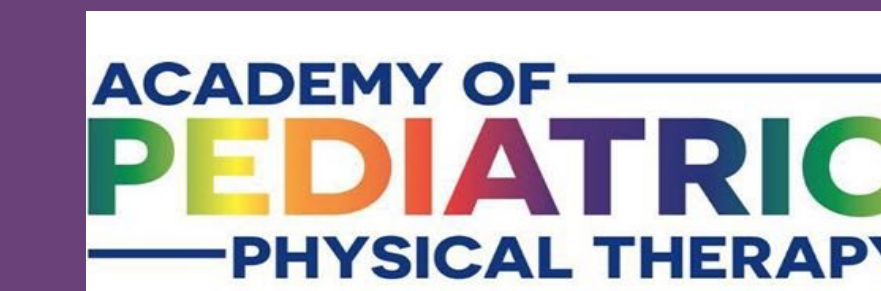




Does Implementation of a School-Based Physical Activity Program Alone Reduce Body Mass Index in Children with Obesity?

Jones S, Blaser B, Toombs H, Wahl D
Southwest Baptist University, Bolivar Missouri



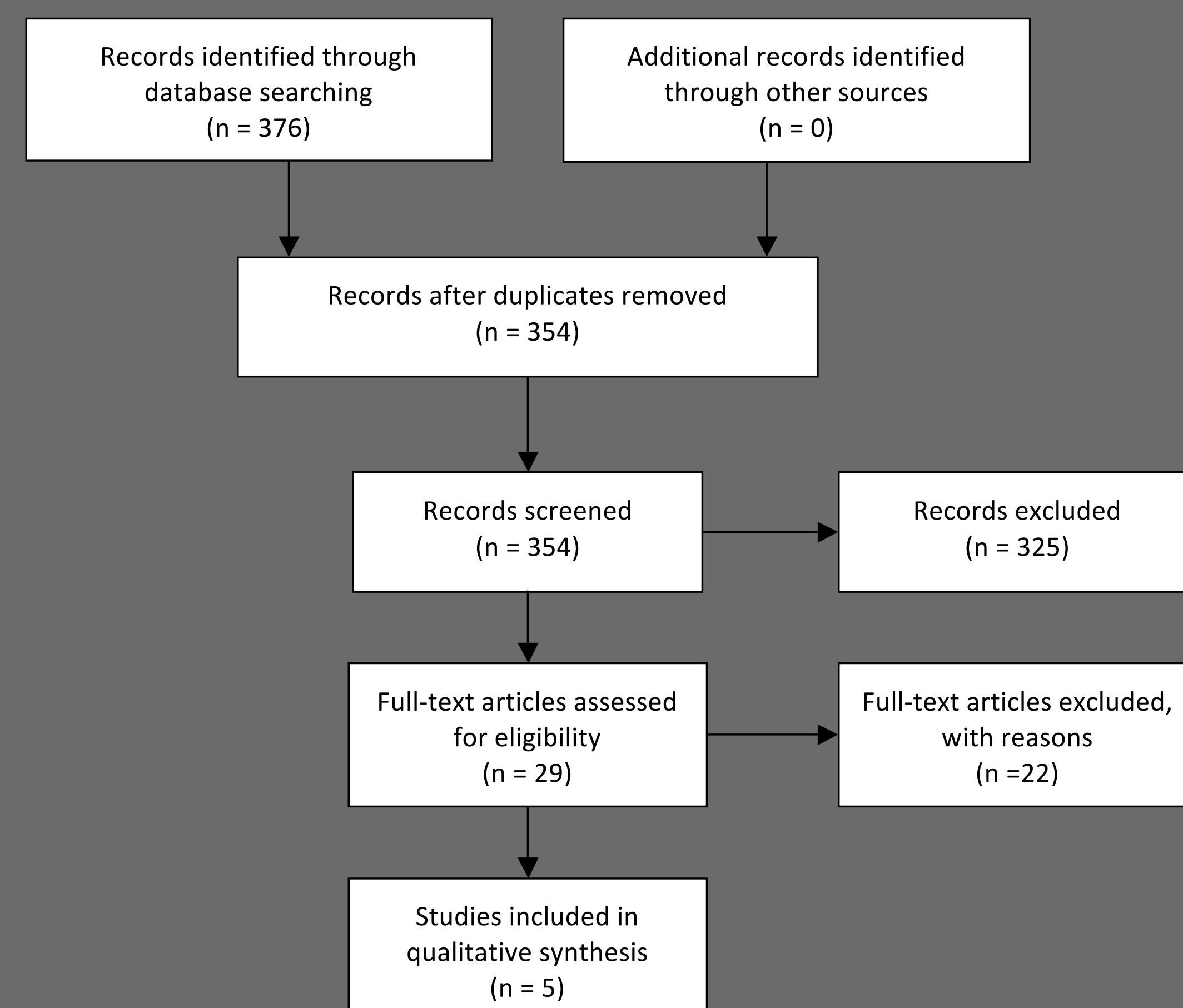
Introduction / Purpose

According to the United States Center for Disease Control and Prevention, childhood obesity is an epidemic and has more than doubled in children ages 6-11 from 1980-2012. It is understood that a multimodal approach is the best method to reduce Body Mass Index (BMI). However, such approaches may not be feasible due to socioeconomic constraints and varied family participation. This systematic review was conducted to determine if a school-based physical activity program (PAP) alone, in addition to regular Physical Education (PE), can decrease BMI in school-aged children.

Methods

The American Academy of Cerebral Palsy and Developmental Medicine (AAPDM) methodology was used to conduct this review. Five databases were searched using the following criteria: school aged children, school-based PAP provided in addition to PE, an outcome measure of BMI, and peer-reviewed studies published within the last 10 years. Four authors independently reviewed studies for eligibility, and the strength was rated using the AAPDM conduct of group design questions

PRISMA Diagram



Results

The initial search produced 376 articles. Following removal of duplicates and studies that did not meet inclusion criteria, five articles remained. One study was a level III non-randomized trial, three were Level II randomized controlled trials (RCT), and one was a Level I RCT. All studies demonstrated moderate to high methodological strength. Reviewed studies included a total of 1,324 subjects. The number of minutes of the PAP varied among the studies from 60-605 minutes per week and there was heterogeneity in the types of activities provided between the different studies. Even with these limitations, each study showed an overall reduction in BMI for children who participated in a PAP with the greatest effect seen in obese and overweight children.

Lead Author/Design/Level	Participants	Control Intervention	Intervention	Outcome Measurement	Results/Findings
Eather (2012) Cluster RCT Level II Australia	n=226 Control=118 Age: 10-11	Usual Health PE for 60 minutes/week for 8 weeks	Usual Health & PE PLUS -an exercise program "Fit-4-Fun" that included three major components: 3 X 20 minutes/week for 8 weeks	-20 meter shuttle run -Standing jump -7-stage sit-up -Basketball throw -Push-up test -Sit and reach -BMI -Pedometer	A primary school-based intervention focusing on fitness education significantly improved health-related fitness and physical activity levels in children. BMI mean score decreased 0.96kg/m ² in the IG
Lazaar (2007) Cluster RCT Level II	n=425 Age: 6-10 Multiple schools	None	Two 1-h sessions of school PE (various exercises completed in 5-minute intervals).	-BMI -Waist Circumference -Fat-free Mass -Sum of four skinfolds	Obese 6-10 year olds in PA program IG over a 6-month period showed more favorable changes in BMI, ZS, WC and FFM than children in the PA program CG. BMI decrease for boys in intervention group (-2.8%) compared increase (+1.5%) in control group
Sacchetti (2013) RCT Level I Italy	n=497 Age: 8-9	Traditional physical education program	PE Program with longer duration, higher intensity and frequency. 45 minutes a day of moderate to vigorous exercise.	-Self-administered questionnaire -Height, weight, and BMI -Sit & reach -2kg medicine-ball forward throw test -Standing long jump test -20min running speed test -Forward roll test	The enhanced program of physical education was effective in improving physical abilities of children and determining a decrease (boys: 10%; girls: 12%) in daily sedentary activities. The experimental group showed a significantly lower rise in BMI compared to the control group (p<.001).
Sigmund (2012) Longitudinal 2-year non-randomized trial Level III	n=176 Ages: 6-9 Four schools	Standard PA program of two 45-minute PE lessons per week consisting of simple gymnastic exercises, movement games, and exercises with equipment.	Standard PA program PLUS: -One 20-min recess with PA content, -40- 90 minutes of PA content during after school care	-Caltrac accelerometer -Yamax Digiwalker SW-200 pedometer -PA log book to track above data -Activity energy expenditure	After the 2-year PA intervention (2008): -the percentage of students in the IG classified as obese was 0% compared to 22% of girls and 23% of boys in the CG - the percentage of students in the IG classified as overweight was 0% for girls and 11% for boys compared to 12% for girls and 17% for boys in the CG
2013 Sigmund Longitudinal 2-year follow-up	n=174 Age: 10-12 Four schools	See above	See above	See above	At the 2-year follow up (2010) -the percentage of students classified obese changed from 0 to 2% for girls and from 0 to 6.7% for boys in the IG; from 22 to 17% for girls and remained at 23% for boys in the CG -the percentage of students classified as overweight changed from 0 to 4.7% for girls & from 11 to 13% for boys in the IG and from 12 to 17% for girls and from 17 to 19% for boys in the CG

KEY: BMI (Body Mass Index); CG (Control Group); FFM (Fat Free Mass); IG (Intervention Group); PA (Physical Activity); PE (Physical Education); RCT (Randomized Control Trial); ZS (Sum of 4 skinfolds); WC (Waist Circumference)

References

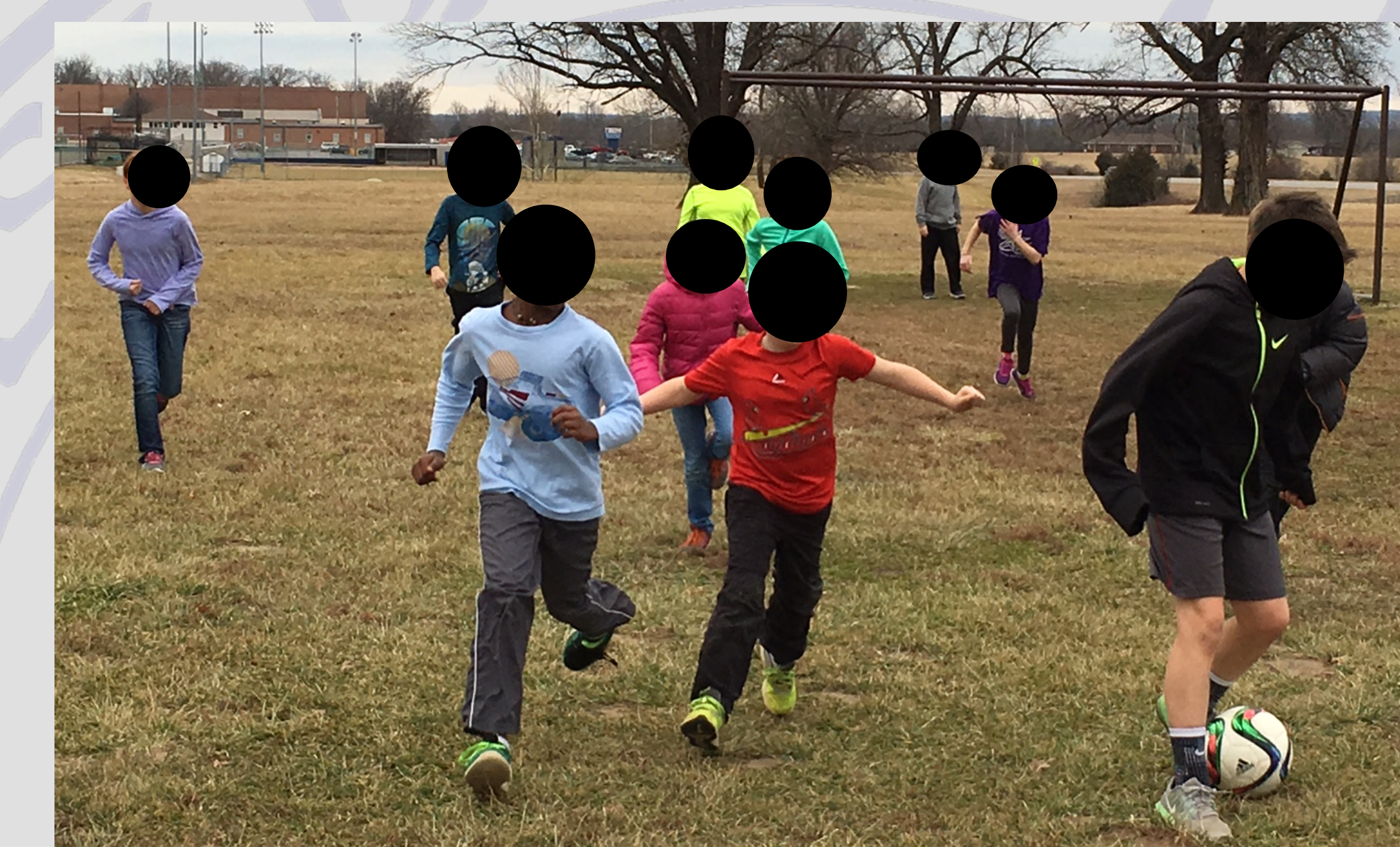
- "Childhood Obesity Facts" Centers for Disease Control and Prevention. Centers for Disease Control & Prevention, 2015. Web. 09 June 2016.
- "After-school Program Impact on Physical Activity and Fitness. A Meta-analysis." *Clinical Governance: An Intl J Clinical Governance: An International Journal* 15.2 (2010):
- Sacchetti R, Cecilian A, Garulli A, Dallolio L, Beltrami P, Leoni E. Effects of a 2-Year School-Based Intervention of Enhanced Physical Education in the Primary School. *J School Health*. 2013; 83(9):639-646.
- Eather N, Morgan P, Lubans D. Improving the fitness and physical activity levels of primary school children: Results of the Fit-4-Fun group randomized controlled trial. *Preventive Medicine*. 2013; 56(1):12-19.
- Lazaar N, Aucouturier J, Ratel S, Rance M, Meyer M, Duché P. Effect of physical activity intervention on body composition in young children: influence of body mass index status and gender. *Acta Paediatrica (Oslo, Norway: 1992)* [serial online]. September 2007; 96(9):1315-1320. Available from: MEDLINE with Full Text, Ipswich, MA. Accessed April 14, 2016.
- Sigmund E, Ansari WE, Sigmundová D. Does school-based physical activity decrease overweight and obesity in children aged 6-9 years? A two-year non-randomized longitudinal intervention study in the Czech Republic. *BMC Public Health* 2012; 12(1):570.
- Sigmund E, Sigmundová D. Longitudinal 2-Year Follow-up on the Effect of a Non-Randomised School-Based Physical Activity Intervention on Reducing Overweight and Obesity of Czech Children Aged 10-12 Years. *International Journal of Environmental Research and Public Health* *IJERPH* 2013;10(8):3667-3683.

Conclusion

Although a multimodal approach has been shown to be most effective, this review showed that the addition of a PAP alone is effective in reducing BMI in 6-12 year-old children, especially those who are already obese or overweight. Many schools may not have the resources to implement a multimodal approach, but may be able to provide a PAP in addition to their current PE curriculum. It appears that a minimum of 8 weeks of moderate to vigorous activity is indicated. However, further research is needed to determine the optimal amount of physical activity required to reduce BMI so that minimum activity levels can be established.

Clinical Relevance

Given the increasing incidence of childhood obesity in the United States, school-based physical therapists could play a significant role in advocating for and establishing school-based PAPs to reduce BMI among children. Development of these intervention programs may not only impact children who are already overweight or obese, but may also improve the overall health and wellness of all school-aged children.



Acknowledgements

Special thanks to: Bolivar Primary School students for photographs, Southwest Baptist University for resources/ support and to God, the giver of all good things. For information or questions, please contact: Sarah Jones, DPT, PCS, ATP at sarahjones@sbuniv.edu