 'healthy' children from Wales (UK) and USA; but similar to children with chronic diseases and obese children in USA.[36,37] It is therefore encouraging that the parent-proxy scores increased significantly at the end of the Families for Health programme, in both physical function and psycho-social health. The difference lost statistical significance by 9 months, but the clinical significance of these improvements in quality of life should not be underestimated. Children reported improved physical functioning which may help engagement in physical activity.

Surprisingly, a review of the literature showed that the association between obesity and self-esteem in children is modest in community samples, though shows a stronger link in clinical samples.[38] Baseline scores for children on Families for Health appeared lower than Scottish children at least on the athletic and appearance domains,[39] but the programme has shown no change. The validity of Harter's Self-Perception Profile has been questioned for intervention designs in British children,[40] suggesting that further work may need to use an alternative measure.

Improvements on the Family Eating and Activity Questionnaire[30] could be attributable to social desirability response bias, with answers from parents reflecting perceived expectations. Interviews with parents, however, validated the questionnaire findings, with some families indicating they had bought dinner tables and had stopped having sweets/snacks in the home.

Changes in activity levels, however, were only partially demonstrated. The inactivity/activity balance on the Golan questionnaire did improve significantly, with children becoming less sedentary.[30] Increased step-counts at 9 month follow-up also indicated success of the programme to encourage 10,000 steps per day. However, minutes of MVPA did not change as a result of Families for Health, though the second group showed a significant increase from baseline in January to the end of the programme in April. This highlights a problem with looking at changes over time. Children are less active in winter,[41] and as we did not have a full 12 month follow-up, habitual activity was measured at different times of year, making interpretation difficult. Though MVPA did not change, the two other measures suggest an increase in habitual activity.

The relationship between parents and children improved significantly at the end of the programme, reflecting the emphasis in 'Families for Health' on parenting and relationship skills. Giving parents the main responsibility for the behaviour change in the family is central to the success of the Families for Health pilot and may enhance long-term sustainability. This will be examined in a two-year follow up.

Conclusion

The Families for Health programme is a promising new childhood obesity intervention which has the potential to make a real difference to help families with children who are overweight or obese, impacting on obesity and other health outcomes. This programme warrants further piloting and evaluation in a randomised controlled trial.

What is already known on this topic?

- The most promising interventions outside of the UK for the management of obesity in children under age 12 are when parents are given the main responsibility for change.

What this study adds

- The Families for Health programme is a promising new childhood obesity intervention which shows benefits in measures of overweight and other health outcomes.

Acknowledgements

The development and piloting of the Families for Health (FFH) programme was funded by a Public Health Initiative award from the Department of Health. Coventry Teaching PCT supported the pilot both practically and financially.

The materials for this programme were developed by Candida Hunt and the University of Warwick. Candida Hunt developed the training, trained children and parent group facilitators and facilitated the parents' groups.

Professor Jane Barlow, Chris Burrows, Dr Laurel Edmunds, Dr Krystyna Matyka, Dr Anita Morgan and Elizabeth Wilcock sat on the Research Advisory Group which provided advice and support for the development of the programme and the evaluation. Dr Moria Golan provided advice on the development of the programme.

Thanks also to:- Michelle Oldfield for administrative support; the facilitators, Mandy Coombes, Clair Hobbs, Daksha Myrie, Dawn Swan and Stephen Withers; Coventry Sports and Leisure Centre; and to the families who took part.

Competing interests – None

Figure Legend

Figure 1 - Flow of families through the pilot groups

To go underneath Figure 1:-

** Attended half the sessions but attended irregularly. i.e. One family attended mostly in the first half of the programme and little in the second half. One family attended at the start and end of the programme but missed many of the middle sessions.*

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Appendix I – Details of the Families for Health programme

Parents' Programme:- The approaches used included facilitated discussion, role play, goal setting, skill practice, a solution focused approach rather than a focus on problems, and homework. The topics covered included both support with parenting skills and family lifestyle. Parenting skills topics included giving praise, raising self-esteem, positive discipline, consistently enforced family rules, relationships education, emotional health and developing autonomy. Family lifestyle topics included controlling the child's eating environment to limit exposure to unhealthy foods, making healthy choices available, food labels, portion sizes, family meal times; cooking advice and the opportunity to try new foods; decreasing sedentary behaviour (e.g. limiting TV); and increasing sustainable physical activity.

Children's programme:- There were three components. First, information on healthy eating using the Balance of Good Health,[19] food labels, trying new foods and practical food preparation (served at the mid-session break with parents). Second, circle time enabled discussion of the emotional aspects of their lives and of living with obesity, to develop their emotional literacy, raise self-esteem and build confidence. Third, a focus on physical activity aimed to increase activity levels by participation in games, introduction to new physical activities that could be sustained, and the use of pedometers to encourage 10,000 steps per day.

Figure 1 – Flow of families through the pilot groups

