A community-based cooking programme "Eat Better Feel Better" can improve child and family eating behaviours in low socioeconomic groups

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What is already known

- Discretionary food and convenience food intake are associated with high prevalence of overweight and obesity
- Cooking interventions increase participant's cooking confidence and food literacy.
- Community based approaches to deliver cooking skills on a small scale are promising strategies to improve fruit and vegetable intake and reduce convenient food consumption

What this study adds

- A government funded cooking programme can be successfully delivered to hard to reach target groups by community organisations
- The Eat Better Feel Better cooking programme reduced convenience food and discretionary food consumption while increasing fruit and vegetable intake in children in the short and long term
- The Eat Better Feel Better cooking programme is a useful tool to provide healthy eating advice and promote diet change at population level

ABSTRACT (240)

Background: The immediate and sustained impact of the Eat Better Feel Better cooking programme (EBFBCP) on food choices and eating behaviours in families and children was evaluated.

Methods: The EBFBCP (6-weeks, 2h/week) was delivered by community-based organisations in Greater Glasgow and Clyde, Scotland. Before, after and at follow-up, parents/caregivers completed short pictorial questionnaires to report family/child eating behaviours and food literacy.

Results: In total 83 EBFBCP were delivered and 516 participants enrolled of which 432 were parents and caregivers. Questionnaire completion rates were 57% (n=250) for before and after and 13% (n=58) for follow up. Most participants (80%) were female, 25-44 years old (51%) and considered socioeconomically deprived (80%). The immediate effects of the EBFBCP on eating behaviours and food literacy were: families ate less takeaway/fast foods (10% reduction, p=0.019) and ready meals (15% reduction P=0.003) and cooked more from scratch (20% increase, p<0.001). Children's consumption of discretionary food/drinks was significantly reduced after the EBFBCP for: sugary drinks (10% reduction, p=0.012), savoury snacks (18%, p=0.012), biscuits (17%, p=0.007), sweets/chocolates (23%, p=0.002), fried/roasted potatoes (17%, p<0.001), savoury pastries (11%, p<0.001). Number of fruit (15%, p=0.008) and vegetable portions (10%, p<0.001) increased while biscuits decreased (13%, p=0.005). Parental food label reading increased: calories (22%), fat (23%), sugar (22%), ingredients (19%) and portion size (19%). Most changes were sustained at a median 10 months follow-up.

Conclusion: The EBFBCP improved children's and families food choices and behaviours. The EBFBCP can be recommended to support families to make better food choices.

INTRODUCTION

Unhealthy eating patterns contribute to weight gain and increase the risk for chronic disease[1]. In Western countries, the consumption of highly processed and discretionary foods that are energy dense and nutrient poor contributes up to 50% of total energy intake due to their high sugar and saturated fat content[2 3]. Discretionary food consumption across the life span is associated with higher obesity prevalence[4]. Convenience food consumption, such as eating out, consuming takeaway and ready meals also contribute to increased obesity prevalence in adults and children[5]. The lack of cooking skills and a decline in home cooking practices is a barrier to healthy eating in young adults living in deprived areas[6]. Limited home cooking is associated with less likelihood to meet dietary guidelines[7], in addition cross-sectional evidence adjusted for socio-economic, gender and age factors in the UK shows that those with higher cooking skills are less likely to consume ultra-processed and discretionary foods[8]. [9]

Cooking interventions are popular public health strategies to promote diet and eating behaviour change. They are attractive to implement in community-based settings because they use participative approaches, they can be delivered in small groups, they can be flexible and adaptive to the target groups (e.g. families of young children, vulnerable groups)[9]. Cooking programmes also have additional outcomes. They contribute to reduce isolation and loneliness and provide additional skills such as training in food hygiene supporting increased employability for the food and catering sector[10]. Community based cooking programmes are effective in teaching cooking skills, increasing cooking confidence and knowledge of healthy eating that result in positive changes in eating behaviours[11]. However the evidence on impact of cooking programmes is often based on non-rigorous study designs with small sample size, non-validated evaluation tools, short term outcomes and an evident lack of health related outcomes[12]. In addition, a recent systematic review of observational and intervention studies highlighted the lack of government driven policies on community based cooking programmes and the lack of evidence of the effectiveness of such approaches[13]. In the UK, cooking interventions are often planned and delivered by small third sector organisations who lack strategic planning and long term funding[9]. Furthermore, there is limited evidence on the impact of government driven cooking interventions on unhealthy eating behaviours. In particular the impact of cooking on other outcomes such as discretionary food consumption has not been thoroughly explored[11 13]. We aimed to evaluate the immediate and sustained impact of the Eat Better Feel Better cooking programme (EBFBCP) developed by the National Health Service (NHS) Greater Glasgow and Clyde (GGC), Public Health in Scotland on food choices and eating behaviours in families and children.

METHODS

Study design and ethical considerations

A before-and-after with a follow-up evaluation design was used. The before and after component was a service improvement evaluation and did not require ethics approval while the follow-up study was conducted after the intervention and ethical approval was obtained from the Medical, Veterinary and Life Sciences, Ethics Committee at Glasgow University (200140157). All procedures involving human subjects were conducted in accordance with the guidelines laid down in the Declaration of Helsinki. Consent for participants to be contacted again was sought at the

beginning of the service evaluation and only those who agreed and provided a telephone number were contacted by telephone for a follow-up interview.

Settings and Intervention

The EBFBCP was developed, organised and funded by NHS GGC Public Health. The programme content was previously described[14]. In short, the EBFBCP consisted of a 6 week, once/week cookery class with healthy eating education elements and practical activities lasting 2 hours. The Eat Well Guide informed the core healthy eating messages with additional information on reading food labels and understanding the Food Standards Scotland traffic light system. Other aspects included tips to achieve "5 a day" fruit and vegetable recommendations, preparing healthy breakfasts, packed lunches and takeaways as well as reducing confectionary and sugar intake. The EBFBCP can be accessed at http://www.nhsggc.org.uk/about-us/professional-support-sites/community-cooking-network/. The EBFBCP was first tested and evaluated for content and outcomes related to barriers to healthy eating[14]. Following the first evaluation, the NHS GGC Public Health commissioned a larger number of cooking programmes, their impact evaluation is presented in this study. A procurement framework prior to commissioning and tendering of the programme was developed and disseminated to local community-based deliverers. The framework aimed to unify the delivery of cooking programmes by different centres and suppliers to assure its quality and to keep the highest standards by providing specifications outlined in the tender documentation. This included adherence to best practice guidance and training requirements. A request to tender was advertised on the Public Contract Scotland website (2015) and work was awarded by a scoring panel.. The programme reached 6 out of 8 localities in GGC. A total of 83 EBFB cooking programmes were delivered between 2016 and early 2017.

Recruitment and Participants

The target population for this evaluation were parents and caregivers of young children living in areas of socioeconomic deprivation in the GGC Health Board. Participants were recruited through NHSGGC, local Health and Social Care partnerships and partner organisations such as third sector organisations and self-employed community chefs. A total of 516 participants from 6 localities and 8 different centers enrolled in the EBFBCP. From this, 84 participants were excluded because they were not part of the target group, these were adults with mental health and addiction issues, adults (caregivers) and families of children with additional support needs, vulnerable adults or young men only groups that did not report to have children. A total of 432 participants were included in the data analysis, they were parents and caregivers of children under 5 year of age (n=358, 83%), pregnant mothers (13, 3%) and families (61, 14%). From this we analysed data from 250 (58%) participants who completed before and after questionnaires and answered >= 80% of questions. At enrolment, 267 participants agreed to be contacted again for follow-up. 87 were reached but only 58 (13%) who answered questions over the telephone had matching baseline questionnaires for paired analysis (**Fig 1**). Thirty-nine participants had matching questionnaires for the three time points (before, after and follow-up) but the results are not presented here because their findings were similar to those completing before and follow-up questionnaires.

Measures and outcomes

The outcomes were family eating and cooking behaviours and child consumption of specific foods, identified as being popular choices consumed by the Scottish population[15 16]. Relevant family eating and cooking practices included

eating meals together, eating restaurant, takeaway and supermarket ready meals and buying and cooking ingredients from scratch. Child eating behaviours were measured by weekly frequency of consumption of discretionary foods, fruit and vegetables, takeaway and ready meals and sugary drinks. We also measured number of portions consumed for fruit, vegetables, biscuits and whether participants checked food label components (calories, sugar, fat, portion size and ingredients). Measurements were obtained before and after the EBFB cooking programme and at follow-up using questionnaires to be self-completed by the adult who attended the cooking programme and who reported family and child eating behaviours. The questionnaires were adapted from our previous evaluations[14 17] to be suitable for this evaluation. We followed feedback from the first phase evaluation of the EBFBCP to reduce the length of questionnaires and to make it easier to read. For this, we used pictorial constructs. There were 19 questions on food choices and one question on food labelling use which included 5 different elements. From the 19 questions on food choice, two questions related to breakfast frequency and portion size were excluded from analysis due to ambiguity and also because they performed poorly when assessing reliability. After the intervention, participants were asked to provide feedback about the course using three open-ended questions (results not shown here). All questionnaires collected before and after the EBFBCP were completed by the participants and returned to the course deliverer and sent back to the NHS GGC Public Health for entry and analysis. The data entry and analysis were conducted by independent researchers at University of Glasgow.

Statistical Analysis

One researcher entered data and a second researcher performed a quality control by checking each questionnaire and assuring correct data entry. Questionnaires that reported 80% of valid responses were included in the analysis. Statistical analysis was conducted using IBM SPSS (version 21.0, IBM, Foster City, CA, USA). Cronbach alpha was used to test internal consistency of the 19 items in the questionnaire. Reliability was measured for before and after groups of questions that used similar scales, all questions with a Cronbach alpha >0.6 were included in the analysis. Cronbach alpha for family eating and cooking practices (4 questions) and children's food intake (9 questions) using weekly frequencies was 0.701. Children's intake in terms of portions was measured using a scale from 0 to 5>, in this group of questions, 3 items had a Cronbach alpha of 0.605 and 2 items had a Cronbach alpha <0.600, the later were considered poor and the corresponding questions were excluded from the analysis. A question on reading food labels had a Cronbach alpha of 0.868. The main outcomes for intervention effects were analysed using Wilcoxon signed-rank tests. Paired data were compared for before and after and before and follow-up intervention effects. Statistical significance was accepted at $p<0.05$.

RESULTS

Participants in the EBFPCP who completed before, after (n=250) and follow-up questionnaires (n=58) showed similar demographic characteristics (**Table 1**). The characteristics of those who did not complete questionnaires (n=182) are also presented in Table 1 to allow comparisons between respondents and non-respondents. Overall, the characteristics of all participants that enrolled, participants that completed before, after and follow-up questionnaires are similar to the participants that were excluded from the analysis. The majority of those who completed questionnaires before, after and follow up were female, between 25 and 44 years of age with 2 children with a median age between 8 and 4 years old. Most participants lived in Inverclyde and fell within quintiles 1 and 2 of socioeconomic deprivation scores

as described by the Scottish Index of Multiple Deprivation (SIMD). The EBFB programme had a high attendance rate with most participants reporting to attend at least 4 sessions (~70%), attendance rates declined to ~55% at week 6.

Immediate Impact (Before and After programme)

The programme had a positive impact on improving family eating and cooking practices associated with healthier eating habits (**Table 2**). A significantly higher number of parents reported eating takeaway foods, less frequently from 2-4 times/week to once/week (23 vs 13%, p=0.019), more families ate ready meals bought from the shops less frequently (33 vs 18%, p=0.003) and more families bought ingredients to cook from scratch (17 vs 37%, p<0.001).

Parents and careers also reported positive changes in their children's food choices after the programme. Statistically significant reductions in weekly consumption of discretionary foods included less full sugar and soda drinks (25 vs 15%, p=0.012); crisps and savoury snacks (33 vs 15%, p<0.004); biscuits (33 vs 16, p<0.007), sweets and chocolates (39 vs 16%, p=0.002); chips, fried or roasted potatoes (36 vs 19%, p< 0.001), and sausage, rolls, pies and pastries (34 vs 13%, p< 0.001). On the other hand, healthier eating practices were also reported after the intervention including increased number of portions for fruit (23 vs 38%, p=0.008) and vegetables (17 vs 44%, p<0.001) and a reduction in the number of portions of biscuits (29 vs 16%, p=0.005) (**Table 3**).The cooking programme increased participants checking food labels when shopping for food by approximately 20% for each food label component (calories, fat, sugar, portion size and ingredient list) as shown in **Figure 2**.

Participants attendance to the programme was high with more than 60% of participants attending 4 or more sessions. We present a stratified analysis by attendance in **Supplementary Table 1** where it is shown that all except one of the findings were observed in participants that attended more than 4 sessions as compared to those with low attendance. This suggest that participants needed to attend at least 4 sessions to improve their eating behaviours.

Long term Impact (Before and at Follow-up)

From the 267 (62%) participants who agreed to be contacted at follow-up, 87 (20%) were reached but only 58 (13%) had matching questionnaires before the programme that could be used for follow-up comparisons. The length of follow-up was a median of 10 months (minimum 2 months, maximum 22 months); 15% were interviewed 2-6 months after programme completion, 51.9% between 6 to 12 months after programme completion and 48% between 12 and 22 months. A detailed table of results at follow-up is shown in **Supplementary Table 2 and 3** and the key findings are summarised in **Table 4**. The reported improvements in family eating, cooking practices and children's food consumption were maintained at follow-up except for sugary drink consumption, which was no longer statistically different from the start of the intervention. Other aspects retained were checking food labels for energy, sugar and fat but checking ingredients and portion size decreased **(Figure 1, supplementary material**).

Table 1. Demographics of participants of the Eat Better Feel Better 6-week cooking programme

Demographics	All participants		Before and After[1]		Before and Follow-Up[1]		Participants excluded	
	n	%	n	%	n	%	n	%
Sample size	432	100	250	100	58	100	182	100
No. of Sessions Attended								
Week 1	326	75	199	80	48	83	127	70
Week 2	318	74	203	81	49	84	115	63
Week 3	300	69	194	78	54	93	106	58
Week 4	283	65	179	72	40	69	104	57
Week 5	237	55	148	59	39	67	89	49
Week 6	227	53	140	56	32	55	87	48
Average attendance								
1-3 sessions	63	14	17	7	8	14	46	25
4-6 sessions	267	62	170	68	40	69	97	53
Missing	102	24	63	25	10	17	39	21
Gender								
Female	350	81	204	82	52	90	146	80
Male	57	13	43	17	5	9	14	8
Missing	25	6	3	1	1	1	22	12
Age (years)								
≤16	10	2	2	1	2	3	8	4
17–24	57	13	32	13	7	12	25	14
25–34	112	26	70	28	17	29	42	23
35–44	90	21	56	22	13	22	34	19
≥45	77	18	58	23	16	28	19	10
Missing	86	20	32	13	3	5	54	30
No. of children[2]	2	1-4	2	1-4	2	1-4	2	1-4
Children's age[3]	8,6,5,5	1-49	8,6,5,4	1-49	7,6,4,4	2-28	7,6,6,6	1-38
Location								
Inverclyde	216	50	144	58	36	62	72	40
Glasgow North West	68	16	14	6	2	3	54	30
Glasgow North East	35	8	33	13	3	5	2	1
Renfrewshire	69	14	32	13	5	9	28	15
East Renfrewshire	49	11	25	10	10	17	24	13
West Dunbartonshire	4	9	2	1	2	3	2	1
SIMD[4]								
Quintile 1	272	63	166	66	40	69	106	58
Quintile 2	59	14	36	14	9	16	23	13
Quintile 3	20	5	9	4	1	2	11	6
Quintile 4	11	2	9	4	2	3	2	1
Quintile 5	19	4	11	4	3	5	8	4
Missing	51	12	19	8	3	5	22	12

Notes:, [1]Data used for main analysis and results in this paper [2]Median (min-max), based on n=283 for all participants, n=181 (72%) for before and after, and n=46 (83%) for before and follow-up and 182 for participants not included in analysis due to incomplete or unreturned questionnaires . [3] Median age of 1st to 4th child separated by commas, minimum and maximum values are for 4 children, this might include elder children from grandparent who was caregiver completing questionnaire. [4]SIMD, Scottish Index of Multiple Deprivation, quintile 1 the most deprived, quintile 5 the most affluent.

Table 2. Family eating and cooking practices and children's weekly consumption before and after EBFB cooking programme (n=250)

		Weekly frequencies, N (%)							Summary Rank Statistics (%)			*p*-value
		never or < once per week	Once per week	2-4 times per week	5-6 times per week	Once per day	Twice per day or more	Missing	After Intervention			
									Less	More	Ties	
Family Eating and Cooking Practices												
Eat meals together	**Before**	19 (8%)	22 (9%)	46 (18%)	53 (21%)	37 (15%)	57 (23%)	16 (6%)	22	28	50	0.423
	After	19 (8%)	16 (6%)	54 (22%)	48 (19%)	36 (14%)	53 (21%)	9 (4%)				
Eat takeaways/fast food	**Before**	86 (34%)	113 (45%)	37 (15%)	2 (1%)	2 (1%)	2 (1%)	8 (3%)	23	13	64	0.019
	After	86 (34%)	121 (48%)	23 (9.5%)	0 (0%)	1 (0.5%)	2 (1%)	17 (7%)				
Eat ready meals bought from the shops	**Before**	90 (36%)	55 (22%)	68 (27%)	15 (6%)	12 (5%)	2 (1%)	15 (3%)	33	18	49	0.003
	After	84 (34%)	77 (31%)	55 (22%)	9 (4%)	4 (1.5%)	1 (0.5%)	20 (8%)				
Buy ingredients and cook from scratch	**Before**	40 (16%)	35 (14%)	84 (34%)	48 (19%)	14 (6%)	21 (8%)	8 (3%)	17	37	47	<0.001
	After	17 (7%)	26 (10%)	89 (36%)	59 (24%)	18 (7%)	22 (9%)	19 (7%)				
Children drink and food consumption												
Water or squash with no added sugar	**Before**	12 (5%)	11 (5%)	28 (11%)	39 (16%)	38 (15%)	96 (38%)	26 (10%)	19	24	57	0.277
	After	8 (3%)	14 (6%)	24 (10%)	37 (15%)	36 (14%)	99 (39%)	32 (13%)				
Full sugar/soda drinks not diet soft drinks	**Before**	98 (39%)	33 (13%)	45 (18%)	13 (5%)	16 (6%)	11 (5%)	34 (14%)	25	15	60	0.012
	After	94 (38%)	53 (21%)	35 (14%)	8(3%)	16 (6%)	5 (2%)	39 (16%)				
Crisps and savoury snacks	**Before**	17 (7%)	28 (11%)	85 (34%)	24 (10%)	61 (24%)	11 (4%)	24 (10%)	33	15	52	0.012
	After	19 (8%)	38 (15%)	80 (32%)	28 (11%)	49 (20%)	5 (2%)	31 (12%)				
Biscuits	**Before**	22 (9%)	25 (10%)	76 (30%)	39 (16%)	54 (22%)	10 (4%)	24 (10%)	33	16	51	0.007
	After	27 (11%)	33 (13%)	82 (33%)	28 (11%)	41 (16%)	7 (3%)	32 (13%)				
Sweets and chocolate	**Before**	20 (8%)	34 (14%)	88 (35%)	41 (16%)	33 (13%)	10 (4%)	24 (12%)	39	16	45	0.002
	After	26 (10%)	44 (18%)	89 (36%)	23 (9%)	31 (12%)	3 (1%)	14 (6%)				
Cakes, puddings and pastries	**Before**	62 (25%)	69 (28%)	54 (22%)	15 (6%)	16 (6.5%)	3 (1%)	31 (12.5%)	28	20	52	0.052
	After	65 (26%)	78 (31%)	52 (21%)	11 (4%)	7 (3%)	2 (1%)	35 (14%)				
Chips and fried/roasted potatoes	**Before**	53 (21%)	59 (24%)	69 (28%)	26 (10%)	12 (5%)	6 (2%)	25 (10%)	36	19	44	<0.001
	After	59 (24%)	67 (27%)	70 (28%)	16 (6%)	3 (1%)	1 (0.5%)	34 (14%)				
Sausages, sausage rolls, pies, pastries	**Before**	43 (17%)	79 (32%)	66 (26%)	22 (9%)	9 (3%)	7 (3%)	24 (10%)	34	13	53	<0.001
	After	63 (25%)	74 (30%)	63 (25%)	10 (4%)	2 (0.5%)	4 (1.5%)	34 (14%)				

Table 3. Children consumption of fruit, vegetables and biscuits (n=250)

Categories		Daily frequencies, N (%)							Summary Rank Statistics (%)			*p*-value
		None	One	Two	Three	Four	Five or more	Missing	After Intervention			
									Less	More	Ties	
Fruit portions/day	**Before**	13 (5%)	38 (15%)	64 (26%)	61 (24%)	21 (8%)	25 (10%)	28 (11%)	23	38	39	0.008
	After	9 (4%)	28 (11%)	58 (23%)	66 (26%)	25 (10%)	29 (12%)	35 (14%)				
Vegetable portions/day	**Before**	28 (11%)	54 (22%)	64 (26%)	41 (16%)	17 (7%)	16 (6%)	30 (12%)	17	44	39	<0.001
	After	16 (6%)	43 (17%)	57 (23%)	57 (23%)	25 (10%)	14 (6%)	38 (15%)				
Biscuits typical portion*	**Before**	10 (4%)	80 (32%)	92 (37%)	25 (10%)	4 (1%)	6 (2%)	31 (12%)	29	16	55	0.005
	After	12 (5%)	93 (37%)	86 (34%)	12 (5%)	2 (0.5%)	4 (1.5%)	41 (16%)				

* not reported as daily consumption but estimate of typical portions/day.

Table 4. Summary of statistically significant findings before and after the Eat Better Feel Better Cooking programme and findings sustained at follow-up

	Family eating practices and children's food consumption	Before and After (n=250)	Before and After (n=58)
1	Family: eat meals together	N	N
2	Family: eat takeaways/fast food (Chips, Indian, McDonalds)	Y	Y
3	Family: eat ready meals bought from the shops	Y	Y
4	Family: buy ingredients and cook from scratch	Y	Y
5	Children: drink water or squash with no added sugar	N	N
6	Children: drink full sugar drinks or soda drinks/not diet drinks	Y	N
7	Children: eat crisps and savoury snacks	Y	Y
8	Children: eat biscuits	Y	Y
9	Children: eat sweets and chocolate	Y	Y
10	Children: eat cakes, puddings and pastries	Y	Y
11	Children: eat chips and potatoes that have been fried and/roasted	Y	Y
12	Children: eat sausages, sausage rolls, pies, pastries	Y	Y
13	Children: Fruit (number of portions/day)	Y	Y
14	Children: Vegetable (number of portions/day)	Y	Y
15	Children: Biscuit (typical number of portions/day)	Y	N

Note: Y = statistically significant change, N = not statistically significant change.

DISCUSION

"Eating well, having a healthy weight and being physically active" are components of a global strategy to promote healthier life styles and are part of the Scottish Government Public Health Priorities[18]. Thus, public health interventions that address these priorities within governmental settings are urgently needed. Using a community-based approach to deliver public health interventions is important for sustainability, reach within local communities, inclusiveness and to facilitate reaching target groups. Cooking programmes have been extensively used by health practitioners and third sector organisations as a vehicle for provision of practical cookery skills, the delivery of healthy eating advice and because they concomitantly provide other psychosocial benefits[12]. However, there is much critique of their value because they suffer from lack of rigorous evaluations, small sample size and lack of hard outcomes related to health. Still the few cooking programmes that have been rigorously evaluated have shown improvements in participants eating behaviour[11] and are therefore valid tools to promote dietary behaviour change.

We aimed to evaluate the impact of a large-scale government funded programme on family practices and child eating behaviours associated with unhealthy diet. The EBFBCP was piloted and evaluated for its design and effectiveness to improve cooking skills, confidence relating to food and reduce

barriers to cooking[14]. To scale up and increase reach in deprived areas, we chose to use community-based organisations as a delivery agent. This utilised the existing experience, knowledge and expertise of community agents to recruit participants who are harder to reach. The target population for this programme were those living in vulnerable areas due to higher socioeconomic deprivation. Another important element was to engage with parents of children <5 years of age to promote healthier life styles from an early age. Longitudinal studies of dietary patterns with high consumption of sugar, butter and sausages acquired in childhood are associated with increased number of risk factors for cardiovascular disease [19]. Similarly, other cohort studies have shown that unhealthy eating patterns in early childhood track into adolescence [20] and historic cohorts have demonstrated that consuming healthier diets is associated with lower cardiovascular mortality [21].

The EBFBCP provides much needed evidence of actions to inform government policy in Scotland and other similar settings. Several elements addressed in the EBFBCP align with the Scottish Government delivery plan for a healthier future [22]. These are that "children have the best start in life, that they eat well and have a healthy weight, that the food environment supports healthier choices, that leaders across all sectors promote healthy weight and diet and that diet-related health inequalities are reduced".

The framework adopted for the delivery of the EBFBCP was suitable to reach the proposed target population by using community groups who could, or currently engage with hard to reach target groups. The evaluation framework for the immediate impact of the programme was limited as we only reached approx. 50% of participants who completed before and after questionnaires. However, this is comparable to the quasi-experimental evaluation of Jamie Oliver's Ministry of Food cooking programme[23] and higher than our previous evaluation studies in Scotland[14 17]. The questionnaires used in this evaluation were shorter than our previous tools and used a pictorial design to address issues of literacy, this worked well as participants completed >80% of the items. On the other hand, the follow-up strategy was not successful with just a quarter of participants completing the follow-up questionnaire. This response rate was much lower than our previous evaluations of 27% [14] and 43% [17], this could have been mainly to participants being contacted just over the phone while previously a combination of postal and telephone interviews were used Relying solely on telephone interviews should be avoided for future studies.

The key outcomes of this study were frequency of consumption and number of portions of highly consumed discretionary foods in Scotland [16] but also fruit and vegetable intake as a proxy of healthy eating. The findings suggest that the EBFBCP had a positive impact on several aspects related to family eating practices and improved children's consumption of fruit and vegetables, simultaneously unhealthy eating behaviours such as convenience food eating and consumption of discretionary foods were reduced. Previous evaluations have shown similar results in adults and families[17 24], but they

have been mostly based on a small sample size and have not focused on discretionary food consumption nor provided a detailed description on frequency and number of portions consumed.[1125]

The major strength of this evaluation is its population approach and larger scale to allow more representativeness. Our findings generate evidence to inform the implementation of similar interventions. However, we suggest that future programmes with parents of young children should be limited to 4 weeks because we observed a decrease in attendance rates from 70% at week 4 to 55% at week 6, alternatively future programmes could facilitate childcare by offering a crèche or implement programmes where parent and child interact together during cooking.

A further strength is that we were able to recruit vulnerable populations, which is essential to reduce diet inequalities in public health. We could also follow a small proportion of participants to demonstrate the sustainability of the programme, this is very encouraging as the changes in behaviour remained similar after 8-10 months of attending the EBFBCP. Similar findings were reported in our one-year longitudinal evaluation of another government based cooking programme in parents of nursery-aged children in Scotland [17].

A main limitation of the study is the lack of a randomised and control component. However, this is not feasible in the context of "real life" delivery of public health interventions as was the original set up of the EBFBCP. Alternative evaluation designs such as a "before and after programme evaluation" which are more suitable to this type of intervention aiming to impact diet at population level can provide invaluable information to inform programme effectiveness, guide policy and funding[12]. A further limitation is the use of self-reported questionnaires and lack of biomarkers of intake which could provide a better estimate of diet quality. The low completion rate for follow-up and the variability in the time elapsed between programme completion and telephone interviews are also a limitation, thus our findings in terms of long-term impact should be interpreted with caution. This emphasises the need for better follow-up evaluation strategies and studies with a larger sample size.

Conclusion

The EBFBCP had an immediate positive impact in reducing parent and caregiver reported children's discretionary food consumption while increasing fruit and vegetable intake; this was maintained for most food choices and eating behaviours after 10 months. The EBFBCP can be recommended as a public health strategy to support families to make better food choices to improve children's diet.

COMPETING INTERESTS

None declared.

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AUTHORS' CONTRIBUTIONS

A.L.G, study design, data entry and quality control, analysis, interpretation of results, writing and editing, supervision. N.S.A, data entry and cleaning, telephone interviews, data analysis. E.H., management of programme and coordination of evaluation, writing and editing, A.P writing, editing. A.G-D. study design, writing and editing, programme supervision and management

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FIGURE LEGENDS

Figure 1. Eat Better Feel Better cooking programme participation and questionnaire completion rate. Bold numbers are those included in the main analysis.

Figure 2. Percentage of participants checking food labels before and after the Eat Better Feel Better cooking programme (n=250)

SUPPLEMENTARY MATERIALS

Supplementary Table 1. Summary of statistically significant findings before and after the Eat Better Feel Better Cooking programme stratified by attendance (n=250)

Supplementary Table 2. Family eating and cooking practices and children's weekly consumption before and after EBFB cooking programme (n=58)

Supplementary Table 3. Children portion consumption of fruit, vegetables and biscuits (n=58).

Figure 1. Percentage of participants checking food labels before the Eat Better Feel Better Cooking Programme and at follow up (n=58)

DATA ACCESIBILITY STATEMENT

The data underpinning this article are available in Enlighten: Research Data http://dx.doi.org/10.5525/gla.researchdata.894

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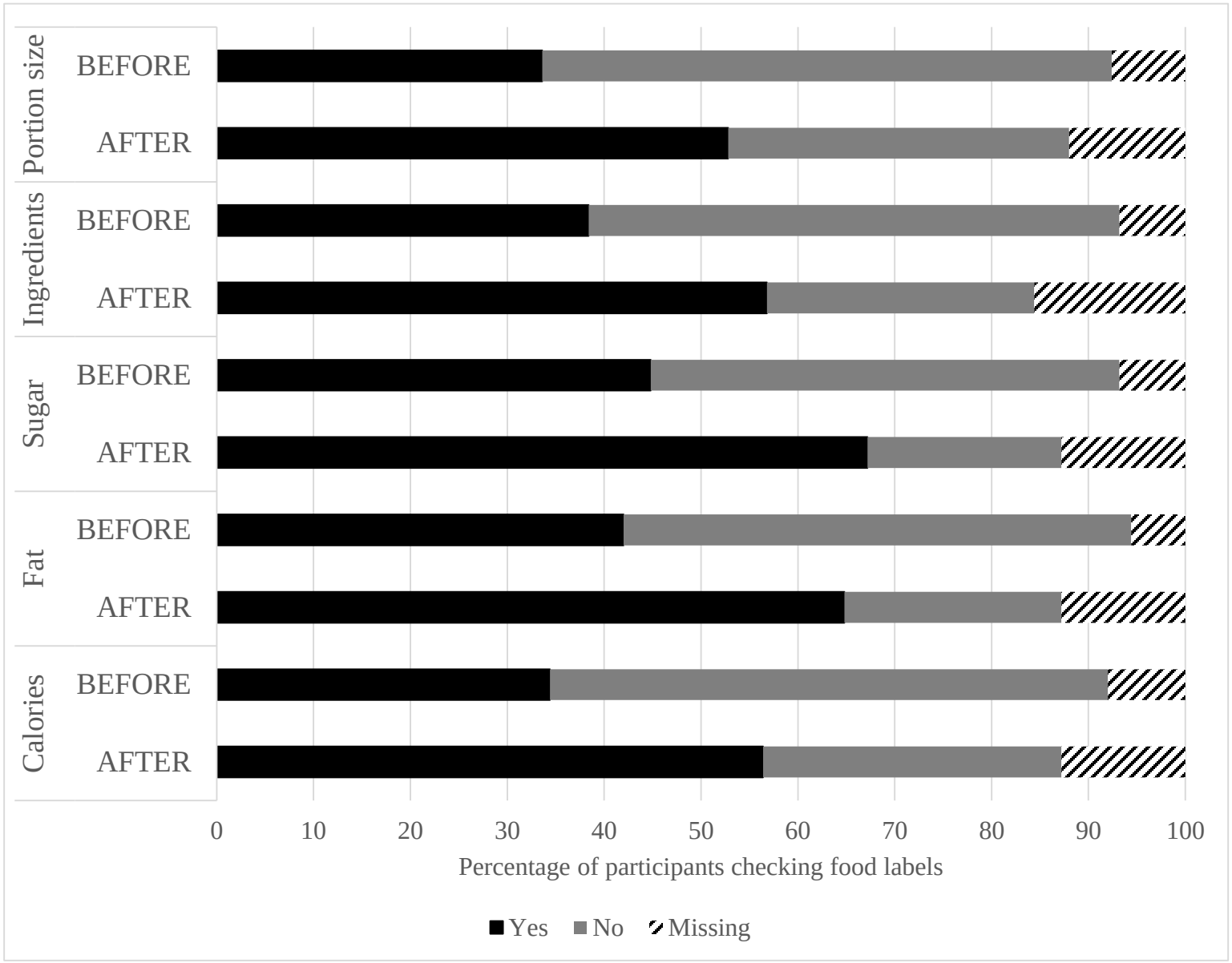
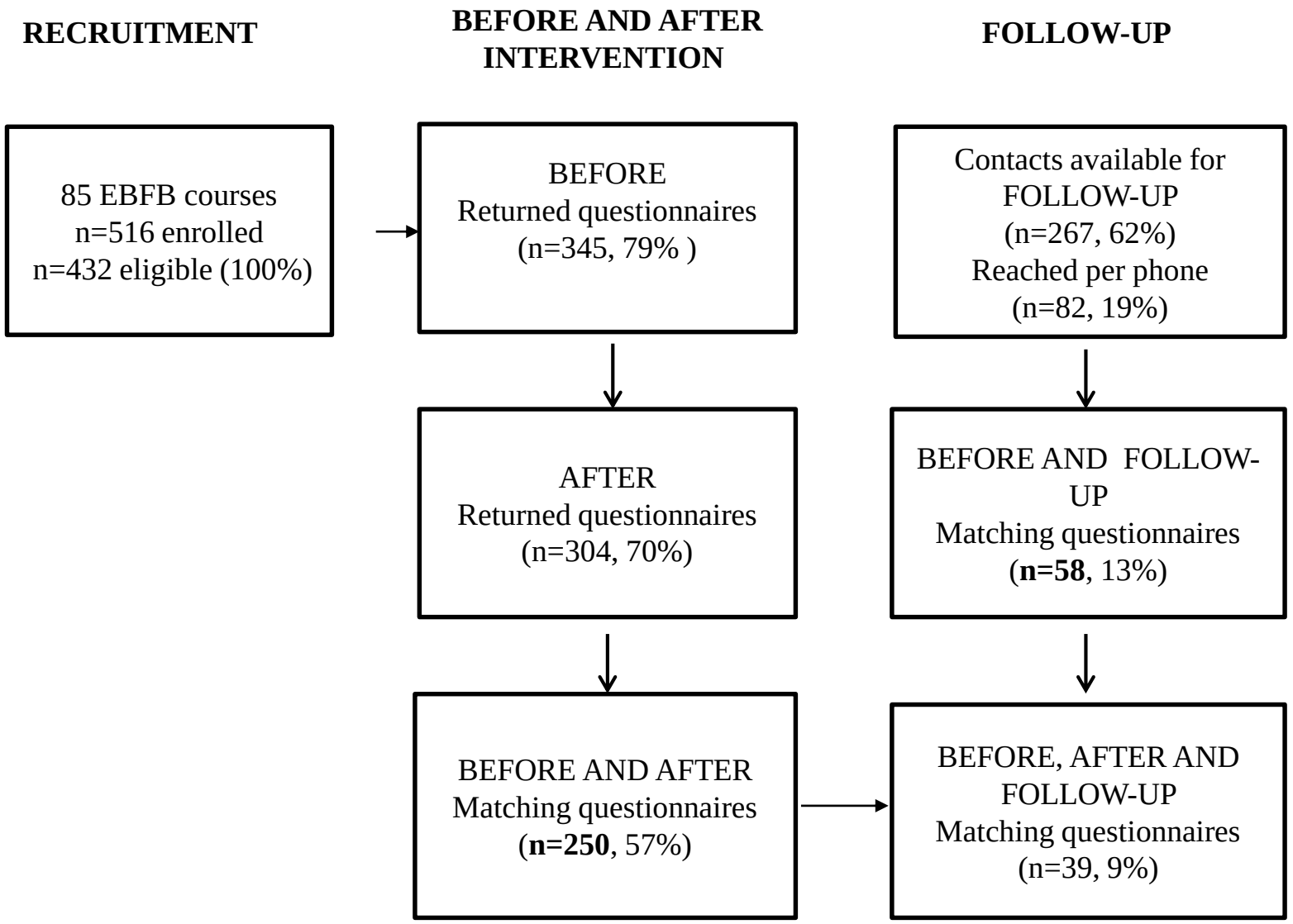

Portion size
BEFORE
AFTER
Ingredients
BEFORE
AFTER
Sugar
BEFORE
AFTER
Fat
BEFORE
AFTER
Calories
BEFORE
AFTER
0
10
20
30
40
50
60
70
80
90
100
Percentage of participants checking food labels
Yes
No
Missing


RECRUITMENT
BEFORE AND AFTER INTERVENTION
FOLLOW-UP
85 EBFB courses
n=516 enrolled
n=432 eligible (100%)
BEFORE
Returned questionnaires
(n=345, 79%)
Contacts available for FOLLOW-UP
(n=267, 62%)
Reached per phone
(n=82, 19%)
AFTER
Returned questionnaires
(n=304, 70%)
BEFORE AND FOLLOW-UP
Matching questionnaires
(n=58, 13%)
BEFORE AND AFTER
Matching questionnaires
(n=250, 57%)
BEFORE, AFTER AND FOLLOW-UP
Matching questionnaires
(n=39, 9%)