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Original Research

Effect of participation in a park-based afterschool program on cardiovascular disease risk among severely obese youth

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ABSTRACT

Objectives: The prevalence of severe obesity in youth is rising, despite reports of obesity rates stabilizing overall. While reports on treatment outcomes for youth with severe obesity (bariatric surgery, behavioral and pharmacological treatments) exist, very few community-based programs have reported changes in health outcomes in this population. We assessed changes in cardiovascular health risk profiles among racial/ethnic minority youth with severe obesity who participated in Fit2Play™, a park-based afterschool health promotion program.

Study design: A longitudinal cohort study.

Methods: Children aged 6–14 years ($N = 1546$, 51% Hispanic, 44% non-Hispanic black) who participated in the Fit2Play™ in one of 34 urban park sites for one school year over five separate school years (2010–2015) had height, weight, four-site skinfold thicknesses, systolic blood pressure (SBP)/diastolic blood pressure (DBP), fitness tests, and a health/wellness knowledge test collected at the beginning and end of the school year. Two-level repeated measures mixed models examined changes in cardiovascular health outcomes (body mass index [BMI], skinfold thickness, systolic/diastolic blood pressure percentile [SBPP/DBPP], cardiorespiratory fitness [PACER]) in youth with severe obesity over 1- and 2-year follow-up.

Results: Compared with baseline, BMI decreased 13% (incidence rate ratio [IRR] 95% confidence interval [CI]: 0.83–0.90), sumof skinfold thicknesses decreased 5% (IRR 95% CI: 0.91–0.99), SBPP decreased 5% (IRR 95% CI: 0.90–0.99), DBPP decreased 19% (IRR 95% CI: 0.77–0.86), and PACER scores increased 12% (IRR 95% CI: 1.0–1.27) after two years of participation in the Fit2Play™ program.

Conclusions: Findings here support community/park-based youth programs as effective and accessible treatment options for reducing cardiovascular disease risk among youth with severe obesity.

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Introduction

Prevalence rates of severe obesity are increasing in the United States (US)[1] despite reports of overall rates of obesity stabilizing,[2] with low income and racial/ethnic minorities at greatest risk.[1] Currently, almost 10% of non-Hispanic black and 7.6% of Hispanic youth in the US aged 2–19 years have severe obesity,[2] defined as ≥120% of the 95th percentile of body mass index (BMI) adjusted for age and sex. Severe obesity in youth is associated with many cardiometabolic comorbidities, liver and kidney issues, lower sleep quality, and lower quality of life scores.[1,3–5] Moreover, severe obesity in youth predicts severe obesity in adulthood and is associated with asthma, arthritis, and poorer cardiometabolic and psychological risk profiles into adulthood as well.[6,7]

While bariatric surgery is shown to be efficacious in treating severe obesity in adolescents,[8–10] it is not a practical (affordable/accessible) treatment option for all.[3] Alternatively, weight loss behavioral and pharmacological treatment programs for children and adolescents with severe obesity in both inpatient and ambulatory settings are shown to have small effect sizes and/or poor long-term (>1 year) outcomes.[5,11,12] Indeed, an imperative need is cited for more research to assess programs that specifically address health promotion and weight reduction in youth with severe obesity.[5,12] Moreover, widening obesity-related health disparities warrant particular attention toward at-risk populations including racial/ethnic minorities, and those with low socio-economic status who are most impacted by the increase in, and comorbidities associated with severe obesity.[2]

The purpose of this study was to examine changes in cardiovascular disease risk outcomes in a sample of racial/ethnic minorities youth with severe obesity participating in the Fit2Play™ program, a park-based physical activity and health promotion program over one school year. A follow-up analysis was also performed to examine changes in cardiovascular health outcomes for a subset of the study population who participated in the program for two consecutive years.

Methods

Study design and participants

This subset of data was generated from the Fit2Play™ data set, which includes youth aged 6–14 years who participated in the Fit2Play™ program from 2010 to 2016 ($N = 2200$). The Fit2Play™ program has been described previously in detail.[13] Briefly, it is a 10-month (entire school year) afterschool program that takes place on every school day from 2 to 6 pm and is offered in 34 different sites throughout Miami-Dade County, Florida. Youth with severe obesity with all predata and postdata for at minimum one year were included in this analysis ($n = 176$). A smaller subset of children with severe obesity who participated in the program for two consecutive years ($n = 30$) were included in a follow-up analysis. This study was approved by the University of Miami Institutional Review Board.

Fit2Play™ program overview

The Fit2Play™ program emphasizes providing children with fun and engaging physical activity outdoors for at minimum 40 min a day with its foundation based on Sports, Play and Active Recreation for Kids (SPARK).[14] The SPARK curriculum comprises play and evidence-based,[15] outcome-oriented structured active recreation for children with a focus on developing and improving motor skills, movement knowledge, and social and personal skills. Participants also receive nutrition education sessions weekly based on the empowerMe4Life,[16] a health and wellness curriculum consistent with the American Heart Association's scientific recommendations in promoting heart-healthy lifestyles. The Fit2Play™ program is implemented by park coaches, with oversight from health and wellness trained specialists and a registered dietician. Daily program attendance is recorded for each participant.

Measures

Demographics

Demographic data including participants' age, sex, and race/ethnicity were provided by parents via self-report at program registration. Drawing from the Florida Department of Health (2010–2014) data, a categorical park-area poverty variable, was based on percent of households living below the federal poverty line, categorized as 3.2–11.7%, 11.8–15.9%, 16.0–20.3%, 20.4–29.9%, and 30.0–44%, respectively. Park-area poverty data were linked to individual participant records based on park zip code.

Anthropometrics

Age- and gender-specific BMIs were computed using the Centers for Disease Control and Prevention (CDC) guidelines for calculating a BMI value relative to the 95th percentile. The 95th BMI percentile (BMIpct95) variable generated via the CDC macro code[17] was used in all analyses.

Skinfold thickness measurements were used to provide a reliable estimate of obesity and regional fat distribution.[18] All anthropometric measurements followed prior Fit2Play™ study protocol[13] and were collected in triplicate and averaged for analysis to reduce measurement error.

Blood pressure

Systolic blood pressure percentile (SBPP) and diastolic blood pressure percentile (DBPP) adjusted for age, sex, and height percentile were measured as previously described.[13] Briefly, a total of three diastolic and systolic measurements were taken successively with one-minute in between each measure. For analysis, the first value was dropped, and the subsequent two were averaged and then converted to standardized continuous percentiles and binary hypertension variables based on age, sex, and height-adjusted values, consistent with the American Heart Association protocol guidelines.[19]

Cardiorespiratory fitness

Aerobic fitness was assessed with a timed 400 m run and a Progressive Aerobic Cardiovascular Endurance Run (PACER)

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