A pragmatic evaluation of a family-based intervention for childhood overweight and obesity

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Scientific summary

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Background

Childhood overweight (including obesity) affects just under a third of children aged 2–15 years in England and is associated with poor health in childhood and adulthood. The problem is unequally distributed, with higher rates among children living in the most deprived neighbourhoods and in some ethnic groups. Childhood overweight results from an imbalance between energy intake and expenditure, linked to sedentary behaviour, low physical activity and diet. Although these are potentially modifiable, the features of an 'obesogenic' environment which promote obesity, and which are often beyond families' control, make change difficult.

Research suggests that weight management programmes involving the whole family, targeting physical activity and diet and promoting healthy lifestyles, are moderately effective. However, few have been evaluated when rolled out at scale in service settings. Mind, Exercise, Nutrition, Do it! (MEND) 7–13 is one of a suite of paediatric weight management interventions delivered by MEND Central, a social enterprise. MEND 7–13 is a multicomponent family-based intervention which aims to support families of overweight and obese children to adopt and sustain healthy lifestyles. Children aged 7–13 years are eligible for the programme if they are overweight or obese (referred to as overweight throughout this document unless otherwise specified), defined as exceeding the 91st centile of the UK 1990 growth charts. The programme was shown to be effective in reducing body mass index (BMI) and improving self-esteem after 6 months and 1 year in a randomised controlled trial.

The MEND 7–13 programme combines knowledge from nutritional and sports science and psychology to address individual-level behaviour change – education, skills training and motivational enhancement – while also recognising the need to engage multiple, interacting systems of influence within the family context. It was developed to be delivered to children and at least one parent/carer in community settings. After its development, MEND 7–13 has been scaled up rapidly across England. MEND Central collated information about health outcomes both before and after delivery, providing a useful resource for exploring how interventions work under service conditions.

Objectives

We framed our analysis through the following research questions:

1. What are the characteristics of children who take part in MEND, a family-based intervention for childhood overweight and obesity, when implemented at scale and under service conditions?
2. How do the outcomes associated with participation in MEND vary with the characteristics of children (sex, socioeconomic circumstances and ethnicity), MEND centres (type of facility, funding source and programme group size) and areas where children live (in relation to area-level deprivation and the obesogenic environment)?
3. What is the cost of providing MEND, per participant, to the NHS and personal social services? How does this vary and how is variation in cost related to variation in outcome?
4. What is the salience and acceptability of MEND to those who commission it, those who participate in full, those who participate but drop out and those who might benefit but do not take up the intervention?
5. What types of costs, if any, are borne by families (and by which members) when participating in MEND, and in sustaining a healthy lifestyle afterwards?

Methods

We took a multidisciplinary approach. We used data from 18,289 children who were referred (or self-referred) to MEND 7–13 between 2007 and 2010, including sociodemographic information (sex, age, ethnicity, family structure, housing tenure, employment status of parents), which we linked to information about neighbourhood deprivation, built environment and food environment (density of fast food shops). As a large proportion of the MEND 7–13 starters had missing data on some variables, we used multiple imputation to obtain unbiased estimates of how those covariates were associated with outcomes.

To address our first question we compared sociodemographic characteristics of participants with comparator data from the Health Survey for England (HSE) 2007–10, the Millennium Cohort Study (MCS) wave four and the National Child Measurement Programme (NCMP). These data, collected in the same years as the MEND data, and measuring BMI, allowed us to select respondents who were, like the MEND 7–13 participants, overweight and of a similar age range. Using prevalence estimates from these comparators and population estimates, we first estimated the size of the MEND-eligible population, and the proportion of that population referred to, starting and completing the programme. We then assessed the proportions of MEND participants by socioeconomic circumstance and ethnicity against those in the comparator data. Finally, we used information about attendance to examine which groups were most and least likely to complete the programme (i.e. to attend > 75% of sessions).

To examine variation in the outcomes associated with the programme we constructed multilevel models examining the change in BMI (our primary outcome) associated with MEND 7–13, change in zBMI (BMI standardised by age and sex using UK 1990 growth charts), and changes in reported self-esteem, psychological distress, physical activity and diet. Multilevel models were used to take account of clustering of participants within MEND 7–13 programmes (on average about eight to nine participants per programme in just under 2000 programmes). We built each model separately in order to understand which covariates in the MEND data set were associated with each outcome.

Although our initial intention was to conduct a de novo analysis of MEND financial data, in the course of reviewing the literature we identified work which had recently estimated these costs for MEND 7–13 on a national and local level. These sources were reviewed and used for our analysis rather than repeating work already undertaken. These were then used to estimate what MEND 7–13 costs on a participant and a programme basis, and what factors are likely to be associated with variations in costs.

We addressed the final two research questions through qualitative research with two sets of respondents. First, we interviewed commissioners and delivery partners responsible for the programme in their local organisations, to explore their views of the programme in terms of its salience and acceptability, including costs and benefits. We repeated this with families, conducting group interviews with participants who attended the programme and other family members. Where additional accounts which might augment the family interview were perceived to be useful, individual interviews were conducted.

Findings

What are the characteristics of children who take part in MEND 7–13 when implemented at scale and under service conditions?

We estimated the size of the MEND-eligible population as just over 4 million children. Between 2007 and 2010, 0.4% of this population were referred to the programme, 0.3% started the programme and 0.2% completed at least 75% of sessions.

Compared with the MEND-eligible population, proportionally more MEND 7–13 starters and completers were girls, Asian or from families with a lone parent, and lived in social or private rented, rather than owner-occupied accommodation, in families where the primary earner was unemployed, and in urban and

deprived areas. Compared with the MEND-eligible population, proportionally fewer MEND 7–13 starters and completers were white or from 'other' ethnic groups. Findings were consistent across all three (nationally representative) comparators (the HSE, the MCS and the NCMP).

Having started a programme, boys and participants who were psychologically distressed, lived in socioeconomically deprived circumstances, or attended large groups or those where managers had delivered several programmes were less likely to complete the programme.

How do the outcomes associated with participation in MEND vary with the characteristics of children, MEND centres and areas where children live?

Multivariable models suggest that MEND 7–13 was associated with reductions in BMI of 0.76 kg/m^2 from baseline to follow-up 10 weeks later, in white girls living in socioeconomically favourable circumstances who had completed the programme. This group was selected as the reference as it was the largest group. All other groups demonstrated reductions in average BMI. However, relative to the reference group, reductions in BMI were statistically significantly larger for children with higher baseline BMI, younger children, boys, white children and those who attended smaller programmes in terms of baseline group size. Reductions in BMI were significantly smaller for Asian and black groups, children who lived in less favourable socioeconomic circumstances (those with unemployed parents and living in more deprived neighbourhoods), and for those who completed < 75% of sessions. The reduction in BMI for subgroups ranged from 0.55 kg/m^2 to 0.90 kg/m^2.

We compared the observed reduction in BMI in the service data with that observed in the intervention arm of the trial after the same period of follow-up and noted that it was of similar magnitude.

Participation in MEND 7–13 was also associated with improvements in self-esteem, reductions in psychological distress, increases in reported physical activity and a higher proportion of 'healthy' foods reported in participants' diets. As with change in BMI, these outcomes varied between subgroups.

We also explored a bivariate model of change in BMI and change in self-esteem. This showed that both baseline BMI and baseline self-esteem were independently associated with change in BMI and self-esteem.

What is the cost of providing MEND, per participant, to the NHS and personal social services, how does this vary and how is it related to variation in outcome?

Based on previous studies, the cost per programme for MEND 7–13 was around £4000. We calculated that the mean number of children starting each programme was 8.6, and that 59.9% of children starting each programme would complete it (attend > 75% of sessions). On this basis the mean cost per starter is £463 and the mean cost per completer is £773. The cost per starter also varied according to local programme costs such as the number and type of staff employed, administration and venue hire; the costs incurred from MEND Central, including the size of the contract between the purchaser/deliverer and MEND Central; and the number of participants per programme. Limited information was available on how costs varied quantitatively with these factors. Approximately 90% of these were local costs, predominantly staffing and venue hire, and 10% were the costs of materials and training from MEND Central. There was limited evidence on how factors affecting the variation in costs were related to the variation in outcomes.

What is the salience and acceptability of MEND to those who commission it, those who participate in full, those who participate but drop out and those who might benefit but do not take up the intervention?

The context of our interviews with commissioners was one of uncertainty surrounding changes to the NHS and the organisation of services, and the end of previously available Big Lottery funding.

Commissioners liked the fact that the programme was evidence-informed, involved families, was underpinned by trial evidence and ready for implementation. That said, commissioners were aware of the

evidence gap in longer-term outcomes. Commissioners reported difficulties in planning and resourcing engagement with families. Variable participation and completion rates influenced commissioners' perceptions of value for money. Finally, commissioners had concerns in relation to costs, including planning and resourcing skills for delivery to diverse populations and participants with complex health and social needs.

Most families interviewed had self-referred and referral was usually the mother's decision. The basis for referral tended to be weight concerns and/or difficulties including bullying, and anxiety about the transition to secondary school.

Families reported positive experiences of attending MEND including social acceptance (finding out that 'you are not the only one') and doing exercise with others of a similar build. Valued aspects of the programme content included tips for parents on using measuring cups and reading supermarket labels. Children valued cooking lessons and setting targets for themselves. Other experiences remembered positively included swimming, supermarket tours and sharing recipes.

Less positively, the timings were difficult for parents where the programme competed with work or other commitments. Timings were often difficult for children, who reported competing after-school activities and sometimes feeling tired and hungry when programmes were run. Venues were sometimes hard to get to and sometimes perceived as unsuitable for the programme. Although families described liking the facilitators, particularly exercise instructors, who delivered the programme, concerns were expressed about the skills of some. Children found it hard if they were the oldest or youngest in a programme. Finally, engagement with the behaviours MEND recommends was challenging, as were family dynamics in terms of who goes to the programme and support for participants within the family.

With regards to perceived impact, at least one individual in every family felt that he or she had benefitted, but few felt that they had managed long-term change.

What types of costs, if any, are borne by families (and by which members) when participating in MEND, and in sustaining a healthy lifestyle afterwards?

The cost that families mostly associated with the programme was that of higher quality food or 'treats'. That said, families reported that they generally 'found a way' to prioritise spending on things that benefitted their children.

Time costs needed to be negotiated with other commitments, and there were hidden financial costs associated with child care arrangements. Transport costs were probably underestimated ('It was only a 10-minute drive away').

There were socioemotional costs of making and maintaining changes to lifestyle behaviours generally unsupported by the wider environment.

Discussion

This study exploited the opportunity to use service-level data to investigate how a scaled-up intervention might operate under service conditions.

Our analysis suggests that referral to, initial participation in and completion of the programme, although only including a small proportion of overweight children, are equitable socioeconomically and by ethnic group. Our estimates suggest that average changes in BMI in all groups were 'clinically relevant'. However, those from more deprived neighbourhoods and from Asian and black groups did not change as much as

others. As these groups are already more likely to be overweight or obese, this is of concern. Moderation of the secondary outcomes associated with MEND 7–13 is complex.

In terms of the salience and acceptability of MEND 7–13 among commissioners, there were tensions between those we interviewed liking MEND for being 'evidence-based' and 'off the shelf'/'a solution in a box', while also being concerned about costs, acknowledging that it is 'only as good as the staff' and requires significant backstage organisation.

All families found some value in MEND and individual elements of the programme were appreciated. However, in terms of creating a 'micro-environment' to protect against the wider obesogenic environment, few families felt that MEND had made a big difference to weight or lifestyle, while the stresses on family time and, for some, feelings of failure to rise to the challenges of MEND were hard. MEND's perceived lack of impact may reflect families' feelings that there was a gap between their behaviours, their circumstances, the wider environment and MEND recommendations which, with MEND alone, they did not feel they had the capacity to bridge.

Further research should focus on the sustainability, costs (including emotional costs to families) and cost-effectiveness of behaviour change. However, weight management schemes are only one way that overweight and obese children can be encouraged to adopt healthier lifestyles. We therefore situate our findings within the social model of health and with reference to health inequalities, obesogenic environments, a lifecourse approach and frameworks of translational research.

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