

Original Article

Multimodal-lifestyle interventions for overweight and obese children: a summary of results

MILENA MORANO¹, ALFONSO RAGO², GAETANO RAIOLA³

^{1,2} Parisi-De Sanctis Institute, MIUR-Italian Ministry of Education, University and Research, Foggia, ITALY

¹ School of Medicine and Health Sciences, “G. D’Annunzio” University of Chieti-Pescara, Chieti, ITALY

³ Department of Humanities, Philosophy and Education, University of Salerno, Salerno, ITALY

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Abstract:

The increase of obesity and decline of fitness during childhood highlight the need for suitable interventions, designed to increase physical activity in children and adolescents. This paper aims to describe and identify the characteristics of three childhood obesity programs conducted in pediatric primary care setting and/or in school environment. Participants were overweight and obese boys and girls, aged 8 to 12 years. Children were assessed before and after the interventions with respect to body composition, physical activity, physical fitness, body image, perceived physical ability, enjoyment of physical activity, health related quality of life, and dietary habits. After treatments, overweight and obese children reported improvements in the body mass index, percent body fat, and in almost all health-related fitness tests. Psychosocial health related quality of life, body image, perception of physical ability, and physical activity enjoyment also improved at the end of the programs. For dietary habits, participants reported reductions in total and commercial food caloric intakes, with higher protein and lower fat consumptions from pre- to post-intervention. Results could have methodological implications for tailoring interventions to the needs of obese children. Findings encourage the adoption of a comprehensive approach focused on nutritional education and structured fun-based skill-learning physical activity.

Key words: body composition, body image, health related quality of life, physical abilities, physical activity, physical fitness.

Introduction

Child obesity is a social concern, because it tracks into adulthood and is related to a broad range of negative health consequences, impacting quality of life (Tsiros et al., 2009). Nationally representative data showed that the prevalence of overweight and obesity in 8-9 year-old Italian children is 21.3% and 9.3% respectively, with a larger percentage among boys (9,7%) and in the southern regions of Italy ($\geq 35\%$) (Istituto Superiore di Sanità, 2018). Considering that the rate of pediatric overweight is still high (Olds et al., 2010), research examining the factors that play a role in the prevention and treatment of childhood obesity are warranted (Altavilla et al., 2015).

Cross-sectional studies found that obese children exhibit poorer performance on weight-bearing tasks, lack confidence in their physical competence, and show greater body dissatisfaction compared with their normal-weight counterparts (Deforche et al., 2003; Morano et al., 2011). Consequently, they have sedentary lifestyles and a less positive attitude towards physical activity (Trost et al., 2001). It was suggested that the rising prevalence of overweight has occurred simultaneously with the decline of physical activity during middle childhood and adolescence (Wareham, 2007). Some evidence has previously showed that body dissatisfaction increases with overweight status (Morano et al., 2011), and both actual and perceived physical competence (i.e. the individual's perception of physical condition, sport and strength competence) are important determinants of physical activity and fitness during childhood and adolescence (Vedul-Kjelsås et al., 2012).

Recommendations coming from several agencies and experts highlight that regular physical activity and healthy eating behaviours can play an important role for the management of obesity-related diseases of children and adolescents (Gaetano, 2016). However, due to the lack of longitudinal data, it is difficult to assess how physical activity and eating habits track from childhood to adulthood (Tiziana et al., 2017). Furthermore, the evidence supporting the role of increased physical activity for the prevention and treatment of childhood obesity is not strong (Stensel et al., 2008), because research in this field is limited in both quantity and quality (Cliff et al., 2010).

In two review articles assessing the efficacy of exercise training interventions in obese children or adolescents (Watts et al., 2005; Atlantis et al., 2006), the authors concluded that increased physical activity is effective for reducing body fat, but not for decreasing body weight or body mass index. Despite many studies of

isolated or adjunctive exercise treatment in obese children that have reported only modest weight reductions, more research evaluating the efficacy of interventions on physical activity as a primary study outcome, might provide some potentially effective strategies for promoting physical activity among obese children. Therefore, the aim of this paper was to describe and identify the characteristics of three childhood obesity programs conducted in pediatric primary care setting and/or in school environment. In particular, our objective was to compare interventions at least 6 months of duration, aimed to examine changes in body composition, dietary habits, physical activity, physical fitness, health related quality of life, and some psychosocial determinants of activity behavior (e.g., body image, perceived physical ability, enjoyment of physical activity) in obese boys and girls.

Material & methods

This paper includes studies reporting interventions that incorporated a multidimensional approach in the areas of health-related physical activity, exercise training and behavior modification (Morano et al., 2012, 2014, 2016).

Participants

Participants (ages 8-12 years) were overweight and obese children recruited via pediatricians at a city hospital (Morano et al., 2012, 2014) or through a middle school located in southern Italy (Morano et al., 2016). They followed an obesity treatment program incorporated nutritional education, fitness components, and exercise training (two or three 2h sessions/week) via a variety of indoor and outdoor activities (i.e., mini and sport games, circuits, individual tasks) conducted by specialist instructors. Participants were assessed at baseline (T0) and at the end (T1) of the treatment period that was 9, 8 and 6 months of duration, respectively (see Morano et al., 2012, 2014, 2016).

Measures

Participants were assessed with respect to body weight, height, circumferences, skinfold thickness and fat mass (Norton et al., 1996). Health-related fitness tests (e.g., standing long jump, medicine-ball throw, sprint and agility test; Committee of Experts on Sports Research, 1993; The Cooper Institute, 2006), a physical activity questionnaire (Crocker et al., 1997), and the Perceived Physical Ability Scales (Bortoli & Robazza, 1997; Colella et al., 2008) were also administered. Health related quality of life was evaluated with the Pediatric Quality of Life Inventory (Varni et al., 2001), while body image and individuals' enjoyment of physical activity were measured using Collins' Child Figure Drawings (Collins, 1991) and the Physical Activity Enjoyment Scale (Carraro et al., 2008), respectively. Finally, dietary habits were collected with a 7-d food diary.

Statistical analysis

A 2 (gender) \times 2 (time: T0 vs. T1) repeated measures analysis of variance was performed on each dependent variable to investigate the evolution of the measured parameters in boys and girls over the two test periods. Statistical significance was set at $p \leq 0.05$. All analyses were conducted using the Statistical Package for the Social Sciences, version 17.0 (SPSS, Chicago, Illinois, USA).

Results

From T0 to T1, height ($p < 0.001$), weight ($p < 0.01$) and waist circumference ($p < 0.04$) significantly increased, whereas body mass index declined ($p < 0.005$) (Morano et al., 2012, 2014). In the last work, it was also found that percent body fat ($p < 0.001$) and skinfold thickness of the biceps, subscapular and suprailiac regions ($p < 0.01$) decreased over time (Morano et al., 2016).

Significant main effects for time emerged on almost all motor tests, with children showing better performances at the end of the intervention (Morano et al., 2012, 2014, 2016). In particular, there were significant changes over time in the standing long jump ($p < 0.003$), medicine ball throw ($p < 0.02$), agility shuttle run ($p < 0.001$) (Morano et al., 2012, 2016), 10-m sprint ($p < 0.002$), trunk lift, sit-up (Morano et al., 2016), fundamental motor skills, and Bosco vertical jump tests ($p < 0.001$) (Morano et al., 2014).

For behavioral and psychosocial outcomes, significant time effects were shown, with children reporting lower body dissatisfaction (Morano et al., 2012), higher physical activity and perceived physical ability scores ($p < 0.001$) (Morano et al., 2012, 2014) at the end of the intervention. Psychosocial health related quality of life ($p < 0.05$) and physical activity enjoyment ($p < 0.03$) also improved after program (Morano et al., 2016).

With regard to dietary habits, participants reported reductions in total and commercial food caloric intakes ($p < 0.001$), with higher protein and lower fat consumptions ($p < 0.001$) from pre- to post-intervention (Morano et al., 2016).

Discussion

This paper aimed to examine three multi-component intervention programs at least 6 months of duration, designed to increase physical activity on changes in physical fitness and some psychosocial determinants of activity behavior in obese boys and girls aged 8 to 12 years. Findings suggest that such interventions can

promote physical activity, improve actual and perceived physical abilities, and enhance body satisfaction as well as physical activity enjoyment among overweight and obese children. Furthermore, the use of these programs that incorporated a multidimensional approach to increase physical activity patterns and not weight loss *per se*, had a positive impact on reducing children's body mass index (Morano et al., 2012, 2014, 2016), and improving their body composition and health related quality of life (Morano et al., 2016).

Systematic reviews suggest a negative relation between body mass index and health related quality of life, and significant enhancement in health related quality of life with weight loss (Tsiros et al., 2009; Griffiths et al., 2010; Sanders, et al., 2015). However, previous intervention programs in obese children and adolescents, showed that increases in physical activity improves health related quality of life and can produce psychosocial health benefits without a substantial change in body composition (Goldfield et al., 2007; Rank, et al., 2014). To date, numerous childhood obesity treatments have been implemented, and most have found a reduction of body mass index (Lavelle et al., 2010; Ruotsalainen et al., 2015), whereas few have reported an increase in physical activity at post-test or follow-up (Cliff et al., 2010).

To examine physical activity behavior in children, researchers have adopted different motivational theories of behaviour, including the Harter's model (1985) and Bandura's approach (1997). Based on such theories (Harter, 1985; Bandura 1997) and according to Stodden and colleagues (2008), improving actual physical competence of obese children has the potential to encourage their motivation to participate in physical activity because of their enhanced self-perception. Therefore, successful experiences, measured in terms of improved actual competence, are expected to increase perceived competence which is one of the most consistent predictors of physical activity participation (Stodden et al., 2008).

From this standpoint, it is not surprising that findings showed improvements in almost all variables after the programs, suggesting that creating an activity-friendly environment, focusing on skill mastery, and increasing confidence in performance may be of benefit in obesity management. Results could have practical implications for identifying areas of focus, and tailoring interventions to the needs and interests of obese children. In particular, educators and trainers should provide a variety of fun-based skill-learning activities in order to help overweight and obese children experience success, achieve improvements in actual and perceived physical competences, and consequently, increase their physical activity participation.

Conclusions

This paper that aimed to analyse three multi-component intervention programs in overweight and obese children, emphasises the importance of a comprehensive healthy lifestyle program including physical, psychosocial and behavioral factors. Interventions focused on healthy eating (rather than on reducing energy intake) and enjoyable physical activity (rather than on fixed intensities, duration and frequency of prescribed exercise sessions) in combination with parental involvement, require a multidimensional approach. Such programs should be implemented not only as a modality of reducing body weight of obese children, but also of improving their psychological well being and physical fitness.

Conflicts of interest - No competing interests to declare.

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