

Childhood obesity treatment: telephone coaching is as good as usual care in maintaining weight loss – a randomized controlled trial

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Summary

There is a need for more flexible treatment strategies to help patients reach relevant treatment outcomes and adhere better to treatment. The aim of this study was to evaluate the long-term efficacy, in terms of patients' weight status, of replacing usual care (UC) physical visits with more frequent but shorter telephone coaching (TC) sessions as part of a structured childhood obesity treatment.

In this controlled study, patients aged 5–14 years from the Södertälje outpatient clinic, Sweden were randomized to either UC or TC over an 18-month period after participating in an initial standard obesity treatment programme. The patients were followed for a mean of 3.7 years.

In total, 37 children (UC, $n = 18$ and TC, $n = 19$) were included, with a mean (standard deviation, SD) age of 9.5 (2.6) years and a body mass index standard deviation score (BMI SDS) of 2.9 (0.7). The change in BMI SDS did not differ between the groups during the study ($P = 0.8$). Both groups had similar changes in BMI SDS 3.7 years after the first visit to the clinic, TC = -0.42 and UC = -0.52 BMI SDS units ($P = 0.6$ between groups). There were no gender differences. Furthermore, the average time clinicians spent with each patient during the study did not differ between the groups ($P = 0.5$). No patients were lost to follow-up during the study.

In conclusion, the use of TC may offer greater flexibility in the treatment of paediatric obesity as it was non-inferior for both treatment efficacy and the time spent on treatment by healthcare personnel.

Keywords: Behavioural treatment, childhood obesity, randomized controlled study, telephone coaching.

Introduction

Behavioural modification therapy for childhood obesity involves several strategies, such as individual and/or group support for children and their parents, to achieve and maintain lifestyle changes that lead to the stabilization or loss of weight (1). The effectiveness of the various approaches is age-dependent, but overall, parents' involvement in treatment has been shown to produce better results (2).

Issues reported by families undergoing childhood obesity treatment include practical and economical dilemmas, such as transport problems, additional costs of purchasing

healthier foods (3), work absences (4), school absences and infrequent (or sometimes too frequent) clinic visits (5). Taken together, these issues can constitute significant barriers to the families of children undergoing treatment for obesity (6).

Telephone-based interventions have been used for behavioural changes in adult programmes, such as smoking cessation (7), diabetes (8) and weight loss (9). Previous studies on telephone counselling for childhood weight loss have either been short term (10) or implemented with automated telephone calls (11). One previous study has investigated telephone sessions in the treatment of childhood obesity

with promising results; however, no previous studies have, to our knowledge, compared telephone coaching (TC) with usual care (UC) (12).

Overall, there is a need for more flexible and individualized treatment strategies to facilitate better adherence to treatment (13). Furthermore, personalized and tailored methods may decrease the number of children at risk of dropping out of treatment and could increase the overall efficacy of treatment (13). In order to optimize tailored and feasible treatment options for childhood obesity, the treatment needs to be evaluated in a typical setting for childhood obesity treatment and needs to include typical resources available within UC (14).

Therefore, the aim of this study was to evaluate the long-term efficacy, in terms of patients' weight status, of replacing UC, face-to-face visits, with more frequent but shorter TC sessions over 18 months as part of a structured childhood obesity treatment in an outpatient paediatric clinic. We also aimed to measure the clinical time required from healthcare personnel and to gain insight into the families' experiences of TC.

Material and methods

The general treatment modalities at the clinic consisted of children with obesity between 5 and 16 years of age who were enrolled in the multidisciplinary treatment programme at the Södertälje outpatient paediatric clinic, Södertälje Hospital, Sweden. The treatment programme has been evaluated and described in detail elsewhere (15). To summarize, families began by participating in group activities and later progressed to individualized sessions until the child turned 18. Initial group activities included a 90-min programme for parents once a week for 7 weeks involving both education and structured discussions. In parallel with the parental programme, the children participated in an educational and physical activity group. After this initial group treatment programme, treatment was individualized for each patient and involved visits to a medical doctor (normally 1–2 times/year), a nurse (1–8 times/year) and, if necessary, a dietician and physiotherapist. As treatment was individualized, the frequency of visits varied by patient.

Study design

Between May 2007 and May 2009, all families with children aged 5–14 years were invited to participate in the randomized study of individual treatment after the parents had attended at least four out of seven meetings in the initial group treatment. Exclusion criteria were obesity-related syndromes (Laurence Moon Bardet Biedl and Prader Willi)

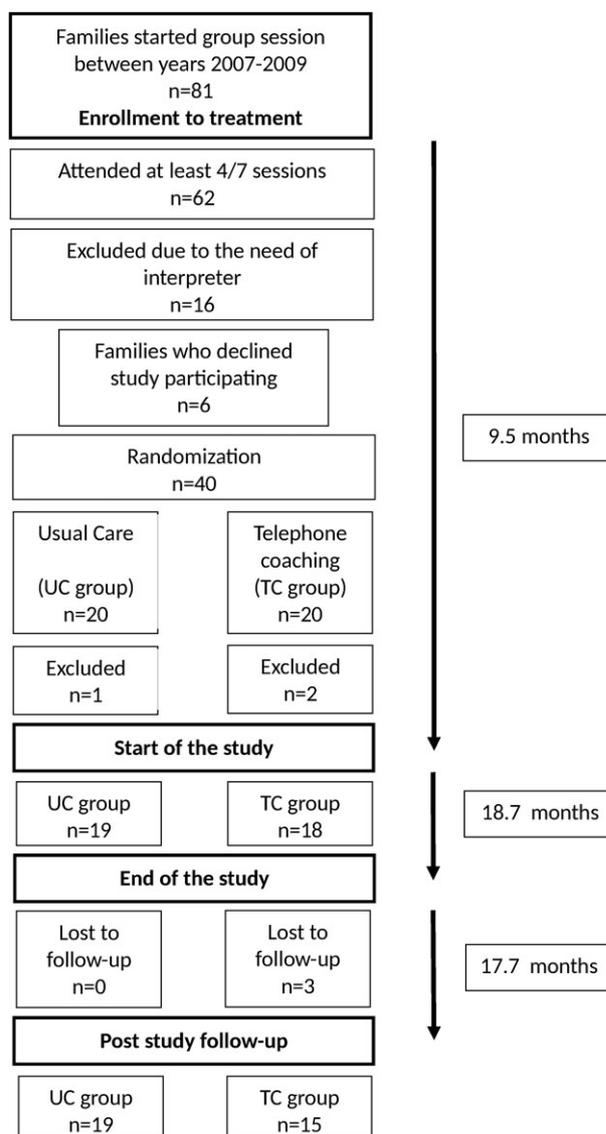


Figure 1 Flowchart from enrolment to treatment to post-study follow-up. Squares with dotted lines represent information about exclusions. Text in bold represents time of weight measurements. Arrows illustrate the meantime, in months, between each of the anthropometric measurements. The mean (standard deviation, SD) follow-up from enrolment to treatment to post-study follow-up was 3.7 (0.8) years.

and non-Swedish-speaking parents due to potential interpretation issues within telephone sessions. A flowchart of inclusion is presented in Fig. 1. Interested families were invited to a meeting where inclusion and exclusion criteria were reviewed, and information about the study was provided. After obtaining signed informed consent, families were randomized to either UC, as the standard treatment at the clinic (described above), or to TC sessions. Unmarked and sealed envelopes were prepared, half containing participation details for the UC arm and half for the TC arm of the study. After acceptance of study

participation, an envelope was selected at random for each participant, and all patients were provided with a scale and encouraged to measure their weight at home. The intervention period for families was projected to last for 18 months.

In the TC group, the goal was to stay in contact every month, excluding the summer vacation. During each TC session, the treating nurse spoke with one of the parents, and the timing of the next TC session was agreed upon at the end of each conversation. Including paperwork, each call was estimated to last a duration of 15 min. The number of visits in the UC group followed the UC (15) model, and the sessions were led by the treating nurse. Including paperwork, each visit took approximately 45 min for the treating nurse, and at the end of the visit, the patient was placed on a waiting list for their next appointment.

In total, 40 children were randomized for study participation. After randomization, but before starting the study, one child in the TC group and two children in the UC group were not able to participate in the study. This was due to work commitments, deciding that treatment was not needed and because of a change in location. This resulted in 19 children in the TC group and 18 in the UC group starting the study. All treatment was free of charge.

During the study period, families in the TC group used a structured questionnaire with five categories as a guide during TC contact with the nurse. The questionnaire raised issues such as current weight, what works well and less well regarding eating habits, physical activity, sedentary activities, the process of change and potential conflicts around this. The information from the questionnaire was used by the nurse from a problem-solving perspective. The nurse focused on success factors, such as increased physical activity or parental ability to set limits regarding unhealthy foods, and identifying positive characteristics of the children and parents that could be helpful in the treatment of the child's obesity. After 18 months, children had a study-end final visit where the weight and height was checked. Furthermore, families in both groups completed an anonymous questionnaire about their experiences of the treatment they received.

The patients aimed to continue obesity treatment after the study intervention. A follow-up measurement was conducted at least 10 months after the study intervention ended. Weight data are presented from four occasions: at enrolment to treatment, at start of study, at end of the study and at post-study follow-up (Fig. 1).

Families in both groups were in contact with the same treating nurse for each session. The nurse was trained in cognitive behavioural therapy, motivational interviewing and telephone counselling and had 3 years of experience of providing childhood obesity treatments prior to the start of the study.

All data were entered and later collected from the National Childhood Obesity Treatment Register (BORIS), supervised by the National Board of Health and Welfare in Sweden. Collected data included background and demographic information, including gender, parental weight status, parental occupation, immigration status, family living situation (cohabited parents), other diagnoses and anthropometric measures. At all visits, height (Seca 216, Birmingham, United Kingdom) and weight (Vetek TI-1200, Väddö, Sweden) were assessed by the same nurse, with children wearing underwear and lightweight shirt. The study was approved by the Stockholm Regional Ethical Committee (2006/1291-31/4) and is registered: ClinicalTrials.gov: NCT 02794090.

The main outcome result was change in the degree of obesity, quantified using the international body mass index standard deviation score (BMI SDS) by Cole *et al.* (16).

A power calculation revealed that a sample size of 14 individuals in each group was required to detect a difference of 0.3 BMI SDS units, with a power of 80% and a significance level of 95% ($P < 0.05$).

Statistics

The primary outcome variable, change in BMI SDS, was evaluated using *t*-test and analysis of variance (ANOVA). In the ANOVA, covariates were gender, age and degree of obesity at the start of the intervention; ethnicity; parental weight status; and whether parents cohabited. Between-group differences were tested using the *t*-test and the Chi-square test. Analyses were performed using SAS Statistical software (version 9.4, SAS Institute Inc, Cary, NC, USA).

Results

Descriptive

The proportion of females in the TC group was 47% and in the UC group was 22% ($P = 0.1$). There was no difference in age between the groups, mean (standard deviation, SD) 9.8 (2.6) years and 9.3 (2.6) years in the TC and UC group, respectively; $P = 0.5$. The degree of obesity did not differ between the groups either at enrolment to treatment or start of the study intervention. Descriptive statistics for the two treatment groups are shown in Table 1. In the TC group, 72% vs. 65% in the UC group had at least one obese parent ($P = 0.6$). Corresponding proportions of overweight parents were 22 and 25%, respectively ($P = 0.9$). The time between the enrolment to treatment and start of the study did not differ between the groups ($P = 0.9$). There were significant decreases in BMI SDS between enrolment to treatment and start of the study in both the TC (-0.28 (SD 0.29); $P < 0.0001$) and UC (-0.41 (0.36);

Table 1 Descriptive statistics of the randomized study population

	Telephone coaching group <i>n</i> = 19 Mean (SD) [min–max]	Usual care group <i>n</i> = 18 Mean (SD) [min–max]	<i>P</i> between groups
Gender, female (%)	47.4	22.2	0.1
Start of study intervention			
Age (years)	9.8 (2.56) [5.6–13.7]	9.3 (2.59) [5.1–12.4]	0.5
Weight (kg)	55.9 (16.9) [27.0–80.6]	49.6 (13.8) [27.4–76.8]	0.2
Height (cm)	145.3 (14.9) [121.5–167.0]	141.1 (14.1) [119.0–168.0]	0.4
BMI	25.7 (3.6) [18.1–31.5]	24.3 (2.8) [19.4–29.1]	0.2
BMI SDS	2.97 (0.80) [1.7–5.0]	2.91 (0.58) [2.0–4.1]	0.8
Obesity (%)	79.0	61.1	0.2
Family characteristics			
Parents living apart (%) [†]	27.8	35.3	0.6
Non-Scandinavian parent (%) [‡]	26.3	38.9	0.4
Mothers with overweight/obesity (%)	27.8/61.1	29.4/29.4	<0.05
Fathers with overweight/obesity (%)	35.3/58.6	33.3/66.7	0.8
Start of treatment – retrospective data			
Age (years)	9.0 (2.20) [5.2–12.4]	8.5 (2.63) [4.9–12.0]	0.5
Weight (kg)	52.4 (15.0) [26.2–79.0]	48.0 (13.9) [28.0–74.8]	0.4
Height (cm)	140.2 (14.3) [114.0–166.0]	136.1 (14.8) [116.0–165.0]	0.4
BMI	26.0 (3.1) [20.2–30.6]	25.3 (2.9) [20.5–29.9]	0.5
BMI SDS	3.29 (0.80) [2.4–5.9]	3.37 (0.64) [2.5–4.9]	0.8
Obesity (%)	94.7	94.4	1.0

BMI SDS according to Cole *et al.* (17).

*T-test were performed for continuous variables and chi square for categorical variables.

[†]Data not available for one child in each group. One participant missing data and one widower.

[‡]One or both parents immigrated to Sweden from outside Scandinavia. Nationalities that were represented included: Turkey *n* = 7, Iraq *n* = 4, Syria *n* = 3, Philippines *n* = 1, Morocco *n* = 1, Spain *n* = 1.

BMI SDS, body mass index standard deviation score; SD, standard deviation.

$P < 0.0001$) groups, with no significant between-group differences ($P = 0.2$; Fig. 2).

Main outcome

The study duration was 18.6 months in the TC group and 18.8 months in the UC group ($P = 0.7$). As illustrated in Fig. 2, neither group demonstrated a significant change in BMI SDS from start of the study (9.5 months after enrolment to treatment) to the end of the study; TC group, mean (SD) -0.16 (0.39) and BMI SDS units ($P = 0.1$) and UC group -0.12 (0.43) units ($P = 0.4$). The groups did not differ with regards to change in BMI SDS ($P > 0.8$). No family dropped out during the study.

In the TC group, seven families requested extra visits to the clinic in addition to the telephone contacts. One and three extra visits were requested for three families, and one family requested four face-to-face visits during the 18 months. Employing a baseline value-carried-forward approach for such individuals, the decrease in BMI SDS for the TC group was 0.16 (0.38), which did not differ from the UC group ($P = 0.9$). Those receiving extra visits in the TC group were a mean of 1.8 years older and had a BMI SDS 0.14 units higher at the start of the study, which was not statistically significant.

The mean (SD) time to post-study follow-up from the end of the study was 17.7 (4.5) months, with no difference between groups ($P = 0.9$). However, three individuals, all from the TC group, had no follow-up measurement. As illustrated in Fig. 2, neither group demonstrated a significant change in BMI SDS from start of the study to the post-study follow-up measurement ($P = 1.0$), signifying BMI SDS stability. Nor was there a between-group difference in longitudinal change in BMI SDS from enrolment to treatment to post-study follow-up, TC -0.42 and UC -0.52 BMI SDS units, $P = 0.6$.

Secondary outcome

The TC had on average (SD) 14.4 (1.3) TC sessions, and the UC group had 5.4 (3.0) face-to-face visits. The average time spent by the treating nurse for each patient during the 18-month study did not differ between the groups: TC group 254 - (SD 56) min (including extra face-to-face visits); UC group, including missed appointments, 270 (SD 76.5) min ($P = 0.5$).

After the study, 16 out of 19 parents (84%) in the TC group and 17 out of 18 (94%) in the UC group completed the anonymous questionnaire about their experience of the received treatment. The majority of parents considered the treatments 'good' (70%) and 'helpful' (76%). The groups

reported differently on the ‘manageability’ of the treatment, 63% in the TC group compared with 22% in the UC group responding positively. The majority of parents in both groups felt that the sessions helped them to ‘keep the focus on the child’s weight’ and ‘inspired them to work with lifestyle changes’. No parent reported that the contacts had been ‘bad’. However, five parents, equally distributed between the groups, reported the treatment as ‘tough’ or ‘non-inspiring’.

Subgroup analysis revealed that gender was not associated with changes in BMI SDS, either in the TC or UC group ($P > 0.5$). Older subjects were more likely to decrease their BMI SDS in the UC group ($\beta = -0.1, P < 0.003$) but not in the TC group ($\beta = 0.0, P = 0.5$). However, when one major outlier (+2.8 SD from mean change) in the TC group was excluded from the analysis, younger participants achieved greater decreases in BMI SDS ($\beta = 0.1, P = 0.002$) in the TC group.

A higher BMI SDS at the start of study was associated with a greater change in BMI SDS during the study in the TC group ($\beta = -0.40, P \leq 0.005$) but not in the UC group ($\beta = -0.01, P = 1.0$).

When evaluating parental weight status, family living situation and Scandinavian origin, no association with weight change before or during the study was identified (data not shown).

Discussion

This randomized controlled study suggests that after an initial weight loss treatment, usual face-to-face visits can be

substituted with more frequent TC sessions, as demonstrated by non-inferior results in terms of change in BMI SDS.

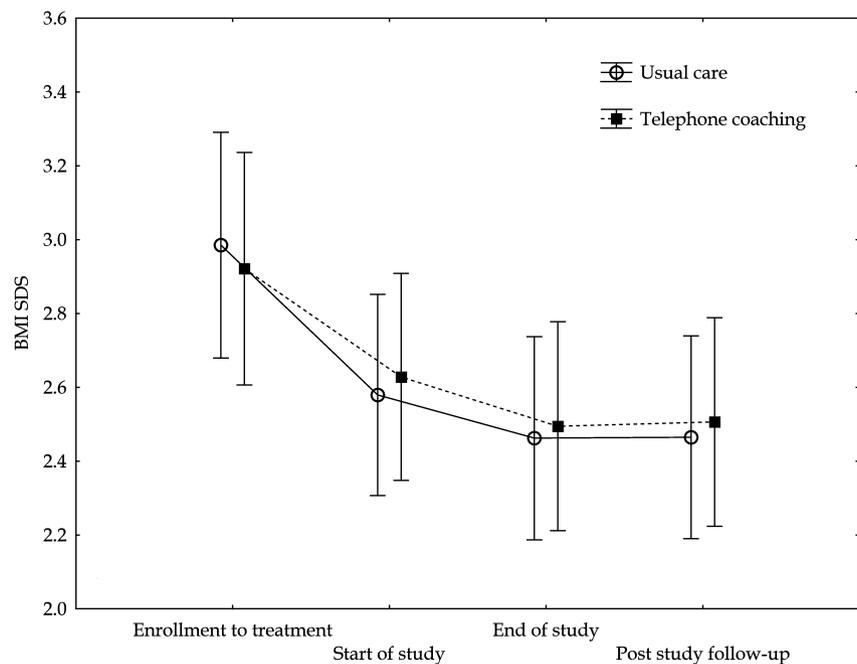
Children in need of obesity treatment often require frequent contact over an extended period of time. A possible amendment to childhood obesity treatment would be to permit some appointments to be delivered by telephone as a complement to face-to-face visits. Parents could be offered the opportunity to choose the most suitable treatment for their child and their circumstances, and this may increase feelings of autonomy and encourage greater parental responsibility.

The present study shows that it is possible to maintain BMI SDS changes equally using either face-to-face or flexible TC sessions to achieve behavioural change. Furthermore, weight loss was sustained 18 months post-study follow-up using both methods. The benefits of the initial treatment programme were recorded earlier (15,18) and were probably due to the specific intense programme at the start of treatment at the clinic.

Short-term interventions with TC have been shown to be successful for weight loss in children (10). Earlier studies have indicated that one potential problem when treatment is delivered exclusively by telephone contact is that the alliance between healthcare personnel and the patient can be difficult to establish (4,12). However, the treatment approach in this study helped form an alliance between the healthcare personnel and the family at an early stage thanks to the specific initial group treatment approach.

In order to achieve relevant treatment results, the treatment of childhood obesity should start at an early age and

Figure 2 Body mass index standard deviation scores for the telephone coaching (TC) group and usual care (UC) groups. Graph represents mean and 95% confidence limits.



incorporate long-term follow-up (15,17,19,20). In this study, older children displayed better results from the treatment when it was delivered face-to-face, whereas younger children responded well to a telephone-based programme wherein treatment was delivered by their parents. This may be because parents have a greater impact on younger children. Furthermore, older children are more able to understand the goals of treatment and have more autonomy in making lifestyle decisions. They may benefit more from being actively involved in their own treatment rather than just receiving the message from their parents.

The TC group had more frequent treatment sessions than the UC group. Hence, we cannot exclude the possibility of a dose effect of the number of sessions. Nevertheless, the frequent and short sessions in the TC group resulted in the same treatment effect as UC.

In sub-analysis, a major outlier in the TC group was excluded due to a severe increase in the degree of obesity. This patient's parents separated during the time of intervention, which might have contributed to the treatment failure as major stress is known to affect obesity development in childhood (21).

No gender differences regarding change in BMI SDS were detected between the TC and UC groups. The severity of obesity is a variable to consider when choosing a treatment method (19). The present study had a limited number of participants and great variation in the degree of obesity. Consequently, it is hard to draw any conclusion regarding each treatment method's impact on factors known to affect treatment efficacy, such as age at start of treatment and degree of obesity (15,17,19,20).

The parental experiences of the TC and UC treatment visits were independent of intervention, were positive overall about the treatments and felt they improved their everyday lives. Compared with UC visits, TC was perceived to be more manageable. This might result in parents and children being more able to manage long-term treatment instead of dropping out of obesity treatment. Previous studies have also found that parents felt positive about their experiences with TC (12,22).

Some parents in the TC group asked for additional family support. The reason given was that they wanted the child to meet the treating nurse in person in order to receive coaching and advice on how to handle difficult situations in the behaviour-changing work. This was permitted for ethical reasons and stresses that treatment has to be individualized and should not rely on telephone contact alone. Hence, it is not possible to conclude that exclusive TC has the same result as UC face-to-face visits. The children who received extra visits in the TC group were older, which could be explained by younger children seeming to benefit more from treatment if it is delivered to the parents exclusively (23). It is, however, also a finding in itself that families receiving TC as a part of childhood obesity

treatment can notice and be aware of when face-to-face support is needed. When data from participants who had additional visits were analysed with the baseline value carried forward, the results of the intervention remained unchanged.

A common problem in obesity treatment, for children as well as in adults, is the high drop-out rate (13,24). In the present study, all families within both groups successfully stayed in treatment during the study. One possible explanation could be that the families felt an increased responsibility and awareness when they were encouraged to measure weight at home. Another potential contributing factor could be that the families have agreed to participate in a study for a long time, which might reflect their motivation.

The time required by healthcare personnel was similar for each of the treatment groups. In the current study, the same nurse carried out all treating visits. We cannot foresee any dilemmas in implementing this treatment approach and extrapolating the caregiver responsibility to other professionals as well.

There are some limitations to this study. Although the study groups were small, participants were involved long term, and no patients were lost to follow-up during the study. Additionally, the power calculation demonstrated recruitment to be appropriate for the primary outcome. Randomization of small study groups can potentially lead to heterogeneity between groups. However, groups were comparable except for the mothers' degree of obesity.

Conclusion

Flexible TC was non-inferior to face-to-face visits and, therefore, could be a way of increasing the plasticity in the treatment of paediatric obesity while also helping parents to remain focused on making lifestyle changes. It may also simplify appointments without interfering greatly with families' daily lives.

Conflict of Interest Statement

No conflict of interest was declared.

Authors' contributions

AB contributed to the conception and design of the study and acquisition of data, critically revised the manuscript and approved the final version before submission. EH contributed to analysis and interpretation of data and drafting of the article and approved the final version before submission. SK contributed to the design of the study, critically revised the manuscript and approved the final version before submission. PD contributed to the conception and design of the study, analysis and interpretation of data, drafting the article and approved the final version before submission.

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