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Combating child obesity: impact of HENRY on parenting and family lifestyle

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CONFLICT OF INTEREST

HENRY was established by CH and MR; JG is Programme Manager at HENRY and KR is Director of HENRY. The research was supported by a grant from the Virtual College.

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Abstract

Background: One quarter of children in England are overweight/obese at school entry. We investigated the impact of a programme designed to provide parents of infants and preschool children with the skills required for a healthier family lifestyle.

Method: A cohort of families was followed across the eight-week *HENRY* parent course at nine locations in England. 77 parents enrolled on the course, of whom 71 agreed to complete questionnaires addressing eating behaviours, dietary intake, and parental self-efficacy. Pre- and post-course data was available from 60 (84.5%) parents (eight-week follow-up data from 58 parents) and analysed using repeated measures analyses.

Results: Significant changes were observed, with most sustained at follow-up. Parents reported increased self-efficacy and ability to encourage good behaviour ($p<.001$). Increased consumption of fruit and vegetables was reported in both children and adults, together with reduced consumption of sweets, cakes and fizzy drinks in adults (all $p<.01$). There were also positive changes in eating behaviours (e.g. frequency of family mealtimes, and eating while watching TV or in response to negative emotion ($p<.01$)) and reduced screen time in adults ($p<.001$).

Discussion: The results build upon earlier evaluation, indicating that the HENRY intervention has a beneficial impact upon the families of infants and preschool children. Furthermore, the findings suggest that positive changes inspired by the programme can be maintained beyond its completion. Such changes may serve to protect against later obesity.

Keywords

Childhood obesity, obesity prevention, obesity risk factors, preschool children, parental self-efficacy

Introduction

The rise in obesity poses a serious public health challenge: if current trends continue, over half of the UK adult population could be obese by 2050 [1]. Approximately one in four children in England are overweight or obese by school entry, rising to a third by the end of primary school [2]. Moreover, obese children are more likely to become obese adults [3, 4] and may be at greater risk of cardiovascular problems [5, 6]. Consequently, it has been argued that efforts to combat obesity would be best directed to prevention and targeting preschool children.

In comparison with efforts aimed at school-aged children, initiatives targeting babies and younger children are in their infancy [7-13]. A few randomised controlled trials are underway, largely in day care centres or through home visiting [14]. However, their impact upon children's weight remains unclear, and evidence is yet to be produced for a successful, preventive obesity intervention for preschool children.

HENRY (Health Exercise Nutrition for the Really Young) [15, 16] is an initiative that has been widely commissioned across the UK. It aims to tackle early childhood obesity through training community and health practitioners to work more effectively with the parents of young families. Initial evidence suggests that the programme is achieving its aim of improving the way practitioners work with families, and has a positive impact on their work settings and personal lives [17].

In addition to health professional training, HENRY offers an eight-week course for parents and carers of preschool children, and it is upon this that the present study focuses. The community-based course is designed to offer parents the skills and tools needed to provide a healthier lifestyle for their family and themselves. It takes a broad approach to healthy

living: healthy eating is covered, but equally important are parenting skills, physical activity and emotional wellbeing together with developing a positive attitude to change and enhancing self-esteem. Attention is paid to factors associated with later obesity, namely early feeding practices, eating behaviour, nutrition, play, parenting skills and emotional wellbeing [18]. General objectives of the HENRY programme are presented in Box 1. In common with all aspects of the wider HENRY programme, the course is underpinned by the Family Partnership Model [19], an evidence-based approach that emphasises the centrality of the parent–practitioner relationship.

Box 1. Key objectives of the HENRY programme

Parenting

- Increase in confidence to make changes to family lifestyle
- Development of an authoritative style of parenting
- Modelling of a healthy lifestyle

Eating patterns

- Establishment of regular family mealtimes
- Reduction in grazing behaviour

Healthy eating

- Providing appropriate child-sized portions
- Reduction in energy dense foods and sugar-sweetened beverages; increase in fruit & vegetable consumption

Physical activity

- Increase in active play
- Reduction in sedentary behaviour, especially television viewing

Emotional wellbeing

- Increase the emotional wellbeing of the child and all family members

A key component of HENRY is enhancement of parental self-efficacy, i.e. increasing parents' confidence in their ability to act successfully in the parental role, including managing behaviour and resolving problems [20]. Parental self-efficacy is associated with better quality mother-toddler interactions [21], as well as greater maternal sensitivity and responsiveness [22], parenting characteristics that protect against later problem behaviour [23, 24]. This may be considered within the framework of social cognitive theory [25], which posits an integral role for personal efficacy: enhanced self-efficacy makes behaviour change more likely, and successful mastery of new behaviours brings a reciprocal impact upon one's self-efficacy. Thus, providing parents with a sense of empowerment and the ability to make desired changes in their family's lifestyles are core aspects of the HENRY intervention.

The present study investigates the impact of the intervention by following a cohort of parents completing the course at several locations in England, and comparing data (including family dietary intake, eating behaviours and parental self-efficacy) from before and after the course, and at eight-week follow-up to assess if changes are sustained.

Method

Participants

Courses were delivered at nine locations in England between September 2010 and March 2011, involving 77 participants of whom 71 agreed to complete questionnaires. Pre- and post-course questionnaires were available from 60 (84.5%) participants, of which 58 were women and 2 men, with a mean age of 30.4 (±5.3) years (Table 1 contains sample

characteristics). Eight-week follow-up data was available from 58 parents (96.7% of those completing the first questionnaire).

Intervention

The eight-week HENRY parent course is delivered by trained facilitator pairs to groups of 8-10 parents. Each session lasts 2.5 hours, consisting of 'Family Time' where parents and children enjoy a healthy snack and play an active game; and 'Parent Time' where group members explore the programme topics together while the children attend a crèche. Participants explore a new topic each week (e.g. parenting skills, portion sizes, physical activity and play) through activities that lead to shared understanding and ideas for strategies to support changes. At the end of each session, group members are encouraged to set individual goals for the week ahead. Each week, parents build a 'resource toolkit' of materials that promote the course's key messages, including a game, portion size guide, and story books.

Procedures

Courses were delivered in Children's Centres, a UK government initiative designed to provide support for young families in disadvantaged areas of the country. Nine locations offering the HENRY programme were selected for study. Parents attending an introductory, 'taster' session were invited to participate and completed the first questionnaire at this time. The course was then delivered over eight weekly sessions, with the second questionnaire and course evaluation forms completed at the final session. At follow-up, parents were invited to a 'catch-up' session where they met to discuss progress and completed the final questionnaire. Parents unable to attend returned questionnaires by post. There were no incentives to attend the course, but £5 vouchers were offered for completion of each

questionnaire (awarded at the end of the study). The study was approved by the University of Leeds Research Ethics Committee.

Measures

Stepping stones

During the first session, facilitators introduce a sequence of 'stepping stones', numbered from 1 (not very healthy) to 10 (perfectly healthy). Parents consider how healthy their family's lifestyle was and how healthy they would like it to be. In the final session they reflect and score this again. This non-validated tool is included in all HENRY parent courses.

Questionnaires

A questionnaire booklet [available from the authors on request] was completed at course beginning and end, and eight-week follow-up. Basic demographic information was also collected (age, gender, ethnicity, employment status, number of children at home).

Parental self-efficacy & ability to set limits

Parental self-efficacy was assessed using the five-item Parenting Self-Agency Measure [20] which measures parents' overall confidence in their ability to act successfully in their parental role. Items relate to the individual's confidence, knowledge and willingness to expend effort in problem-solving with their child, for example, "I feel sure of myself as a mother/father", and were completed using a Likert scale (1= never – 5= always). The validity of the measure has been demonstrated [20]. The scale's internal consistency in this sample was high (Cronbach's alpha >.80 at each timepoint).

Participants' ability to encourage good behaviour and set limits was assessed using five items developed for this study. The measure was headed, "Being an effective parent means encouraging good behaviour and setting limits. How well do you think you do this?", and parents were asked to rate their ability in relation to mealtimes, TV and computer games, active play, bedtime, and generally. They responded using a 5-point scale (1= "not well" - 5= "very well"). Good internal consistency was demonstrated (Cronbach's alpha = .67-.85).

Food Frequency Questionnaire

Habitual family food intake was assessed using a modified Food Frequency Questionnaire [26]. To ensure that the questionnaire was concise, some items were combined (e.g. individual items such as beef, pork, lamb, chicken, fish were included together as "meat, chicken, fish"), and others were removed (e.g. soup). Respondents indicated how often (Never/once a month/once a fortnight/1-7 days a week) they consumed each of 14 items or groups of foods (e.g. "Fresh fruit", "Sweets, chocolate", "Water"), with space to report the number of times per day. Final scores were calculated to see how many times per week an item was consumed. The measure was completed twice - once in relation to the adults in the home, and once for their child(ren).

Eating behaviours, home environment & physical activity

Many of the items relating to eating behaviours and physical activity were based upon the Family Eating and Activity Habits Questionnaire [27]. This identifies environmental and behavioural factors associated with childhood obesity, such as snacks in the home, allowing children to eat what and when they want, and television viewing. Some items were adapted to make them applicable to the UK (e.g. "potato chips" became "crisps", "Chitos" were removed) while new items were included. Parents were asked to report the frequency with

which their family sat together for meals, watched television during mealtimes, and consumed takeaway food (Never/Once a month/Once every 2 weeks/1-2 times a week/3-6 times a week/Once a day/More than once a day). 'Personal eating behaviours' included "stop eating when you have had enough, even if food is left", and "eat when you are angry, bored or feeling low". These were rated on a Likert scale (Never/Hardly ever/Sometimes/Often/Always). Both family and personal eating behaviour items were analysed individually after Cronbach's alpha values suggested that their reliability as combined scales was poor (all <.06). Participants were also asked to indicate which of a list of snacks were typically available at home. These were then grouped as 'healthy' (fruit, raw vegetables, nuts and raisins) and 'unhealthy' (crisps, sweets and chocolate).

Physical activity was also considered in terms of both family and individual behaviour. Family activity items included the frequency with which participants "play with your children at home", and "take your children to playground" (Never/Once a month/Once every 2 weeks/1-2 times a week/3-6 times a week/Once a day/More than once a day). Personal activity items asked for the amount of time spent per week engaged in various activities e.g. cycling, walking and gardening (No activity/<1 hour a week/1-3 hours a week/>3 hours a week). Screen time was assessed as time spent per day watching TV or DVDs, for both adults and children (None/<1 hour a day/1-2 hours a day/2-3 hours a day/3-4 hours a day/4-5 hours a day/>5 hours a day).

Additional measures

Estimated body mass index (BMI) was calculated using self-reported height and weight (adults only). Parents were not measured as it was felt that doing so would adversely affect the atmosphere of the group at the first meeting, and would suggest a focus on parental weight reduction which was not the purpose of the programme. Participants were asked to report their clothing size (females) or trouser waist size (males), as there is evidence that

large clothing size may act as a simple indicator for heart disease, hypertension and diabetes risk [28]. Also included were items concerning respondents' perceptions of their weight.

Analyses

Eating behaviour and physical activity items were recoded and scored in the same direction, i.e. higher scores reflect less-appropriate behaviours (following [27]). Food frequency data was analysed using repeated measures analysis of variance, with Greenhouse-Geisser corrections where appropriate. Post-hoc Bonferroni comparisons were used to identify whether significant results remained at follow-up. Child food frequency data was analysed initially using the whole sample, and then repeated after excluding children aged <1 year at baseline (this was only applied where there were no older children in the family in order to account for infants weaned during the course of the study who would naturally increase dietary intake). Changes in self-reported family healthy lifestyle score ('stepping stones') were analysed using a paired-samples t-test. Due to the level of data provided, parental self-efficacy, eating behaviour and physical activity items were analysed using the non-parametric Friedman's test, with significant results explored using Wilcoxon signed-rank tests. Due to the number of tests being conducted, a more stringent significance level of <.01 was applied throughout.

Results

Attendance, acceptability of the course and stepping stones data

Seventy-seven parents enrolled on the courses, with 67 (87%) completing. The mean attendance rate of completers was 85% (SD=13.7; Mode=7/8 sessions). Reasons for non-attendance were not routinely obtained, but where available the most common were illness or work issues. Participant evaluation form responses (n=64) showed that respondents felt positive about the course (M:4.8/5, SD:0.4) and would recommend it to others (M:4.8/5, SD:0.4). Self-rated family health data ('stepping stones') was available from 64 participants. Scores rose significantly between the start and end of the course (week 1 mean: 4.6 ± 1.7; week 8 mean: 7.8 ± 1.2; t=13.98, df=63, p<.001).

Parental self-efficacy and ability to set limits

Parental self-efficacy rose significantly over the duration of the course ($\chi^2(2) = 34.38$, p<.001; Table 2 & Figure 1). Post-hoc analysis revealed that this rise was maintained at follow-up, remaining significantly higher than baseline (p<.001). Similarly, ability to encourage good behaviour and set limits increased significantly and also remained significantly higher than baseline at follow-up ($\chi^2(2) = 14.68$, p=.001). This data was analysed as a single scale, but post-hoc analyses revealed that parent-reported ability to set limits increased significantly for all five behaviours assessed.

Eating behaviours (family)

Positive changes were found in a range of eating and mealtime behaviours (Table 2, Figure 2). Following the course, participants reported sitting down together for a meal significantly more often ($\chi^2(2) = 10.86$, p=.004), as well as more regular consumption of home-cooked meals ($\chi^2(2) = 11.58$, p=.003), and having the TV on during mealtimes less often ($\chi^2(2) = 36.23$, p<.001). In addition, children ate with an adult more often at snack and mealtimes ($\chi^2(2) = 17.49$, p<.001). Each of these changes was sustained at follow-up. No change was observed in the frequency of consuming takeaway food.

Eating behaviours (parental)

In terms of personal eating habits, participants reported a fall in the frequency with which they ate when angry, bored or felt low ($\chi^2(2) = 13.95$, p=.001), or while watching TV ($\chi^2(2) = 15.26$, p<.001). They reported choosing healthy meals more frequently ($\chi^2(2) = 21.43$, p<.001). Of these, eating while watching TV and choosing healthy meals remained significantly different at follow-up (p<.005). No changes were found in the frequency of eating standing up, eating straight from the bowl or stopping eating when full. Sitting to eat with others increased but was not significant at the p<.01 level (Table 2).

Physical activity

No changes in family activity achieved significance, although the increased frequency of taking children to the playground was just outside the significance level (p=.03). Increased participation was reported in only gardening/DIY ($\chi^2(2) =14.75$, p=.001), post-hoc comparisons indicated that the change occurred only after the course was completed. There was a marginal significant increase in swimming/jogging/gym (p=.019).

Screen time

The amount of time spent watching TV/DVDs was reduced in adults, with a further reduction by follow-up (Friedman test: $\chi^2(2)=24.01$, p<.001; post-hoc Wilcoxon tests T1vT2, p=.003; T2vT3, p=.002). No significant differences emerged in the child screen time data.

Family dietary intake - adults

Several significant changes in adult dietary intake were observed, with the majority enduring at follow-up (Table 3 & Figure 3a). Frequency of consumption of salads/raw vegetables

($F_{2,108}$ = 8.75, p<.001), fresh fruit ($F_{2,108}$ = 12.02, p<.001), cooked vegetables ($F_{2, 110}$ = 5.09, p<.01) all increased. The reported increased consumption of baked beans/lentils/chick peas was marginally outside the required significance level (p=.012). Significantly reduced intake frequencies were reported for cakes/biscuits/sweet pastries ($F_{2,106}$ = 5.92, p<.01) and sweets/chocolate ($F_{2,108}$ = 9.61, p<.001). The changes in consumption of salads/raw vegetables, fruit and energy dense foods were sustained at follow-up. No significant changes were found for meat/fish, chips, milk/cheese/yogurt, or crisps/savoury snacks.

Reduced consumption was reported for sweet drinks/squash ($F_{2,110}$ = 6.01, p<.005) and low-calorie/diet drinks ($F_{2,98}$ = 5.53, p<.01). Participants' reported drinking water more frequently following the intervention, but this difference did not achieve the required level of significance (p=.013). No significant changes were observed for pure fruit juice.

Family dietary intake - children

The child food frequency data displayed a similar pattern (Table 3 & Figure 3b). The frequency of consumption of cooked vegetables ($F_{2, 96}$ = 5.79, p<.01), fresh fruit ($F_{2, 100}$ = 14.17, p<.001) and baked beans/lentils/chick peas ($F_{2, 98}$ = 7.73, p=.001) all increased post-course. The increased intake of both baked beans etc. and fresh fruit remained significant at follow-up. The increase in salads/raw vegetable consumption did not reach the required significance level (p=.011). There was a marginal reduction in the intake of cakes/biscuits (p=.028); no significant changes were found for beverages.

To account for children who were weaned during the study, the data was re-analysed after exclusion of children <1 year old at baseline. The only difference that this made to the results was that the increase in fresh fruit consumption was no longer significant at follow-up.

Presence of snacks at home

The number of healthy snacks (nuts, raisins, raw vegetables, fruit) increased significantly ($F_{2, 116} = 8.99$, $p<.001$). Post-hoc analyses revealed that baseline figures were significantly lower than those at the end of the course, and at follow-up. The same pattern was observed for unhealthy snacks (i.e. crisps, sweets, chocolate), which fell significantly ($F_{2,116} = 13.44$, $p<.001$), with the number at follow-up remaining at the significantly lower level.

Adult BMI and attitude towards weight

Participants' BMI were calculated using self-reported height and weight. No changes were found in BMI or weight. An increase in happiness about their weight was found at follow-up, relative to baseline ($F_{2,112} = 3.85$, $p<.05$).

Discussion

The HENRY parent course, a component of the wider HENRY programme [15], is a community-delivered intervention designed to equip the parents/carers of preschool children with the skills to provide a healthier family lifestyle and so prevent obesity. Data was collected from a cohort of families before and after the eight-week course, and at eight-week follow-up. The findings show considerable promise of a positive impact upon both parental self-efficacy and family lifestyle necessary to achieve obesity prevention. Encouraging changes were observed in dietary intake, family eating behaviours and environment, all of which are associated with the development of obesity [18]. The significant increase in parental self-efficacy was important as this variable is considered a requirement for the achievement of family change and is associated with better-quality parent-child interactions [21].

These findings are particularly important given the dearth of evidence-based interventions in young children; the most promising interventions to date being two Australian programmes for infants [14, 29]. Other interventions focus principally on nutrition with less emphasis on the acquisition of parental skills needed to ensure family behavioural change in the long term [7-13].

The results were analysed using the stringent criteria of significance at the 0.01 level. Several important changes in the dietary intake of both children and adults were found, including significant increases in the frequency of consumption of vegetables and fresh fruit. Adults' consumption of sweets/chocolate, cakes/biscuits and sweetened drinks was reduced. Most importantly, several of these changes were sustained beyond the end of the course. Interestingly, the reduction found in high energy foods was significant for parents but not their children. Given that children's food preferences and intake are strongly influenced by their parents' eating behaviours, this could nonetheless result in the desired effect on their children over time [30, 31]. Modelling, which is strongly emphasised in the HENRY programme, has been shown to have a powerful influence on what children eat [32], and recent qualitative work has demonstrated this [33]. Moreover, the importance of a whole family approach to obesity prevention has been highlighted by recent reviews of early risk factors for later obesity [34, 35]. Parental obesity has been identified as a key predictor, emphasising the need to incorporate efforts to promote healthy weight in parents. Our earlier research suggested that intentions to change behaviour were induced through participation in the intervention (e.g. to increase physical activity, consume more fruit and vegetables) (TA Willis et al., unpublished data). The present results would suggest that these intentions are fulfilled, and, importantly, maintained beyond the intervention period.

The changes in children's diet may have been influenced by the increased availability of healthy snacks in the home; vegetable consumption is known to be greater when children are frequently exposed to and offered them [36]. Other observed changes in the home eating environment may be equally important. For example, family mealtimes were reported to occur more frequently and these are known to be associated with higher children's vegetable and vitamin intake [37, 38] and fewer soft drinks [39]. Shared mealtimes also increase preschoolers' intake of basic food groups [40].

A significant increase in participants' confidence and ability to successfully function in the parental role was also found. Increasing parenting-specific and more general levels of self-efficacy is a vital component of the programme and underpins the observed changes in lifestyle and behaviour. Self-efficacy has been repeatedly demonstrated to be an important predictor of a range of behaviours; low levels of self-efficacy are associated with the adoption of fewer health-promoting behaviours, including eating healthily [41, 42]. The changes can be self-sustaining as higher parental self-efficacy may increase motivation to participate in interventions and to apply the skills taught [43]. Moreover, according to social cognitive theory [25], the most potent contributor to parental self-efficacy is likely to be the individual's experiences of mastery and any accompanying changes in child behaviour.

The relationship between an enhanced sense of control and better health is particularly strong in low-income groups [44, 45], suggesting that efforts to boost self-efficacy in such populations may be of added benefit. Our research was located in Children' Centres with the explicit intention of reaching disadvantaged families. While we do not have detailed socioeconomic data on the participants, the finding that so many of the sample had completed further education suggests that we were only partially successful in this aim. Even greater efforts may be required to recruit those in greatest need of support.

The results are encouraging overall, although some findings were disappointing. While adult screen time was reduced, there was no corresponding reduction in children's television viewing. Similarly, only minor changes were reported in family and individual physical activity. The measure(s) used may have lacked sufficient sensitivity to detect changes, and were adapted from an existing measure [27] (so may also have lacked validity). Ways to increase the emphasis on physical activity/screen time in the programme need to be considered.

Consideration is needed too regarding other potential limitations. First, the data was collected via self-report and is thus liable to response bias. Self-report questionnaires are used widely, with the advantage of collecting a range of data in a simple and cost-effective manner. While this methodology does not measure actual behaviour change, it does at least indicate that healthy lifestyle messages were being absorbed. More rigorous measures, such as detailed food intake measures, weighing of portions and measuring parental weight, would not have been practical and might well have been off-putting, potentially reduced participation, and, most seriously, affected the intervention itself which is based on a non-prescriptive approach and encourages self-determination of goals.

Second, a number of the measures used were modified versions of existing scales and could be open to question regarding validity. The adaptations were made to ensure that measures were closely tailored to the objectives of the intervention, and were reduced in length to minimise questionnaire fatigue. The FFQ was shortened and simplified, leaving it sensitive to change but meaning that certain measures, such as reduced fat options, would not be detected. Parents were also asked to report what their children had eaten (rather than selecting a reference child) as broader impact on the family was sought. This did not seem

to present a problem in completing the questionnaire, but may need to be borne in mind when considering the results. Overall, we believe that the measures were effective in terms of the study's aims. That is, to investigate whether a short, non-prescriptive, community-delivered intervention, covering more than simply nutritional advice, could produce a detectable move towards a healthier family lifestyle.

The study was not powered to demonstrate change, however significant results were obtained. A strength of the study is that the courses included were from a range of locations and communities across England. Our findings indicate that the sample is broadly representative of those attending the course elsewhere and the results are consistent with previous qualitative evidence on the impact of the wider HENRY programme[17]. The promising findings from this pilot indicate that the programme, with some adaptation, should move to the next stage of demonstrating its effectiveness by randomised controlled trial.

Conclusion

The study found evidence that a community-delivered intervention for parents/carers of preschool children was associated with several positive changes, which, if maintained, promote a healthy lifestyle and reduce the likelihood of later obesity. These included changes in dietary intake for both adults and children, changes in family eating behaviour and increased parental self-efficacy. Furthermore, many of the changes were sustained at follow-up, suggesting that the course may have an impact that endures beyond its delivery. Taken alongside previous evidence, the study adds further support to the view that the HENRY programme can have a beneficial impact upon families and help to prevent childhood obesity.

Acknowledgments

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Figure Legends

Figure 1 Parental self-efficacy (i.e. confidence in ability to act successfully in parental role) & confidence in setting limits (around mealtimes, screen time, active play, bedtime & generally) at pre-course, post-course and 8-week follow-up. P values refer to repeated measures analysis.

Figure 2 Family eating behaviours at pre-, post-course and 8-week follow-up. 'Structured mealtimes' comprises 3 items: allowing children to eat whatever they want, whenever they want & how often they eat at set times. P values refer to repeated measures analysis. Items scored such that high scores signify less appropriate behaviours.

Figure 3 Frequency of consumption of selected Food Frequency Questionnaire items by adults (upper panel) and children (lower panel). P values refer to repeated measures analysis.