

Accelerometer Assessment of Children's Physical Activity Levels at Summer Camps

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Why summer camps?

- 14.3 million American children and youth attend summer day camps¹ for up to 10 hours/day for up to 12 weeks.
- Some summer camps are operated by school-based afterschool programs
- Nationally and locally, afterschool programs have adopted standards for physical activity and healthy eating,^{2,3} with some evidence of success.^{4,5,6,7}
- Fitness gains and body weight reductions achieved from school-based interventions may not be maintained during the summer months.^{8,9}



Physical Activity in Summer Camps

- Two assessments using systematic observation found that 20-25%¹⁰ and 28%¹¹ of children were engaged in walking or vigorous activity at any time during camp hours.
- However, no known studies to date have assessed daily summer camp activity levels using accelerometers.



Objectives

- To assess baseline levels of physical activity via accelerometer among elementary school children attending summer camps.
- To inform adaptation of an evidence-based afterschool obesity prevention program [Out of School Nutrition and Physical Activity (OSNAP) Initiative] to the summer camp setting.



For more information about the OSNAP initiative, visit our website at: osnap.org





Methods

Design: Cross-sectional and repeated measures design

Setting & Population: Children ages 5-12 attending 5 summer camps in Boston, Massachusetts.

Measures: Children wore accelerometers (Actigraph GT3X/GT3X+, Pensacola, FL) for one week (5 days) in July or August 2013 during camp hours, except swimming periods.



Data collectors visited camps each day to observe activities.

Outcomes: Daily minutes of moderate, vigorous, and light physical activity and sedentary time, accumulated overall and occurring in bouts (modified 10-minute bouts).





Methods

Data Reduction: Vertical axis intensity counts captured using the low-frequency extension were converted into minutes spent in moderate & vigorous physical activity using the Freedson¹² age-specific 1-minute cut points for children, at thresholds of 4 and 6 METs, respectively. A sedentary cut-point of 100 counts/minute was used.¹³

Analysis: Linear regression analysis was used to estimate differences in daily activity levels according to demographic characteristics and amount and types of physical activity provided in the camp setting. Adjusted for weather characteristics (temperature, dew point, and precipitation) and clustering of days within children and children within camps.





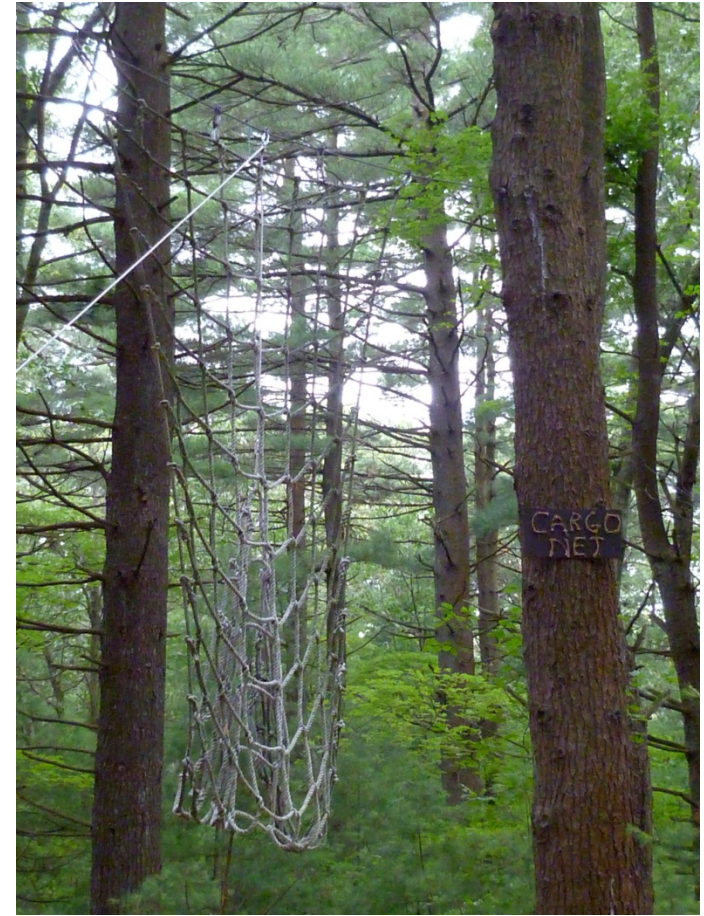
Characteristics of Participating Children

At 5 Summer Camps in Boston, MA, July-August 2013 (N=142)

Characteristic	N (%)
Sex	
Male	76 (54%)
Female	66 (46%)
Race/Ethnicity	
White, non-Hispanic	12 (8%)
Black, non-Hispanic	51 (36%)
Hispanic/Latino	37 (26%)
Multiracial/other/unknown	42 (30%)
Age	
5-6 years	21 (15%)
7-8 years	101 (71%)
9-10 years	12 (8%)
11-12 years	8 (6%)

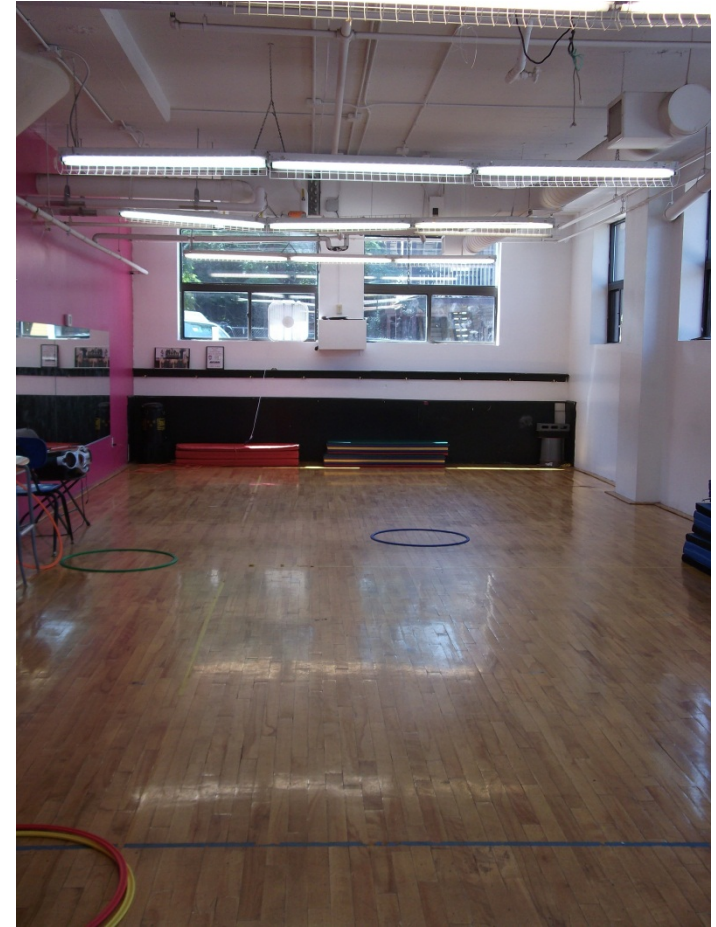


Camp 2



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Camp 3

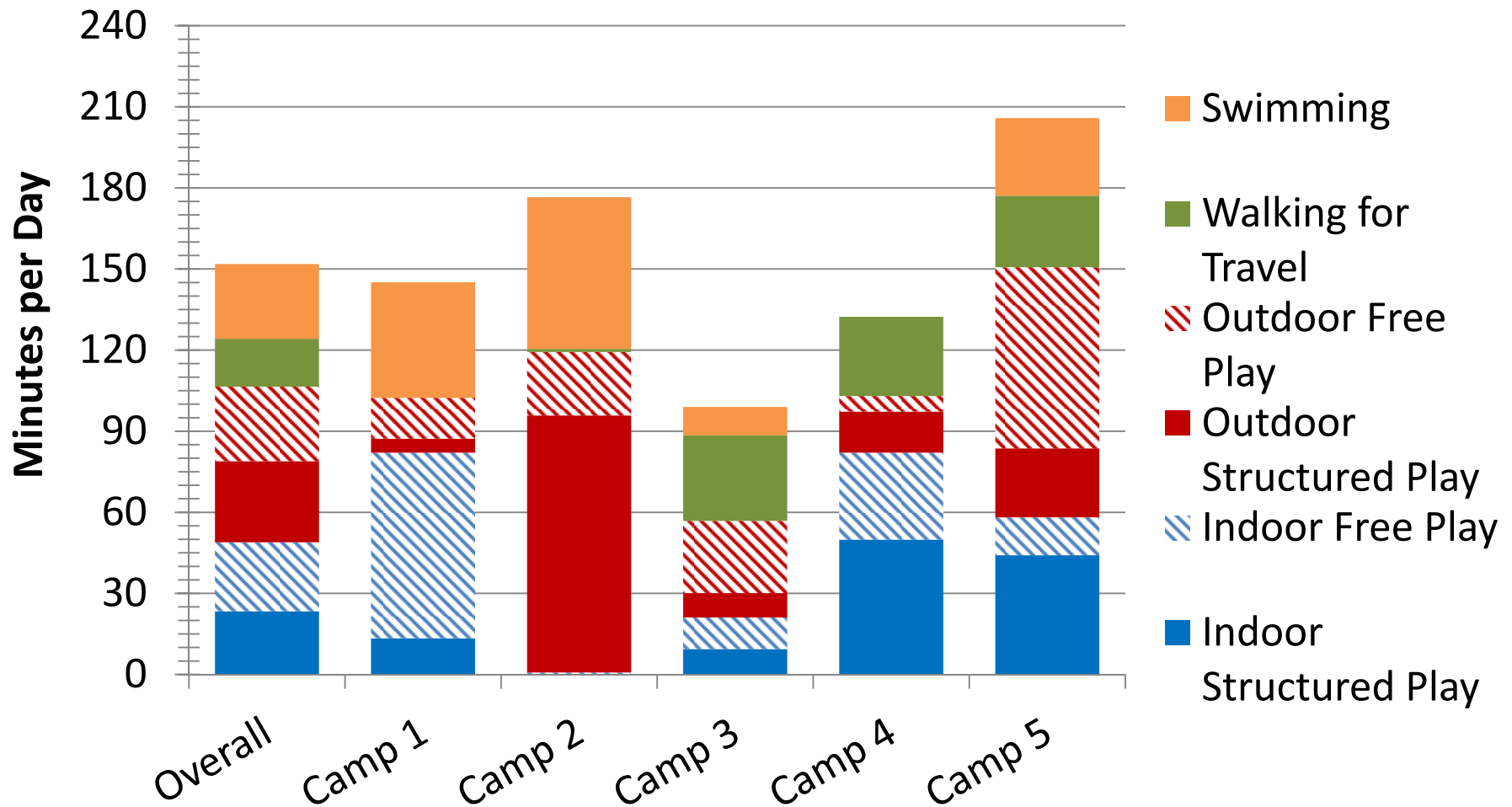


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Camp Practices

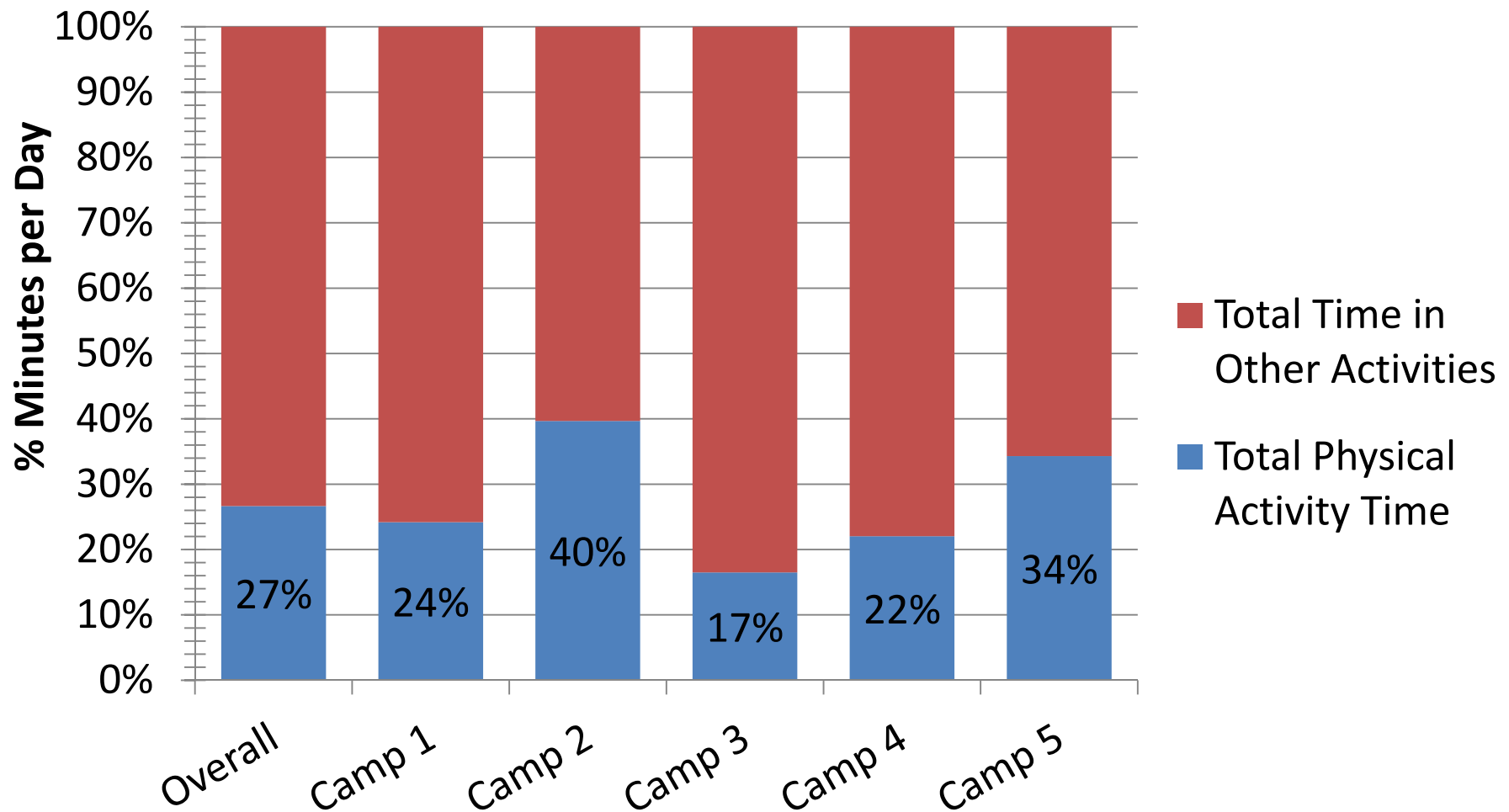
Daily Minutes of Physical Activity Types Offered
To Children at 5 Summer Camps in Boston, MA, July-August 2013





Camp Practices

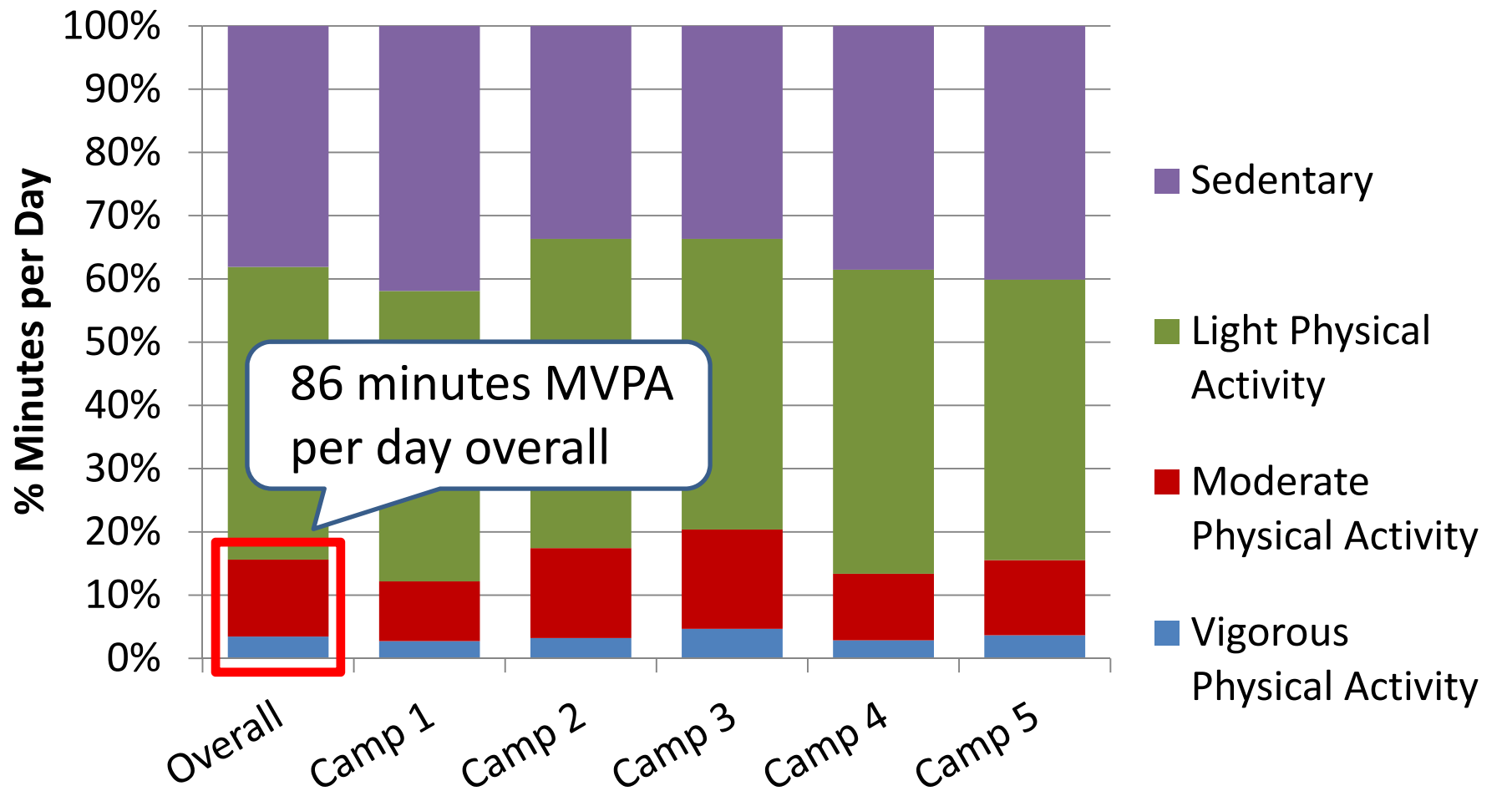
Daily Proportion of Time Physical Activity Offered
To Children at 5 Summer Camps in Boston, MA, July-August 2013





Child Behaviors

Daily Minutes of Physical Activity Accumulated Overall
By Children at 5 Summer Camps in Boston, MA, July-August 2013

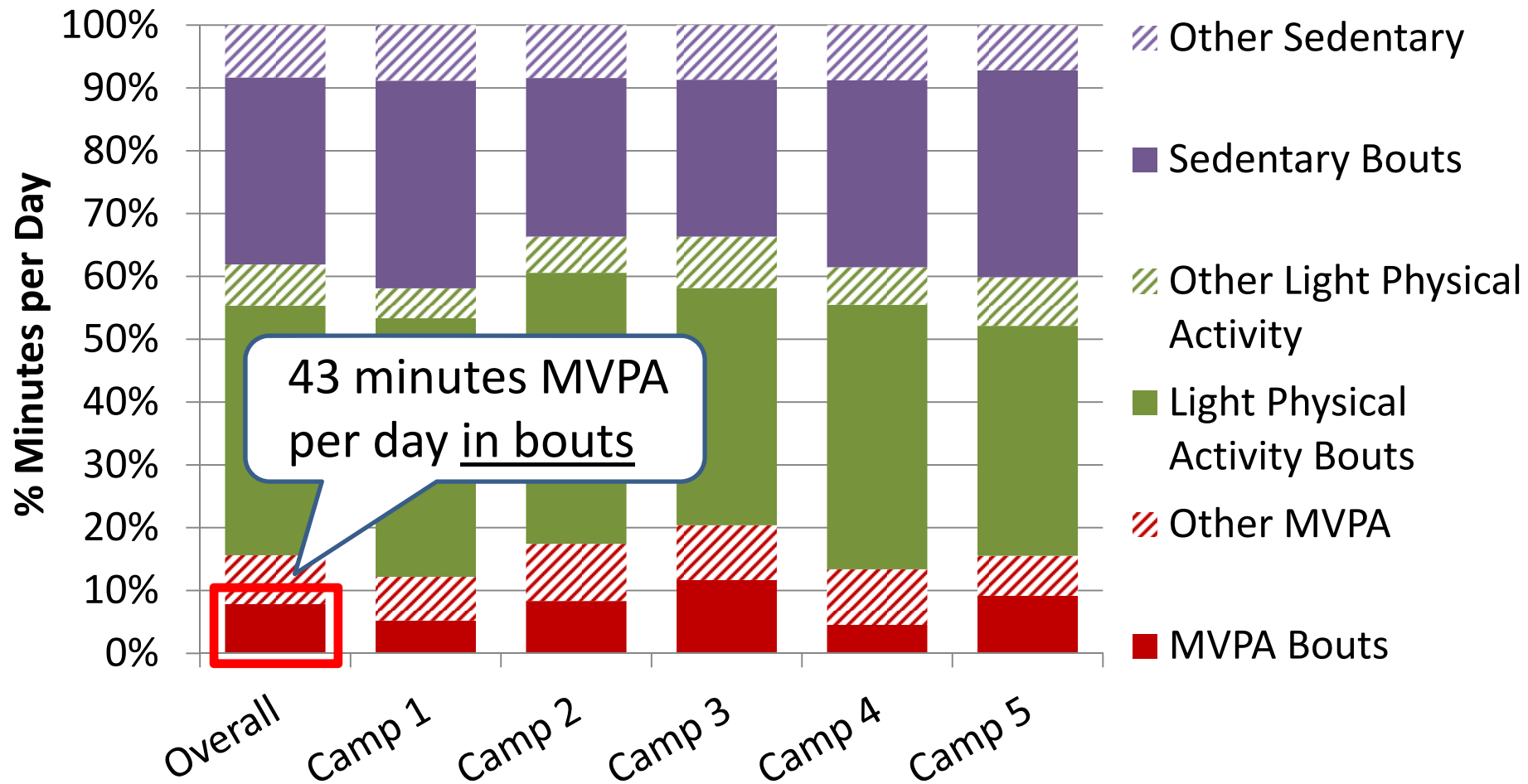


*MVPA: Moderate-to-Vigorous Physical Activity



Child Behaviors

Daily Minutes of Physical Activity Accumulated in Bouts By Children at 5 Summer Camps in Boston, MA, July-August 2013



*MVPA: Moderate-to-Vigorous Physical Activity



What Influences Child Activity Levels?

Predictors of Daily Minutes Accumulated Overall in Activity Levels
At 5 Summer Camps in Boston, MA, July-August 2013 (N=585 Child Days)

	Moderate-to-Vigorous Physical Activity	Vigorous Physical Activity	Sedentary
Characteristic	<i>Difference (SE)</i>	<i>Difference (SE)</i>	<i>Difference (SE)</i>
Female (vs. Male)	-9.99 (4.73)*	-1.88 (2.24)	1.12 (7.35)
Age (years)	-9.22 (1.82)***	-3.94 (0.87)***	1.97 (2.85)
Minutes of Physical Activity Offered			
Indoor Free Play	-0.05 (0.05)	0.01 (0.02)	0.34 (0.11)**
Indoor Structured Play	0.16 (0.05)**	0.04 (0.02)	-0.30 (0.10)**
Outdoor Free Play	0.20 (0.04)***	0.05 (0.02)**	0.01 (0.08)
Outdoor Structured Play	0.38 (0.08)***	0.09 (0.03)*	-0.46 (0.15)**
Active Transport	0.45 (0.08)***	0.09 (0.04)*	-0.32 (0.16)*

* p<.05

** p<.01

*** p<.001

Models also adjusted for daily minutes of monitor wear, percent deviation from average annual temperature, precipitation, dew point, and nesting of days within students and students within camps.



Conclusions

- Elementary school children attending summer camps in Boston, Massachusetts achieved, on average, daily recommended levels of MVPA during camp hours.
 - Males: 93.6 minutes/day; Females 76.6 minutes/day
 - Similar to national estimates¹⁴ of regular MVPA among 6-11 year old males (95.4) and females (75.2)
- Additional MVPA from swimming ~ 11 minutes/day.
- 39% of children achieved 60 or more MVPA minutes on all days present (range 11-79% by camp).



Conclusions

- Activity levels differed by camp, but not after controlling for weather
- Camp practices impacted children's activity levels

Walking for Travel / Active Travel

- 15 minutes of active travel translated to 7 extra minutes of MVPA per day



Outdoor & Structured Activities

- 30 minutes of outdoor *structured* play translated to 11 extra minutes of MVPA,
- While 30 minutes of outdoor *free* play only resulted in 6 extra MVPA minutes





Implications for Practice and Policy

- Summer day camps are active
- Targeted activities may help engage females and older children in physical activity
- In urban camps, the highest physical activity levels may be achieved when camps provide:
 - Structured outdoor activity
 - Opportunities to walk to and from destinations around the city
- In Boston, academic and city agency partners are using these results to inform dissemination of the OSNAP intervention via the REACH Obesity and Hypertension Demonstration Project



REACH: Racial and Ethnic Approaches to Community Health

<http://www.cdc.gov/nccdphp/dch/programs/reach/>



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