Monitoring and Evaluation of Belfast City Council Healthier Families Programme

Final Report August 2011

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Executive Summary

Being overweight increases an individual's risk of a range of chronic diseases. Overweight and obese adults are more likely to have overweight children and it is likely that children's food choices and physical activity behaviours are influenced by the family environment. Community efforts to tackle obesity therefore have begun to focus on the family unit. The Belfast City Council Healthier Families Programme was a 13-week pilot programme designed to promote weight loss and encourage active lifestyles. Participants were assessed at baseline, week 6 and at the end of the programme and then again at 3,6 and 12 months following the end of the programme. This report describes the effectiveness of the programme in altering a range of physical, physiological, psychosocial and dietary parameters.

Weight decreased among adults while children maintained weight over the 13 week intervention period. Physical activity showed an upward trend among adults and was maintained during follow up but activity declined in children during the 12 month post-intervention period. Following the intervention there was evidence of improvement in self-esteem and favourable alterations in dietary intake through improved nutritional habits. 43 out of the 99 individuals initially recruited failed to complete the intervention and a further 23 individuals did not attend all of the follow-up assessments. Although disappointing, this rate of compliance is not atypical for such interventions.

Our analysis suggests that participants with the highest body weight and lowest perception of physical attractiveness at baseline were the most likely to drop out of the intervention or follow-up assessment. Tailoring the intervention at the level of the individual and providing greater support for the most overweight individuals and those with the lowest level of self-esteem at baseline may be required to improve the effectiveness of future weight-loss programmes.

1 INTRODUCTION

1.1 Background

Being overweight increases an individual's risk of a range of chronic diseases including heart disease, high blood pressure, diabetes and stroke and it is thought that approximately 30,000 deaths per year results from diseases associated with obesity (Haslam & James, 2005). In addition overweight and obese individuals are more likely to exhibit low self-esteem, anxiety and depression and suffer social exclusion. Overweight and obesity are caused by an imbalance between energy intake from food and drink consumed and energy expenditure from physical activity and that both of these behaviours (food intake and physical activity) must be addressed in an effective weight management programme. Overweight and obese adults are more likely to have overweight children. Although genetic factors may play a role in this association – it is likely that children's food choices and physical activity behaviours are influenced by the family environment. Efforts to tackle obesity have therefore begun to focus on the family unit.

1.2 Healthier Families Programme

The Belfast City Council Healthier Families Programme was a 13-week pilot programme designed to promote weight loss and encourage active lifestyles. The programme consisted of group and individual family counselling and physical activity sessions designed to increase physical activity and encourage family members to consume a healthier diet.

1.3 Monitoring & Evaluation

A team of researchers from the University of Ulster's Sport & Exercise Sciences Institute and N3C Leisure Solutions were commissioned to assess the effectiveness of the pilot programme in altering a range of physical, physiological, psychosocial and dietary parameters. Participants in the programme were assessed at baseline, at 6 weeks at

the end of the 13 week intervention and at 3, 6 and 12 months following the end of the intervention.

1.4 Purpose

This report describes the monitoring and evaluation of the Belfast City Council Healthier Families Programme conducted by Belfast City Council from April 2010 – June 2011. The report outlines the results of a range of assessments carried out on the 25 families who participated in the 13 week lifestyle intervention conducted by Diet Express (April-June 2010) at baseline, at the midpoint of the 13 week intervention, immediately post intervention and 3, 6 and 12 months post-intervention (Sept 2010, Jan 2011 and June 2011). The report makes several recommendations which are intended to inform plans for expansion of the pilot and/or future weight loss programmes for families.

2. Participants

2.1 Recruitment

25 families (46 adults 52 children) were recruited by Belfast City Council through the Leisure Services department. Recruitment through local community, leisure and healthcare facilities was supplemented by a media advertisement through a television news feature. Families were recruited from four geographical areas within the BCC area.

2.2 Drop Out & Attendance at data collection sessions

Families were required to attend 6 data collections sessions (pre-intervention, mid-intervention, post-intervention and at 3 months, 6 months and 12 months following the end of the intervention). Numbers attending each of the data collection sessions are shown in Table 1. Not every participant who attended a data collection session participated in all tests, therefore attendance data has been compiled from weight measurements since this was the primary outcome measure in the evaluation.

	Baseline	Midpoint	Post	3 months	6 months	12 months
Families	25	21	18	16	13	11
Adults	46	36	29	27	21	20
Children	52	41	31	24	25	19
TOTAL	98	77	60	51	46	39

Table 1 Number of participants attending each data collection session

Not all families who took part in the intervention attended all 6 follow-up sessions. In addition not every member of the family attended each session. Table 2 therefore describes participation in each family. There were 5 families where every family member took part in all 6 data collection points.

Fam	Ad	Ch	Participation in Data collection session
1	2	1	All family members attended all 6 sessions
2	2	2	All family members attended all 6 sessions
3	1	3	All children attended all 6 sessions Adult participated in all sessions except midpoint
4	2	2	All family members attended all 6 sessions
5	2	3	All family members attended first 2 sessions then dropped out
6	2	1	All family members attended first 2 sessions then dropped out
7	2	4	2ad 3ch attended first 2 session, 2ad 1ch attended 12mos follow-up
8	2	3	All family members attended first session then dropped out
9	1	1	All family members attended first 2 sessions then dropped out
10	1	3	All family members attended pre mid and post intervention but no follow-up
11	2	3	All attended baseline 1ad 2ch attended pre mid and post no follow-up
12	2	1	All family members attended all 6 sessions
13	2	2	All family members attended pre mid post and 3mos follow-up 1ad 2ch attended 6 mos follow-up no attendance at 9 mos follow up
14	1	2	All family members attended pre mid post and 3mos and 6 mos follow-up no attendance at 9 mos follow up
15	2	3	All family members attended first session then dropped out
16	2	1	All family members attended first session then dropped out
17	2	2	All family members attended first session then dropped out
18	2	2	2ad 1ch Attended pre mid and post intervention but no follow-up
19	2	1	All adults attended all 6 sessions Child attended all but 6 mos follow-up
20	2	2	All family members attended pre mid post and 3mos follow-up 1ad 1ch attended all 6 sessions
21	2	3	2ad 2ch attended all 6 sessions. 1ch attended pre, mid, post, 3 mos and 6 mos follow-up
22	2	3	2ad 2ch attended all 6 sessions. 1ch attended pre, mid, 6 mos and 9 mos follow-up
23	1	1	All family members attended pre, mid, post and 3 mos follow-up
24	2	2	All family members attended all 6 sessions
25	2	3	All family members attended pre and mid. 2ad and 2ch attended post and 3 mos follow-up

Table 2. Family participation in data collections sessions

Since the data collection was divided into 3 intervention (pre mid and post) and 3 follow-up (3 mos, 6 mos and 12 mos) sessions, those participants attending the pre mid and post intervention assessments were deemed to have completed the intervention. **Pre to post intervention data** and statistical analysis of the change from baseline to

post-intervention is therefore reported for **56 participants (28 adults 28 children)** who attended baseline, 6 week and post intervention assessments.

Participants who completed all 6 assessments were deemed to have completed the intervention and follow-up. **Full data** pre intervention to 12 month post intervention follow up and statistical analysis of the change from baseline to the end of follow-up is therefore reported for **33 participants (17 adults 16 children**)

56 participants completing the intervention from an initial recruitment of 99 represents 57% adherence to the 13 week programme. 18 of the 25 families initially recruited remained involved in the programme through to the post-intervention assessment at week 13. 33 participants completing the intervention and all subsequent follow ups represents 33% adherence at the 15 month time point.

A significance trawl indicated that drop out from the programme was not random. Individuals who had the highest initial body mass were more likely not to complete the 3 intervention assessments (pre mid and post) and even more unlikely to complete the follow-up assessments.

2.3 Demographic information on participants

Gender, age and prevalence of overweight and obesity
Intervention participants (n=56)
15 female and 13 male adults took part in the intervention. The age distribution of the adult participants is shown below:

	25-34 years	35-44 years	45-54 years
Female	3	8	4
Male	1	7	5

11 girls and 17 boys took part in the intervention. The age distribution of the children who participated is shown below:

	5-9 years	10-14 years	15-19 years
Female	0	8	3
Male	5	7	5

Intervention and follow-up participants (n=33)

10 female and 7 male adults took part in the intervention and all follow-ups. The age distribution of the adult participants is shown below:

	25-34 years	35-44 years	45-54 years
Female	1	6	3
Male	0	4	3

7 girls and 9 boys took part in the intervention. The age distribution of the children who participated is shown below:

	5-9 years	10-14 years	15-19 years
Female	0	5	2
Male	3	3	3

3. Anthropometric Measures

3.1 Weight

At the start of the intervention mean ($\pm$ SEM) weight of adults was 95.0 ($\pm$3.4) kg. Using adult BMI cut-off points of BMI >25 for overweight and BMI> 30 for obese 15 adults were obese at the start of the intervention and a further 11 adults classified as overweight. There was a statistically significant decrease in weight to 92.2 ($\pm$3.3) kg by the end of the intervention. 24 of the 28 adults lost weight from baseline to post intervention. Weight loss ranged from 1.5 to 6.8 kg over the 13 week period.

At the start of the intervention mean ($\pm$ SEM) weight of children was 48.4 ($\pm$3.5) kg. Using child cut-off points and assigned age bands (as opposed to actual age) for children we estimate that 9 children were overweight or obese at the start of the intervention. There was slight non-significant increase in mean weight among children over the 13 week intervention. In growing children weight gain is expected over time. The aim of overweight and obesity prevention is not to achieve weight loss but to prevent unhealthy weight gain.

The mean weight (kg) of participants (n=56) completing the intervention is shown below:

	Baseline	Week 6	Post-intervention
Adults (n=28)	94.9	92.8	92.2
Children (n=28)	48.4	48.7	48.7

For adults who took part in the intervention and follow up weight decreased significantly during and following the intervention and rose during the 12 month follow-up period. However even at the 12 month follow-up weight was still significantly lower than at baseline. Children's weight did not change over the course of the intervention

but rose during the 12 month follow up period. Weight of participants who took part in all assessments is shown below:

	Baseline	Midpoint	Post	3 months	6 months	12 months
Adults	92.0	89.9	89.1	89.8	90.2	90.3
Children	46.1	46.6	46.6	48.0	49.3	50.4
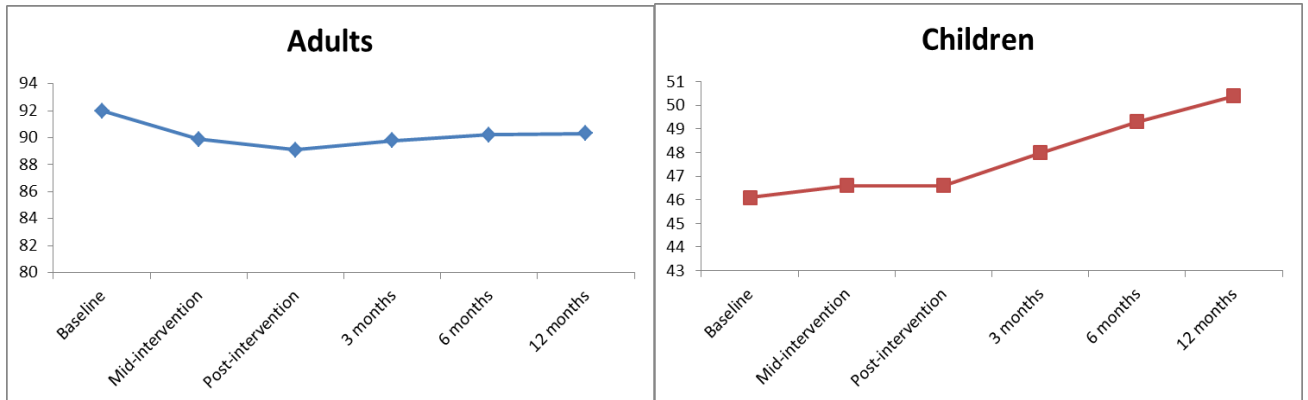
3.2 Body Mass Index (BMI)

BMI is a measure of weight for height. The decrease in mean weight among adults participating in the intervention resulted in a significant decrease in BMI from baseline to post-intervention. Likewise there was no alteration in mean BMI among children who participated in the programme. Mean BMI ($kg \cdot m^2$) of adults and children who participated in the intervention (n= are shown in the table below:

	Baseline	Week 6	Post-intervention
Adults	32.9	32.1	31.9
Children	21.4	21.3	21.2

For adults who took part in the intervention and follow up BMI decreased significantly during and following the intervention and rose during the 12 month follow-up period. However even at the 12 month follow-up weight was significantly lower than at baseline. BMI in children did not change during the intervention but rose during the 12

month follow-up. BMI of participants who took part in all 6 assessments is shown below:

	Baseline	Midpoint	Post	3 months	6 months	12 months
Adults	31.4	30.7	30.4	30.7	30.7	30.8
Children	20.0	20.1	20.1	20.3	20.5	20.7

3.3 Waist Circumference

Waist circumference was measured as an indicator of visceral or abdominal fat. In adult, storage of fat in this region is considered to increase cardiovascular disease risk to a greater extent than storage of a similar amount of fat on the hips and thighs. There was no change in mean waist circumference in adults taking part in the intervention and a small but significant increase in the waist circumference of children taking part. Mean waist circumference (cm) of adults and children who participated in the intervention are shown in the table below:

	Baseline	Week 6	Post-intervention
Adults	106.9	106.8	107.4
Children	77.0	79.9	80.3

For participants who took part in the intervention and follow up there were no significant alterations in waist circumference during the intervention or the 12 month follow-up period but a steady significant increase in this measure in children. Waist circumference of participants who took part in all assessments is shown below:

|	Baseline	Midpoint	Post	3 months	6 months	12 months
Adults	104.0	103.3	103.8	104.5	106	103.9
Children	75.2	77.3	77.0	78.3	79.6	78.2

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4. Physical Activity

Physical activity was measured using pedometers. Pedometers were worn for 4 days (Friday to Monday inclusive) in advance of each of the assessments. Although not statistically significant mean total step counts for 4 days increased from 28,833 at baseline to 36,550 at the post-intervention assessment. Guidelines suggest that adults should accumulate 10,000 steps per day (40,000 over 4 days) with children aiming to accumulate 12,000 -15,000 steps per day (48,000-60,000 over 4 days). Mean steps over the 4 day period are shown in the table below:

	Baseline	Week 6	Post-intervention
Adults	26,967	29,945	34,847
Children	41,896	41,004	48,465

For participants who took part in the intervention and follow up there were no significant changes in the number of steps taken over the 4 day assessment during the intervention or the 12 month follow-up period. Step counts for children declined during the 12 month follow-up. 4 day step counts for participants who took part in all assessments are shown below:

	Baseline	Midpoint	Post	3 months	6 months	12 months
Adults	32,134	35,360	37,741	38,834	38,865	39,124
Children	48,113	41,740	49,255	48,293	41,597	37,231

As indicated steps per day guidelines exist for children and adults, we have therefore converted the 4 day step counts into mean daily steps for adults and children at all 6 assessments and these are shown below:
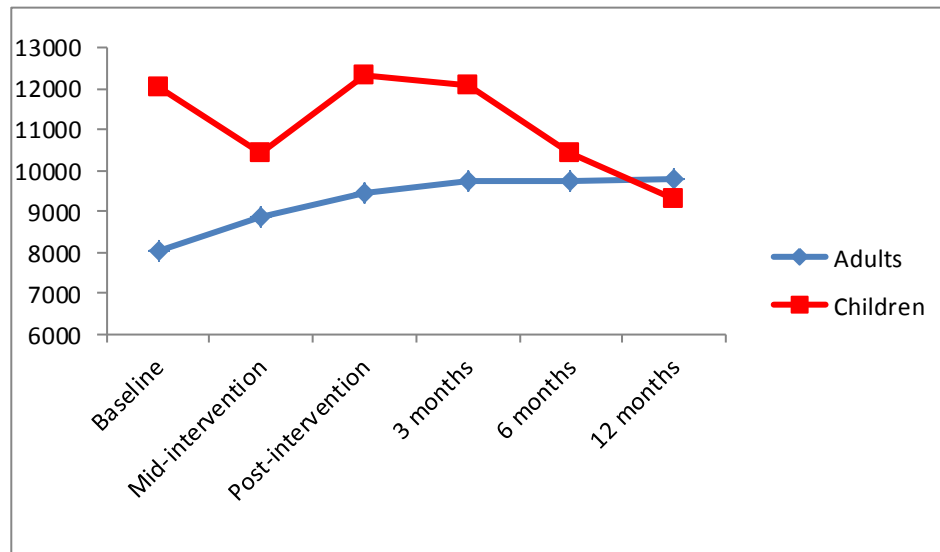
Adults who took part in all 6 assessments were more active at baseline at the midpoint of the intervention and at the end of the intervention than those who did not take part in the follow-up assessments. Children's physical activity declined during the post intervention follow up. Physical activity among children shows a downward trend with age and the decrease observed may reflect this change in age (children all 1 year older).

5. Health Measures

5.1 Blood Pressure

Blood pressure and resting heart rate was measured in all participants. Mean ($\pm$SEM) systolic blood pressure in adults was 135.5 ($\pm$5.9) mmHg at baseline and showed a non-significant decrease to 129.6 ($\pm$1.2). Diastolic blood pressure showed a statistically significant decrease from 91.1 ($\pm$3.7) to 82.2 ($\pm$0.9). At baseline 13 participants had diastolic blood pressure > 140mm Hg and/or diastolic blood pressure> 90 mmHg by the post intervention measurement 4 of these participants had blood pressure beneath these cut-offs points.

Mean systolic and diastolic blood pressure in adults and children at baseline, 6 weeks and post intervention are shown in the table below:

	Baseline		Week 6		Post-intervention	
	Systolic	Diastolic	Systolic	Diastolic	Systolic	Diastolic
Adults	136	91	129	85	130	82
Children	119	78	109	70	111	63

Adults who took part in the intervention and follow-up showed a significant decrease in both systolic blood pressure from baseline to 12 months post intervention. There were no significant changes in children's blood pressure:

	Baseline		Midpoint		Post		3 months		6 months		12 months	
	Sys	Dia	Sys	Dia	Sys	Dia	Sys	Dia	Sys	Dia	Sys	Dia
Adults	136	87	125	82	128	83	132	88	124	81	128	86
Children	117	79	105	66	108	64	127	69	104	62	112	72

5.2 Total Cholesterol

Total cholesterol was measured from a sample of capillary blood in all adults who participated in the intervention. Mean ($\pm$SEM) total cholesterol in adults at baseline was 4.2 mmol·l^{-1}. This remained statistically unchanged throughout the assessments. This total cholesterol is within normal ranges for adults aged 25-54 and therefore a reduction as a result of a lifestyle intervention would not be expected. At baseline 8 participants had total cholesterol levels which could be regarded as elevated (>5.1 mmol·l^{-1}). At the end of the 13 week intervention 5 of these individuals had total cholesterol values within normal range. Mean total cholesterol (in mmol·l$^{-1)}$ in adults at baseline, 6 weeks and post intervention are shown in the table below:

	Baseline	Week 6	Post-intervention
Male	4.1	4.2	4.2
Female	4.9	4.1	4.1

For adults who took part in the intervention and follow up there were no significant alterations in total cholesterol. Total cholesterol of participants who took part in all assessments is shown below:

	Baseline	Midpoint	Post	3 months	6 months	12 months
Male	5.0	4.5	4.3	4.6	4.6	4.4
Female	4.3	4.3	4.3	4.6	4.5	4.5

5.3 Resting heart rate

Resting heart rate (RHR) was measured at each assessment as a crude index of cardiovascular fitness. Although there were fluctuation in HR over the three time points these do not represent any perceptible change in cardiovascular fitness. RHR across the 3 assessments are shown in the table below

	Baseline	Week 6	Post-intervention
All	69.9	66.3	71.3
Male	79.2	68.4	76.0
Female	68.3	65.9	70.6
Adults	69.3	65.6	70.3
Children	73.0	71.0	77.7

For participants who took part in the intervention and follow up there were no significant changes in resting heard rate during the intervention or the 12 month follow-up period. Resting heart rate for participants who took part in all assessments is shown below:

	Baseline	Midpoint	Post	3 months	6 months	12 months
Adults	73.3	68.5	72.4	69.5	66.9	69.1
Children	76.9	73.2	77.9	77.0	77.4	76.7

6. Psychosocial Measures

Participant's self-esteem was assessed using previously validated questionnaires. Questionnaires were self-completed by participants at each assessment. Responses to questions were used to determine participants' perceptions of themselves in a range of areas. Different questionnaires were used for adult, adolescents and children.

6.1 Adults

Individual perceptions of global self-worth, physical attractiveness, athletic competence and sociability were assessed from the adult's responses to the questionnaire items at baseline, after 6 weeks and at the end of the intervention. Each item was scored out of a maximum of 4 points.

Mean global self-worth, scores increased from baseline to week 6 and this increase was sustained through to post-intervention measurement. Mean scores for physical attractiveness, athletic competence and sociability increased from baseline to post-intervention. Scores on each of the 4 scales are shown in the table below:

	Baseline	Week 6	Post-intervention
Global self worth (GSW)	2.3	2.7	2.8
Physical attractiveness (PA)	2.1	2.2	2.4
Athletic competence (AC)	1.8	1.9	2.0
Sociability (SOC)	2.8	2.9	3.0

Only 12 adults (6F 6M) completed the 4 psychological inventories at all 6 timepoints. The mean scores on each scale are shown below.

	Baseline	Midpoint	Post	3 months	6 months	12 months
GSW	2.5	2.9	2.9	2.8	3.0	2.7
PA	2.2	2.3	2.5	2.4	2.4	2.2
AC	2.1	2.4	2.5	2.6	2.3	2.5
SOC	2.7	2.8	2.8	2.8	2.7	2.9

A significance trawl revealed that adults reporting higher initial Physical Attractiveness were more likely to complete the pre and post intervention assessments and more likely to complete the follow-up assessments.

6.2 Adolescents

Adolescents perceptions of global self-worth, physical attractiveness and athletic competence were assessed from their responses to the questionnaire items at baseline, after 6 weeks and at the end of the intervention. Each item was scored out of a maximum of 4 points.

In adolescents there was no change in global self worth, physical attractiveness following the intervention. Perceptions of athletic competence increased from baseline to post-intervention.

Mean scores on each of the 3 scales are shown in the table below:

	Baseline	Week 6	Post-intervention
Global self worth	3.1	3.0	2.9
Physical attractiveness	3.1	3.0	2.8
Athletic competence	2.9	3.1	3.8

Only 4 adolescents completed the assessments at all 6 time points making any statistical analysis of change over the programme impossible.

6.3 Children

Children's responses to their questionnaires were used to determine their perception of their global self-worth, scholastic competence, athletic competence and social acceptance at baseline, after 6 weeks and at the end of the intervention. Each item was scored out of a maximum of 4 points.

In all 4 measures mean scores increased from baseline to post intervention however none of these increases were statistically significant. It is likely that this lack of statistical significance is due to the small sample size.

Scores on each of the 4 scales are shown in the table below:

	Baseline	Week 6	Post-intervention
Global self worth	3.0	3.2	3.4
Scholastic competence	2.8	2.8	3.2
Athletic competence	2.8	3.1	3.2
Social Acceptance	3.2	3.2	3.6

Only 3 children completed the assessments at all 6 timepoints making any statistical analysis of change over the programme impossible.

7 Nutritional Habits

Nutritional habits of families were assessed using a Food Frequency Questionnaire completed by participant at all 6 assessments. Families were required to indicate how many times per day or week that they consumed a range of foodstuffs. This information was used to describe dietary habits at each time point. In total 31 participants completed the food frequency questionnaires at all 6 time points. Mean frequency of consumption per week of key foodstuffs for adults is shown in the table below:

	Baseline	Midpoint	Post	3 months	6 months	12 months
Meat & Fish	16.7	16.1	16.3	15.0	13.0	13.3
Bread & Savoury biscuits	7.7	6.8	7.1	6.0	3.5	3.3
Potatoes Rice and Pasta	11.3	9.5	9.5	10.7	8.4	8.4
Dairy products and fats	16.5	15.2	15.2	15.0	8.9	9.7
Sweets and Snacks	17.0	12.8	12.8	14.0	13.9	15.0
Sugary drinks	9.1	10.6	10.7	14.2	10.6	11.6
Fruit	10.3	14.6	14.6	12.5	10.5	10.6
Vegetables	18.9	23.7	23.7	25.4	20.5	23.7

Significant decreases in consumption of meat and fish, bread and savoury biscuits, bread rice and pasta, dairy products and fats, and sweets and snacks and a significant increase in the consumption of fruit and vegetables appears to have occurred over the course of the intervention and follow-up. These results should be interpreted with care as it is likely that self-report measures of food intake exhibit considerable variation and are affected by misreporting (Subar et al 2003)

8 Conclusions

The 13 week intervention which engaged families in a range of activities designed to encourage weight loss among those family members who were overweight and obese and improve the nutrition and physical activity habits of all families showed some success in altering several of the selected outcome measures. Weight decreased among adults while children maintained weight over the 13 week period. Physical activity showed an upward trend among adults but remained stable in children. The increase in physical activity was maintained during follow up in adults but activity declined in children during the 12 month post-intervention period. Following the intervention there was evidence of some improvement in self-esteem and favourable alterations in dietary intake through improved nutritional habits.

Drop out and/or non-compliance by 43 out of the 99 individuals initially recruited failed to complete the intervention. This high drop-out although disappointing is not unusual for lifestyle interventions targeting overweight and obesity. Adherence to changes in physical activity and dietary behaviours is notoriously difficult to achieve with most research indicated only modest adherence to such changes over 12 to 24 months.

In order to alter morbidity and mortality on a population level, such interventions need to induce changes which are sustained over time. Accordingly, The Standard Evaluation Framework for weight management interventions (2009) recommends that follow up should be at a minimum of 3 points including at 1 year. The assessments at 3, 6 and 12 months following the end of this intervention allowed an evaluation of whether the favourable changes induced by the intervention can be sustained over time. In total 33 participants from 9 families attended all 6 assessments representing one third of the initial sample. Such adherence to follow-up measures at 15 months may not allow an assessment of the impact of the intervention, as some families and participants may have altered nutritional and physical activity habits as a result of the intervention but

failed to attend follow-up. Incentivising attendance at assessment may encourage participation and result in follow-up measurements which provide a more accurate reflection of the medium-term impact of a weight loss or weight management intervention.

Our evaluation was not designed to elicit qualitative information from participants on the quality of the programme, reasons for adherence or drop out or other factors affecting weight loss and physical activity behaviour changes observed. Qualitative feedback from both participants and from the professionals delivering the intervention may provide the type of rich data which could guide the interpretation of our quantitative results and provide further information on reasons for adherence and non-adherence to both the intervention and follow-up assessments.

Our analysis showed that those individuals with the highest body weight at the start of the intervention were less likely to attend all 6 assessments. Individuals with higher body weight may have already tried and failed on several occasions to address weight loss. In addition physical activity may be less pleasurable and more embarrassing for heavier individuals (Kwak at al 2006). Additional efforts to engage the heaviest individuals or those most likely to benefit from weight loss interventions may be required. A recent review by Elfhag and Rossner (2005) suggests that successful weight maintenance is associated with more initial weight loss, and reaching a self-determined goal weight. Including realistic individually agreed weight loss targets and efforts to ensure compliance with the intervention to ensure these targets are achieved may be necessary. Research suggests that weight loss maintenance becomes easier after 2-5 years, emphasising the importance of interventions and support which help people maintain a stable healthy weight in the first few years after this has been achieved   (Wing and Phelan 2005). In the current intervention participants received ongoing but significantly reduced support after the initial 13 week programme. This may have affected attendance at follow-up assessments and/or maintenance of weight loss.

We also identified that individuals with the highest self-reported Physical Attractiveness at baseline were most likely to attend all 6 assessments. This highlights the importance of self-esteem and self-efficacy in weight-loss interventions. Although the evaluation assessed a range of psychological factors, the intervention did not explicitly attempt to improve participants self-esteem or apply behavioural models to achieve physical activity and dietary change. The role of behavioural psychology as a component of weight loss programmes has been identified and it is likely that success in achieving and maintaining weight loss is associated with factors such as internal motivation, social support, coping strategies, self-efficacy, autonomy, and psychological strength stability. (Elfhag and Rossner 2005).

An analysis of data from those individuals who attended all 6 assessments suggests in general that the intervention was successful in achieving weight loss in adults and that although weight gain occurred during follow-up reductions in weight from baseline were still present 12 months after the intervention had ended. This suggests that intervention may have caused some longer term alteration to physical activity and dietary behaviours although this remains somewhat speculative. In children there was maintenance of body weight over the course of the intervention and an increase in body weight during the 12 month follow-up. Such an increase in body weight is not unexpected as children grow and develop. The small number of children (n=16) the age range (5-19) and the lack of information on status make any further interpretation of the rate of increase in weight over this period difficult.

In conclusion the 13 week weight loss programme focused on families with 1 or more overweight or obese members appears to have been successful in promoting weight loss, increasing physical activity and improving self-esteem in individuals who attended pre and post intervention assessments. Those who engaged in follow-up assessment showed some degree of maintenance of these positive changes.

9. Recommendations

On the basis of monitoring and evaluating the BCC Healthy Families programme the following recommendations are advanced. It is intended that these recommendations might be used to guide future family-based weight loss interventions planned by Belfast City Council:

- Elicit feedback from participants on the quality of the intervention, perceived barriers to adherence and attendance at follow-up assessments. This information could be used to shape future interventions to achieve improved adherence

- Seek qualitative feedback from the professionals delivering the intervention to inform the design of future interventions

- Incentivise participation at follow-up assessment to ensure that any evaluation is more robust

- Tailor the intervention at the level of the individual providing greater support for the most overweight individuals and those with the lowest level of self-esteem at baseline.

- Where the intention is to focus on the family unit, consider identifying the 'key influence' individual (for example, main food buyer/preparer or activity leader) within the family unit and target additional support to maximise the impact of their key role

- Conduct a thorough standardised needs analysis, including SMART goals, with each adult and adolescent participant at the pre intervention stage. The needs analysis should include any history of similar interventions/attempts and their outcomes along with any perceived barriers to future success

- Further qualitative evaluation to explore the types of activity that were engaged in and whether these were family based activities or performed alone and which explore the challenges faced by family members in motivating others in their family to be active.

- Qualitative focus groups with participants who increased their activity, asking them about their motivations and insights into the programme and how activity could be sustained in the future.

- If you dietary behaviour change is a primary objective of the intervention more reliable methods of dietary analysis such as using day weighed diet diaries or food photography and picture plate waste (PPW) methods which have been successfully used to avoid the issue of under reporting/over estimating could be employed (Black, 1993; Nelson et al., 1996).

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