

# A review of the effectiveness of interdisciplinary services for the treatment of overweight and obese children in the community

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## Abstract

The alarming rise in the prevalence of childhood obesity in recent years justifies an interest in evaluating the effectiveness of treatment interventions in the primary care setting, where they can be more accessible to the general population. This review aims to evaluate the effectiveness of multidisciplinary team interventions in this setting, in view of increasing recognition of the important role that such teams play in the treatment of childhood obesity.

A search of the Pubmed database was carried out based on pre-established inclusion and exclusion criteria. 26 studies from 18 different journals were included in the review, these being mainly behavioural, parenting and lifestyle interventions or combinations thereof. 18 of the studies reviewed reported on interventions that led to statistically significant changes in waist circumference, BMI or BMI-derived scores such as BMI percentiles and BMI z-scores. Assessing the clinical significance of the reported changes presented difficulties due to lack of explicit reporting of clinical significance and lack of widely-accepted weight-loss goals for such interventions in children.

The most successful interventions tended to feature standardized training of professional staff in the intervention and use of tailored educational material. While the exact formulation of the multidisciplinary team varied, the teams regularly feature professionals trained in the fields of nutrition, physical education/exercise therapy and psychology and often did not involve doctors beyond the participant referral stage. Low-intensity interventions where contact was made on a one-off, 3-6 monthly or monthly basis were generally ineffective.

## Introduction

The global prevalence of childhood overweight and obesity has increased at an alarming rate in the last quarter of a century, with an increase in the estimated number of affected children from 32 million in 1990<sup>1</sup> to 41 million in 2014<sup>2</sup>. The situation in Europe is no less concerning; one in three children aged from six to nine years participating in the second round of the Childhood Obesity Surveillance Initiative (COSI) were shown to be overweight or obese<sup>3</sup>.

This situation has understandably resulted in a growing body of international research into prevention measures to prevent further increase in obesity rates and parallel interventions to achieve sustained weight loss and healthier lifestyles in children who are obese. Targeting these children is important as evidence shows that obese children have higher risk of carrying on obesity in adulthood<sup>4</sup>. Until recently, most paediatric obesity interventions took place in tertiary healthcare settings and research centres<sup>5-6</sup>. However, the importance of primary care-based obesity interventions is increasingly being recognised<sup>7</sup> and primary care is considered to have great potential as a setting for such interventions because it is more accessible to the population<sup>5</sup> and is widely used by children and their care-givers<sup>8</sup>, with whom primary-

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care providers often have a long-standing relationship.<sup>6</sup> For this reason, this review will focus on paediatric obesity interventions based in the primary care setting.

It is widely acknowledged that the multidisciplinary team has an important role to play in the treatment of childhood obesity<sup>9-10</sup>. Additionally, some research suggests that multidisciplinary interventions have the potential to offer more cost-effective care than previously reported interventions<sup>11</sup>. In view of this, this review includes interventions delivered by multidisciplinary teams.

**Methodology**

A search of the Pubmed database was carried out using the inclusion and exclusion criteria detailed in Table 1 and 2. Keywords used in the search were combined into groups defining each of the inclusion criteria, and the search was designed to retrieve articles with at least one term from each of these groups. Systematic reviews/meta-analyses were not included in the study but were reviewed for background information and assessed systematically to check if any references met the search criteria. The selection process for the review is described in the flowchart in Table 3. 25 studies were included in the final review.

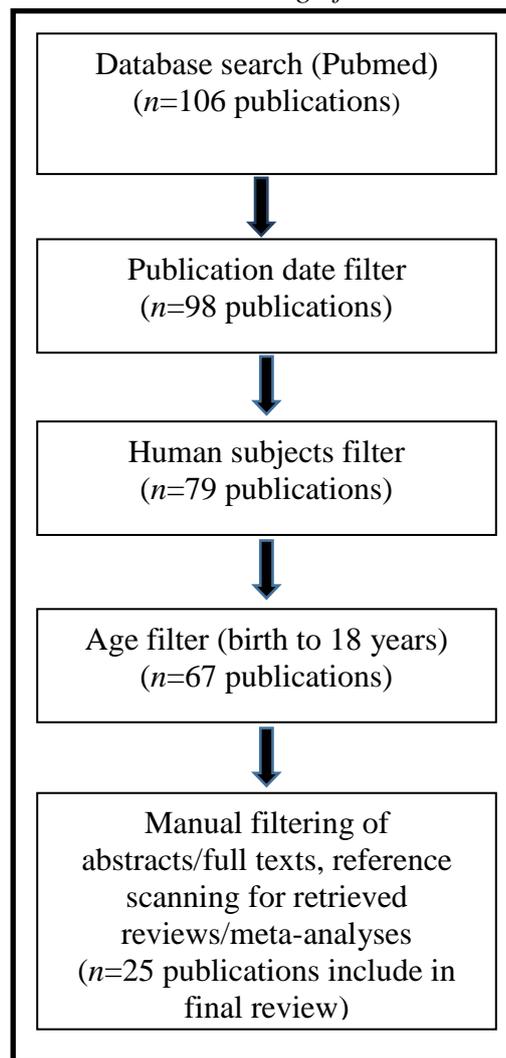
**Table 1: Inclusion criteria for the review**

<p>Inclusion criteria:</p> <ul style="list-style-type: none"> <li>• studies must detail a randomised controlled trial or other intervention study for which results have been reported</li> <li>• reported intervention must be an obesity/overweight treatment intervention aimed at children up to 18 years of age and/or their caregivers</li> <li>• reported intervention must be wholly or mainly based in the primary care setting</li> <li>• reported intervention must be interdisciplinary (involving more than one type of healthcare professional)</li> </ul>
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**Table 2: Exclusion criteria for the review**

<p>Exclusion criteria:</p> <ul style="list-style-type: none"> <li>• study not available in English</li> <li>• study published before 2000</li> <li>• study involves surgical procedures as part of the treatment regime (surgical procedures were considered too specialised to be applicable to the primary care setting)</li> </ul>
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**Table 3: Filtering of results**



**Results**

The review of literature in accordance with criteria included 25 studies from 18 different journals (table 1). The interventions included in this review are mainly behavioural, parenting and lifestyle interventions or combinations thereof, but one study involving pharmacological therapy.

**Effectiveness of reviewed interventions**

Of the 25 papers screened for this review, 7 of

them reported no significant effect on participants BMI or waist circumference<sup>12-18</sup>. While some studies reported that small sample size may have been the reason for failure to prove any significant effect<sup>15</sup> or that insufficient numbers of participants for reliable analyses to be possible<sup>13</sup>, other studies failed to show body composition changes even when adequately powered to detect changes caused by as little as 0.5lbs of weight loss<sup>12</sup>.

18 of the studies reviewed reported on interventions that led to statistically significant changes in waist circumference, BMI or BMI-derived scores such as BMI percentiles and BMI z-scores.

### *Clinical significance*

Three of the studies specified in their results whether the changes in BMI achieved by study participants were clinically significant. In an RCT with parents as sole agents of change<sup>19</sup>, 22% of previously overweight children in the intervention group were reclassified as having normal weight post-intervention while 8.7% of intervention group children previously classified as obese were reclassified as overweight. Another parent-focused intervention<sup>20</sup> led to 'clinically significant' reductions in BMI z-score at follow-up for one third of the intervention group while two-year follow-up of the 'Families for Health' intervention<sup>21</sup> reported clinically significant decreases in BMI z-score in 42% of participants.

Other studies reporting significant changes in primary outcomes did not explicitly report whether these were clinically significant. There are as yet no widely-accepted weight loss goals for such interventions in children.<sup>22</sup> The degree of weight lost by the child is strongly associated with the extent of improvement in their parameters for the risk factors making up the metabolic syndrome<sup>23</sup> which in turn is associated with increased risk of atherosclerosis and cardiovascular disease. The same study reported that while even minimal weight loss (BMI-SDS reduction of <0.25) resulted in improvement in glucose tolerance and blood pressure, reductions of >0.5 in BMI-SDS led to improvement in all metabolic syndrome parameters. By these criteria, assessing clinical significance of five of the remaining studies that reported weight loss results in BMI z-scores is relatively straightforward. Only one of the studies<sup>24</sup> reported a decrease in BMI z-score of > 0.5 and one other

showed a mean decrease in BMI z-score in the intervention group of >0.25 (but <0.5)<sup>25</sup>. The remaining three studies reporting results in BMI z-scores showed modest results that do not denote clinically significant weight loss according to these criteria<sup>26-28</sup>.

Assessing clinical significance of results for trials that reported weight changes in BMI percentile units<sup>8,29</sup> is more challenging; the highest and lowest percentiles lump together values that can differ widely and BMI percentiles lack the comparability across different ages, genders and anthropometric measures that BMI z-scores offer<sup>30</sup>. In fact, BMI percentile is not generally recommended for use as the analytic variable when change in adiposity is being investigated<sup>31</sup>.

Yet other studies<sup>32-34</sup> reported only crude changes in BMI and weight. This makes it difficult to appreciate the significance of results as 'for BMI to be meaningful in children it must be compared to a reference-standard that accounts for child age and sex'<sup>31</sup>. One study<sup>35</sup> reported a reduction in BMI in 50% of intervention participants but did not specify the degree of this reduction, making it impossible to determine the level of effect.

### *Agent of change*

The interventions included in this review varied in their main agent of change. The main agent of change was the participating adolescent in three interventions<sup>28-29,36</sup> and all reported statistically significant decreases in BMI z-score or weight circumference of their intervention groups. The evidence on the ideal extent of involvement of parents in weight control interventions for overweight adolescents is inconsistent<sup>36</sup> but many postulate that family-based models of care are less suited to adolescents as they gain autonomy and become less subject to parental influence<sup>28</sup>. On the other hand, some interventions where parents and children were shared agents of change involved a broad age-range with a mixture of child and adolescent participants<sup>12,29,35,37</sup> with varying success.

In the case of younger age groups, the need for parental involvement in weight loss interventions is generally acknowledged<sup>38-39</sup> and the majority of interventions reviewed involved parents and children as joint agents of change. Interestingly, in recent years it has been questioned whether children need to be involved at all in such

interventions<sup>40</sup>.

Parents were sole agents of change in four reviewed interventions. Two of these<sup>19-20</sup> reported statistically significant improvements in primary outcomes compared to wait-list controls while the other two interventions failed to show any improvement in participants' body composition compared to their one-off information-giving and usual care control arms respectively.<sup>16,18</sup> Of note is the Project Story randomized control trial in which follow-up results showed statistically significant improvements in BMI z-scores for both the parent-only and family-based intervention arms compared to the wait-list controls but no significant difference between the results obtained for the two intervention groups.

### Discussion

Any attempt to comment on the results of this review is made particularly challenging by the fact that a significant number of included studies are reported in a way that makes it difficult or impossible to assess the effectiveness and clinical significance of the intervention (as discussed in the section 'Clinical significance'). If this area of research is to prove as fruitful as possible it is important that a standard method of reporting weight loss outcomes in children is agreed upon to enable reliable comparisons between studies.

A closer look at included studies that proved ineffective for reasons other than lack of power<sup>12,14,16-18</sup> reveals no striking commonalities in their content. All but one did share a notable feature: they were low-intensity interventions where contact was made on a one-off, 3-6 monthly or monthly basis. On the other hand, the most effective interventions had moderate-to-high intensity contact with sessions weekly or twice-weekly for most of the duration of the intervention.

As regards logistics of the most successful interventions, notable features include standardized training of professional staff in the intervention and use of tailored educational material. In the case of the professions involved in the multidisciplinary team, while the exact formulation of team members varied, the teams regularly feature professionals trained in the fields of nutrition, physical education/exercise therapy and psychology and often did not involve doctors beyond the participant referral stage.

Further scrutiny of the reviewed studies with

the most promising outcomes<sup>11,20-21,24-25,41</sup> reveals interesting patterns. Firstly, all the interventions placed an emphasis on skills transference and aimed to help parents and, in most cases, children to apply their knowledge in practice in their everyday lives. Another common feature was the encouragement of self-regulation, in the form of techniques such as self-monitoring, stimulus control and goal-setting. Interestingly, while self-regulation was encouraged, these interventions de-emphasised calorie-counting. The fact that the Traffic Light Diet features heavily among the most effective interventions is indicative of this general attitude; its simplicity and lack of emphasis on calorie-counting make it particularly suitable for use with children and encourages a focus on healthful nutrition choices.

Beyond simply focusing on encouraging healthy choices, the most successful interventions did not simply seek to encourage, but also to enable and facilitate healthier choices by drawing attention to ways in which parents could alter home environment and family dynamics to make them less obesogenic. This generally involved whole-of-family lifestyle changes that avoided 'othering' of the overweight child and extended intervention benefits beyond the participating child to their family members.

It is evident that for such environmental and lifestyle modifications to be sustained in the case of children who are not yet independent, parents of children with excess weight must be key figures. All of the most successful interventions gave importance to the role of parenting in the modification of children's weight-determining behaviours and attempted to provide parents with training in positive parenting practices such as parental modelling and reinforcement. This review unfortunately did not reveal any notable results from interventions targeting adolescents that would enable the authors to comment conclusively on the advisable level of involvement of parents and relative importance of parenting skills in the case of interventions targeting older children.

### Limitations and biases

An important limitation of this study is the use of a single database. Searching other databases may have yielded more results and potentially led to different conclusions being drawn. Exclusion of studies unavailable in English is another potential source of bias.

This review was also limited by the inherent difficulty in making comparisons of effectiveness and clinical significance of results for interventions which reported their results using different weight outcome measures which were often not comparable. Furthermore, studies that met eligibility criteria displayed variety in intervention methodology and intensity, and there was no accepted standard for the types of healthcare professionals comprising multidisciplinary teams for paediatric obesity interventions.

Additionally, the extent to which generalizability of these results is advisable is influenced by the sample size of the individual interventions as well as the socio-cultural context interventions took place in. Issues of loss to follow-up and recruitment difficulties reported by several authors should be kept in mind. In a significant number of the included studies participants received incentives to participate. It is important to question whether certain interventions would be successful or sustainable without such incentives.

### Conclusions

Among the articles reviewed, the most successful paediatric obesity interventions in the primary care setting tended to feature standardized training of professional staff in the intervention and use of tailored educational material with intervention participants. While the exact formulation of the multidisciplinary team varied, the teams regularly feature professionals trained in the fields of nutrition, physical education/exercise therapy and psychology. These interventions frequently did not involve doctors beyond the participant referral stage. Low-intensity interventions where contact was made with participants on a one-off, 3-6 monthly or monthly basis were generally ineffective.

The authors advocate the setting up of an intervention for the treatment of overweight and obese children in Malta. In light of the review findings, we recommend that such an intervention should incorporate a medium-to-high intensity, multi-disciplinary approach with input from nutritionists, psychologists and physical therapists, but it may also benefit from the involvement of other professionals. The emphasis of the intervention should be skills transference and self-regulation as this will empower both children and parents to enact and maintain lifestyle changes by

fostering positive parenting practices, encouraging whole-of-family lifestyle change and addressing the obesogenic environment at the level of the family unit.

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