

Sedentary Behavior & Physical Activity: Independent & Interactive Influences on Health

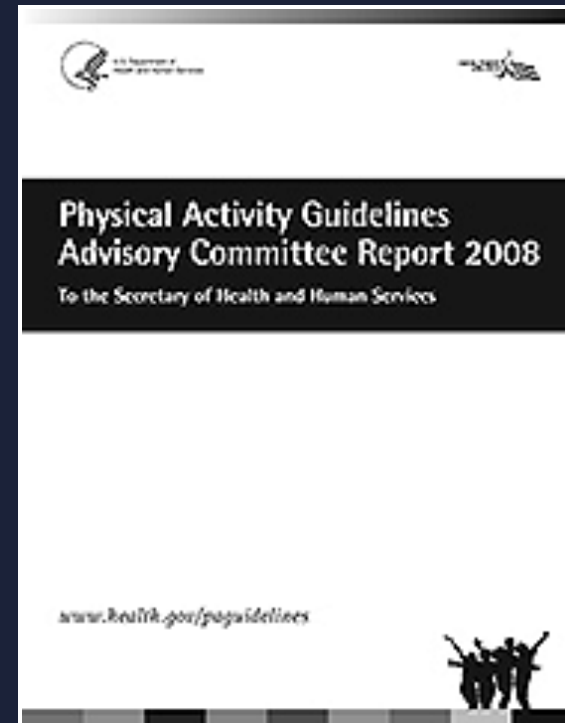
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Physical Activity Guidelines Advisory Committee Report 2008



- The report was presented to the Secretary of Health and Human Services and published in June 2008.



Health Benefits of PA in Children and Adolescents



- **Strong Evidence:**

- Improved cardiorespiratory endurance & muscular fitness
- Favorable body composition
- Improved bone health
- Improved cardiovascular & metabolic health biomarkers

- **Moderate Evidence:**

- Reduced symptoms of anxiety & depression





Physical Activity Guidelines for Americans



Children and Adolescents (6-17 years)

- 1 hour (60 minutes) or more of PA every day
- Most of the 1 hour or more a day should be moderate- or vigorous-intensity PA
- Should include vigorous-intensity PA at least 3 days a week





Physical Activity Guidelines for Americans

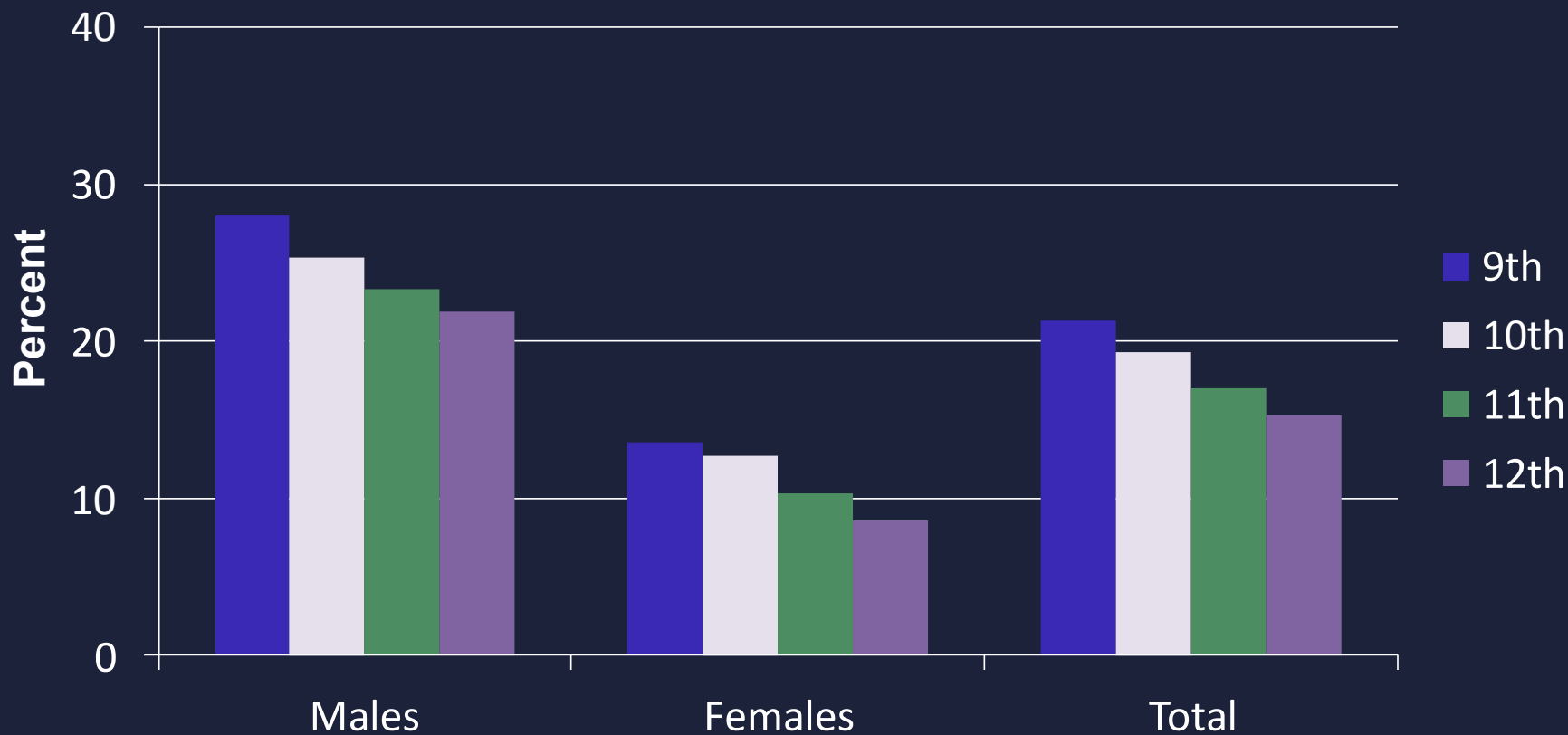


Children and Adolescents (6-17 years)

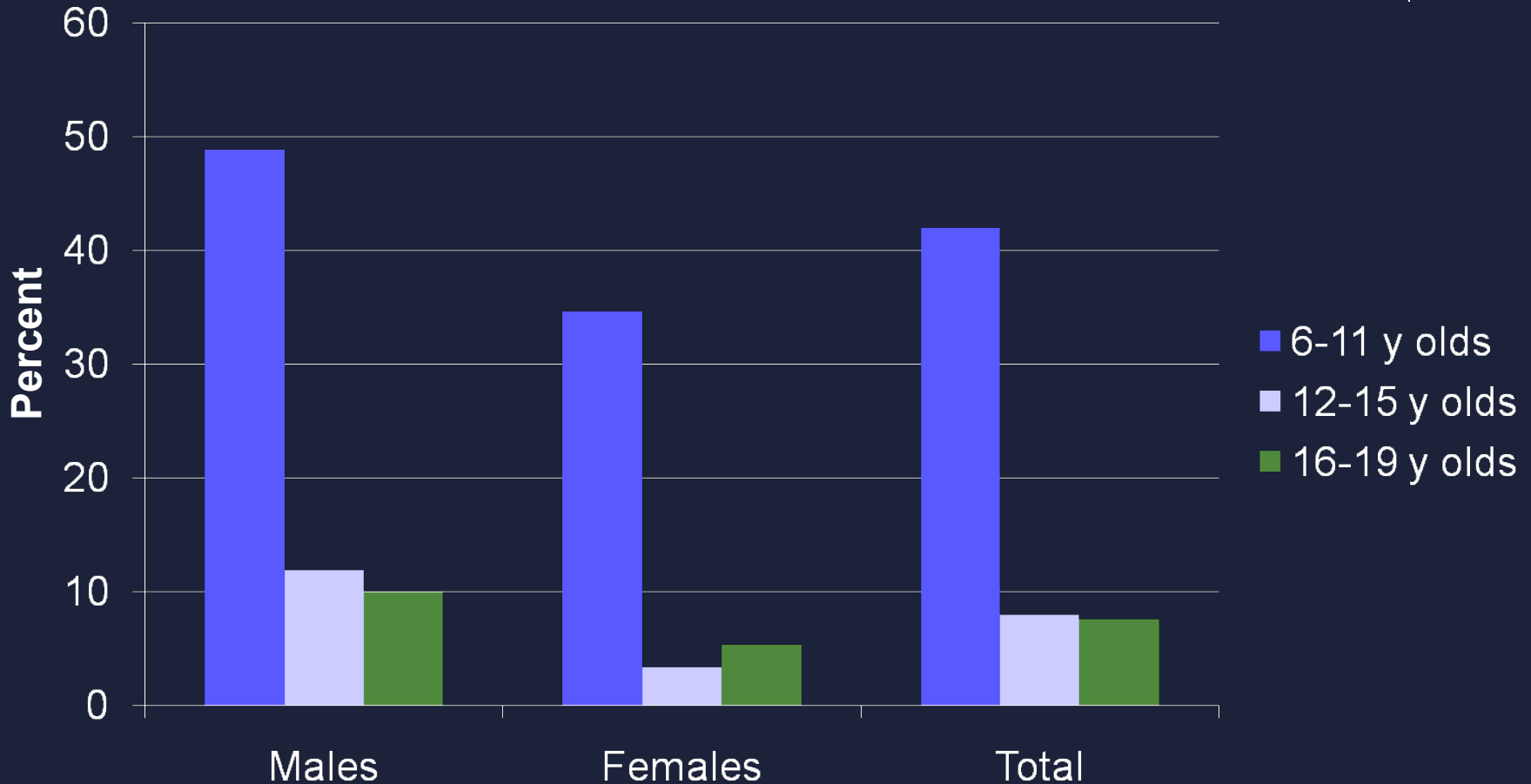
- Muscle-strengthening:
 - At least 3 days of the week
- Bone-strengthening:
 - At least 3 days of the week



Prevalence of achieving 60 min/d of MVPA on all 7 days - YRBS 2009



Prevalence of attaining 60 min of MVPA per day - Accelerometry



Sedentary Behavior





Objectively Measured Physical Activity in Sixth-Grade Girls

Pate RR, Stevens J, Pratt C, Sallis JF, Schmitz KH, Webber LS, Welk G, Young DR. *Arch Ped Adolesc Med.* 2006;160:1262-1268.





Methods

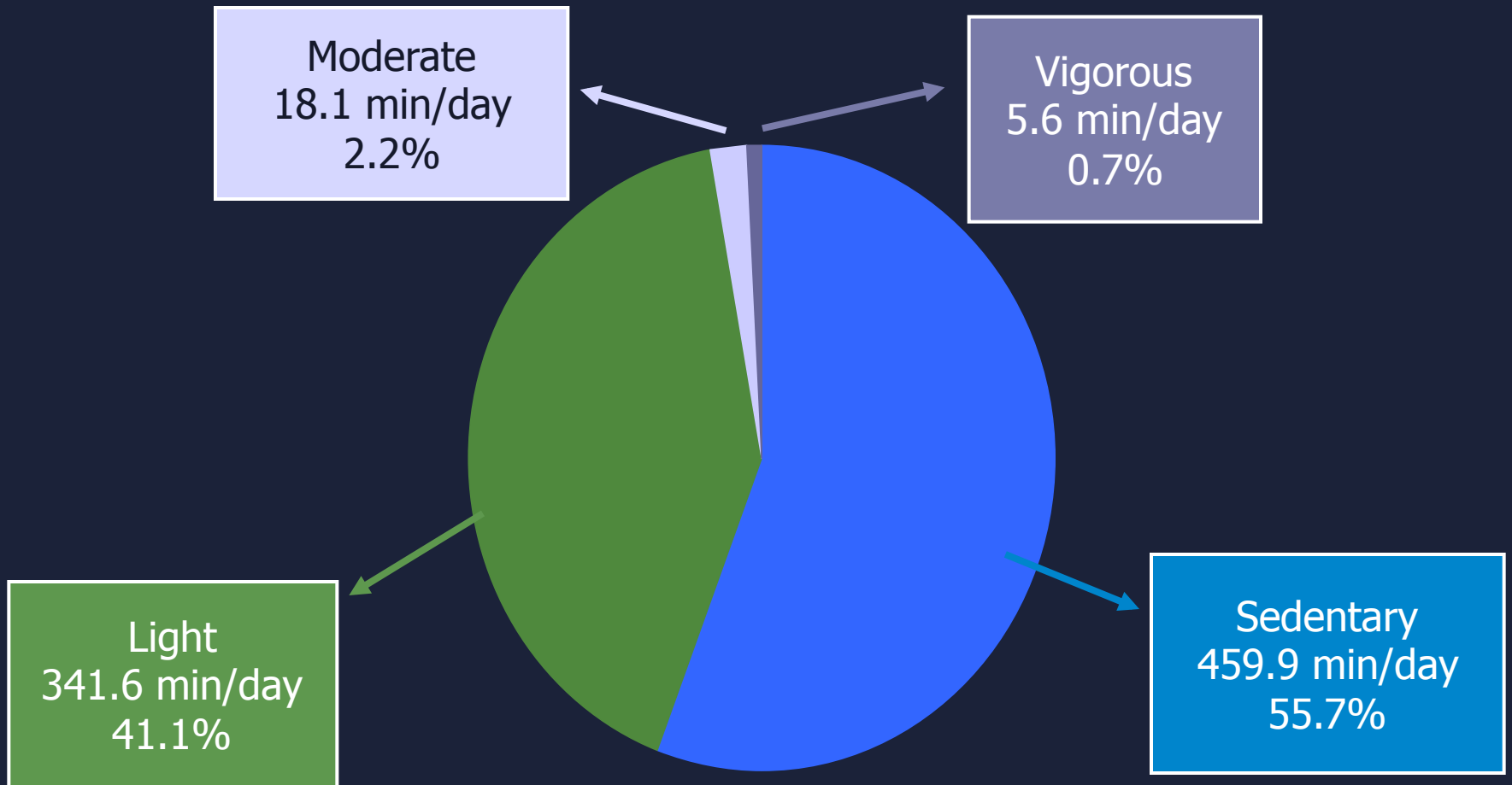
- Cross-sectional study
- Six middle schools from each community:
 - Tucson, AZ
 - San Diego, CA
 - New Orleans, LA
 - Washington DC & Baltimore, MD
 - Minneapolis, MN
 - Columbia, SC
- Random sampling of eligible girls
- $n = 1578$



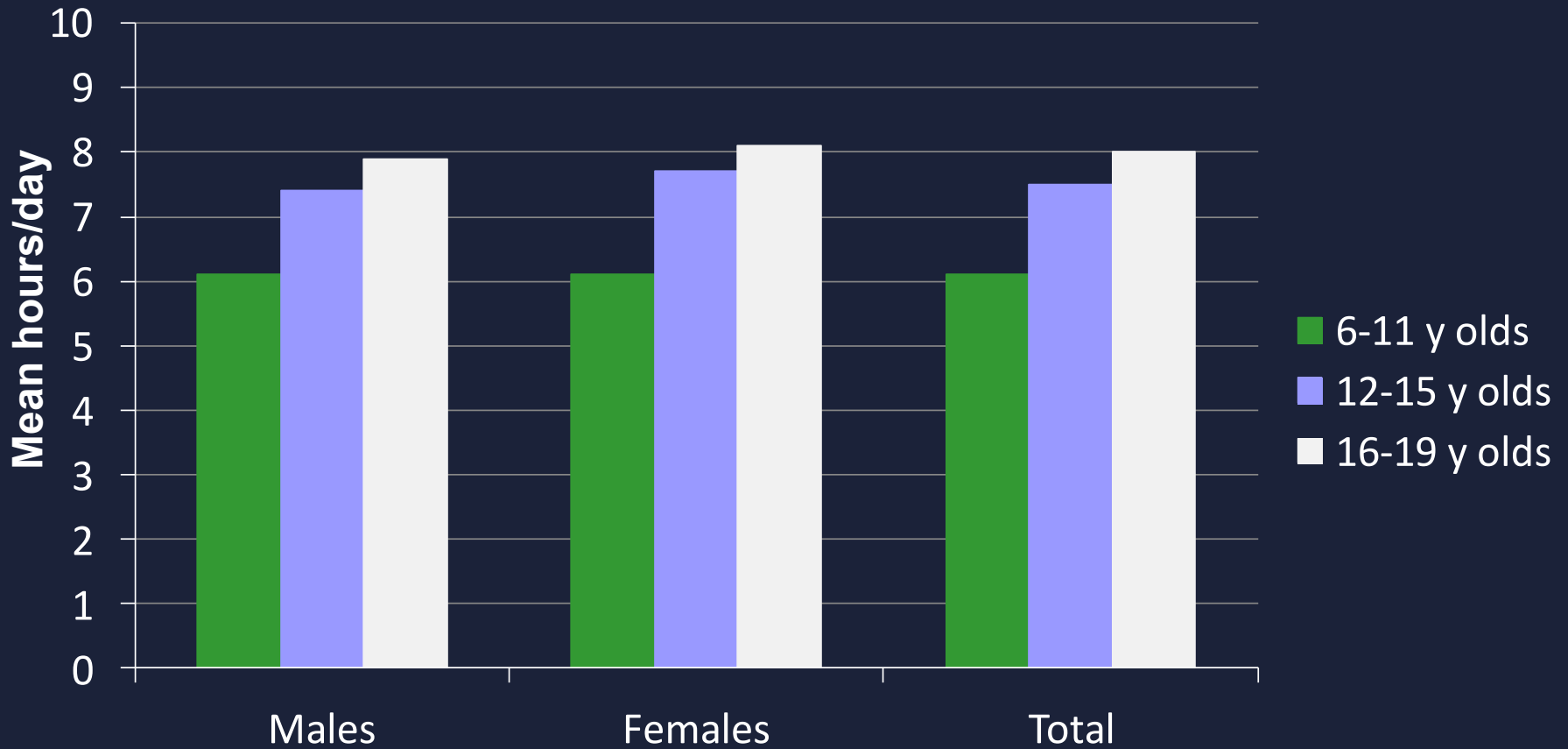
Measures

- Race/ethnicity
- Socioeconomic Status
 - Free or reduced-price school lunch
- Weight and height
- Physical Activity
 - Actigraph accelerometers
 - 6 complete days of data
 - 30-second intervals

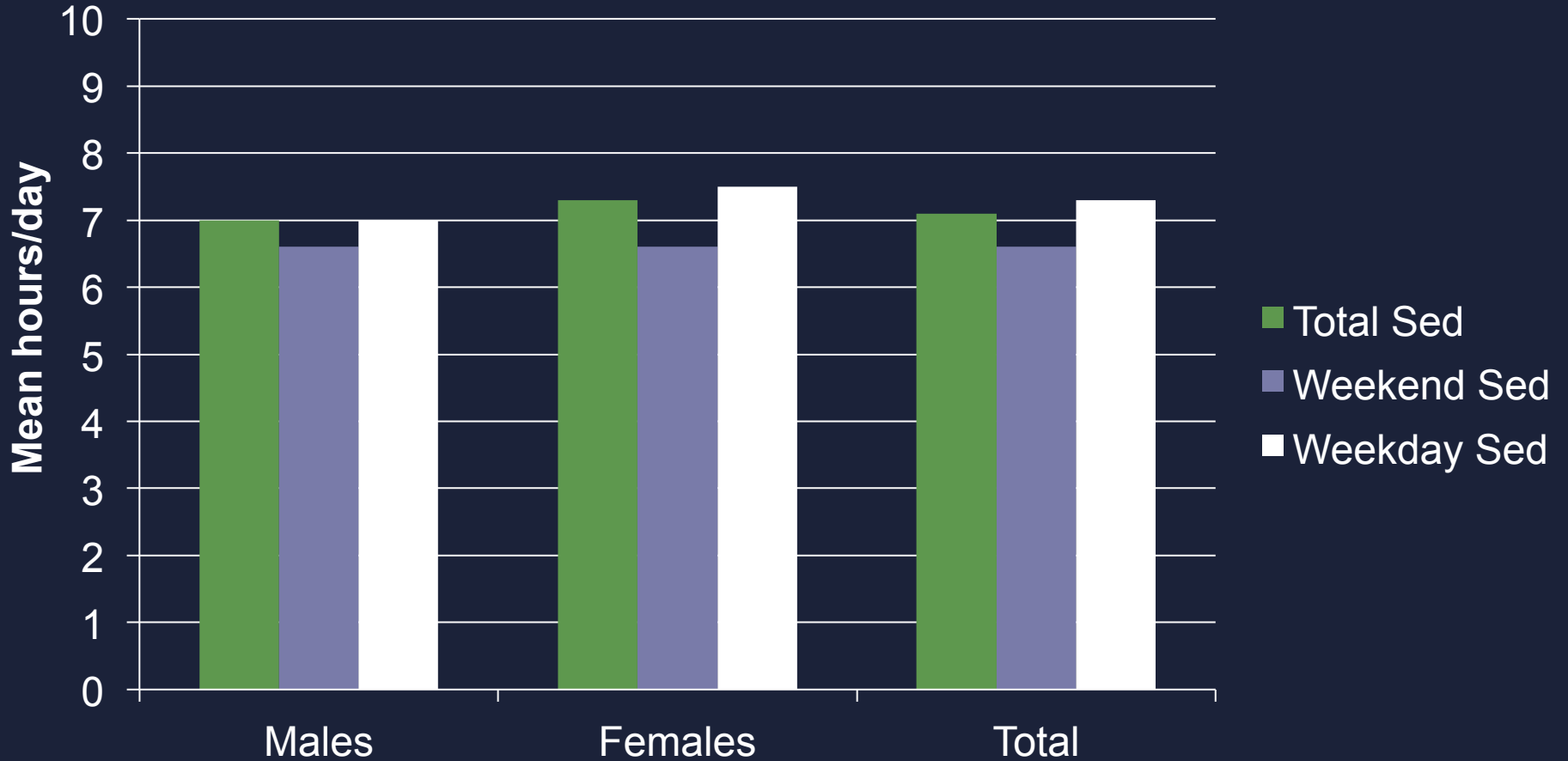
Time spent in various intensities



Time spent in sedentary behavior (h/d) – NHANES 2008



Time spent in sedentary behavior (h/d) – ALSPAC





Media Use in the U.S.

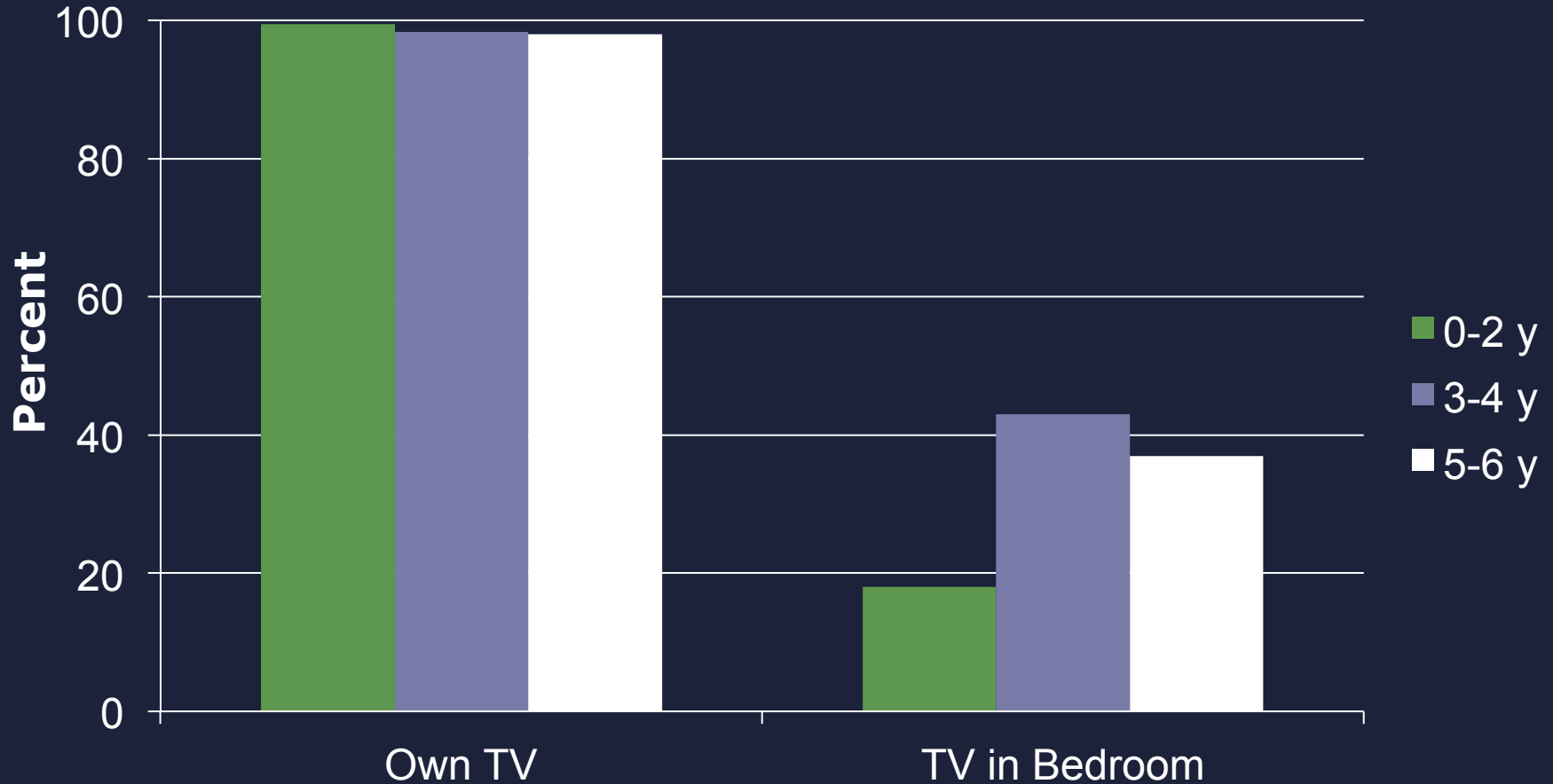
- TV:
 - 115.9 million homes have ≥ 1 TV *
 - 2.5 TV sets per home *
- Computers:
 - 79% of adults use the internet ¶
 - Over 80% have computers; of those, 92% have internet access *
- Mobile Phones:
 - 228 million users (13 y+) *
 - 66% of users send text messages *

American Academy of Pediatrics



- Children < 2 years of age
 - No television viewing
- Children \geq 2 years of age
 - Limit screen time to < 2 hours per day
- Children should not have televisions in their bedrooms

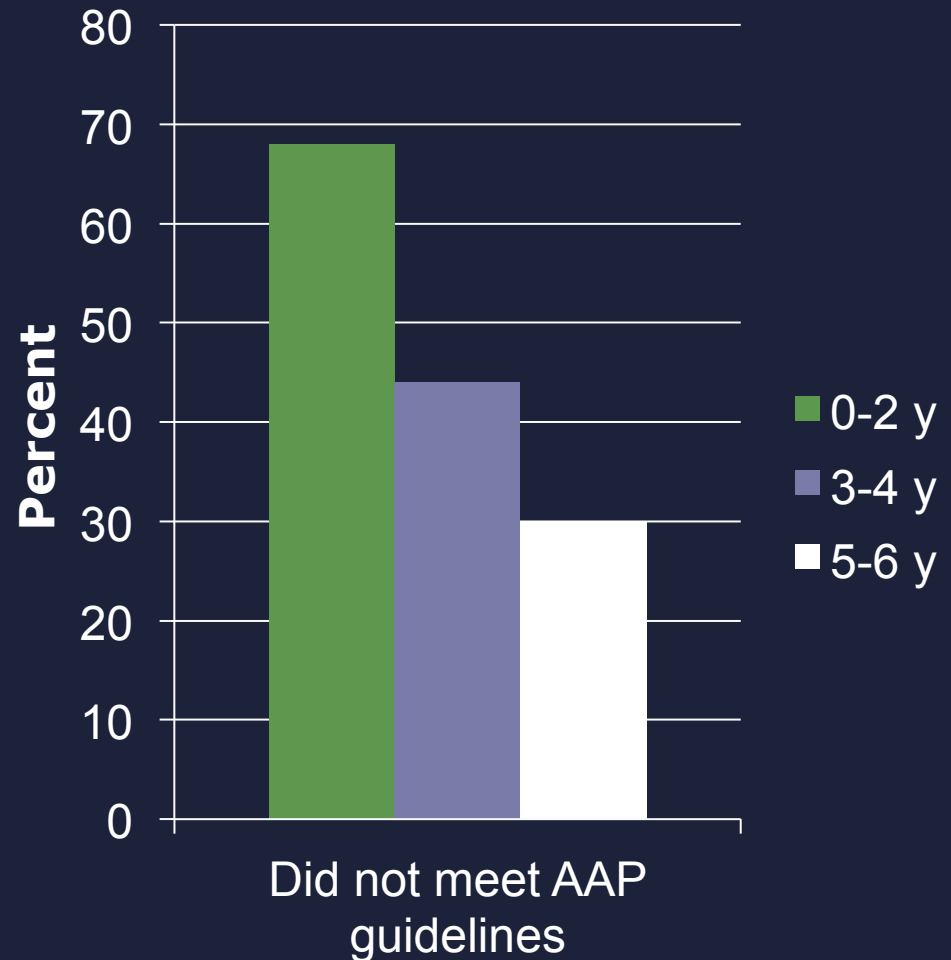
Television Ownership of Families with Children (0-6 y)



TV Viewing Habits of Children (0-6 y)



- Most children watched TV on a “typical day”
 - 63% of 0-2 y olds
 - 82% of 3-4 y olds
 - 78% of 5-6 y olds
- Average of **1 hour 19 minutes/day**



Sedentary Behavior & BMI



- Purpose: To determine if time spent in sedentary behavior is associated with change in BMI from age 9-15
- Sample: NICHD Study of Early Child Care & Youth Development (n=1,364)
- Dependent Variable: BMI
- Independent Variable: Sedentary behavior
 - Accelerometry, < 100 counts/min
- Covariates: MVPA, hours of sleep, healthy eating score, race, gender, maternal education



Sedentary Behavior & BMI

- High and Low Sedentary Behavior

	Sedentary Behavior (hours per day)				
	10 th Percentile	25 th Percentile	50 th Percentile	75 th Percentile	90 th Percentile
Intercept	3.83 (3.66, 4.00)	4.51 (4.43, 4.59)	5.20 (5.08, 5.32)	6.05 (5.93, 6.18)	6.99 (6.72, 7.26)
Age	0.08 (-0.04, 0.20)	0.09 (0.01, 0.17)	0.17 (0.09, 0.26)	0.23 (0.12, 0.34)	0.22 (0.02, 0.42)
Age ²	0.03 (0.01, 0.05)	0.04 (0.02, 0.06)	0.04 (0.03, 0.06)	0.05 (0.02, 0.08)	0.06 (0.03, 0.09)

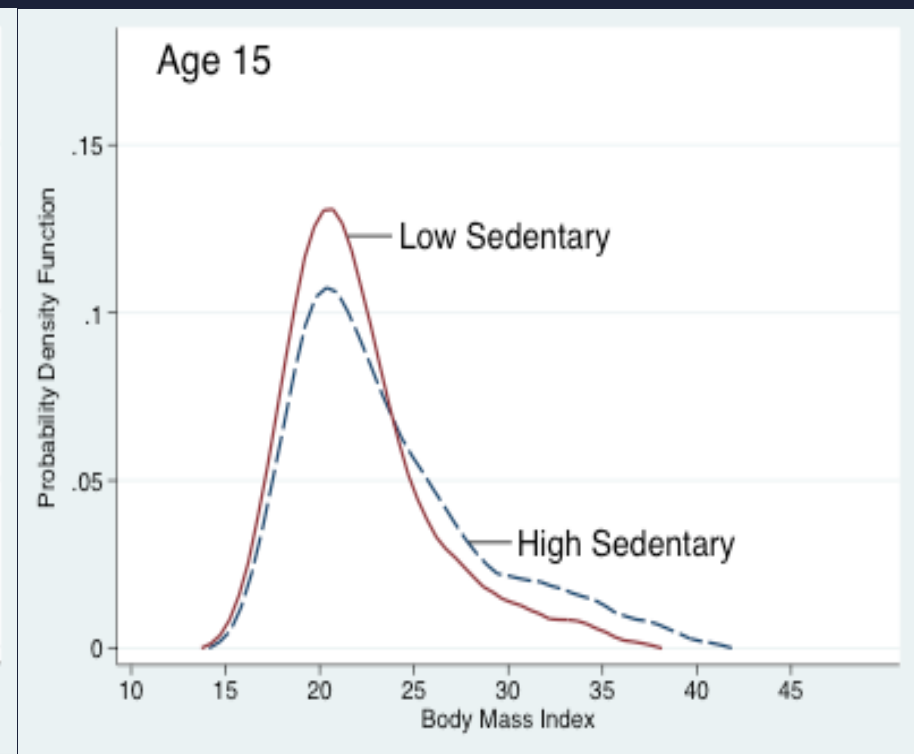
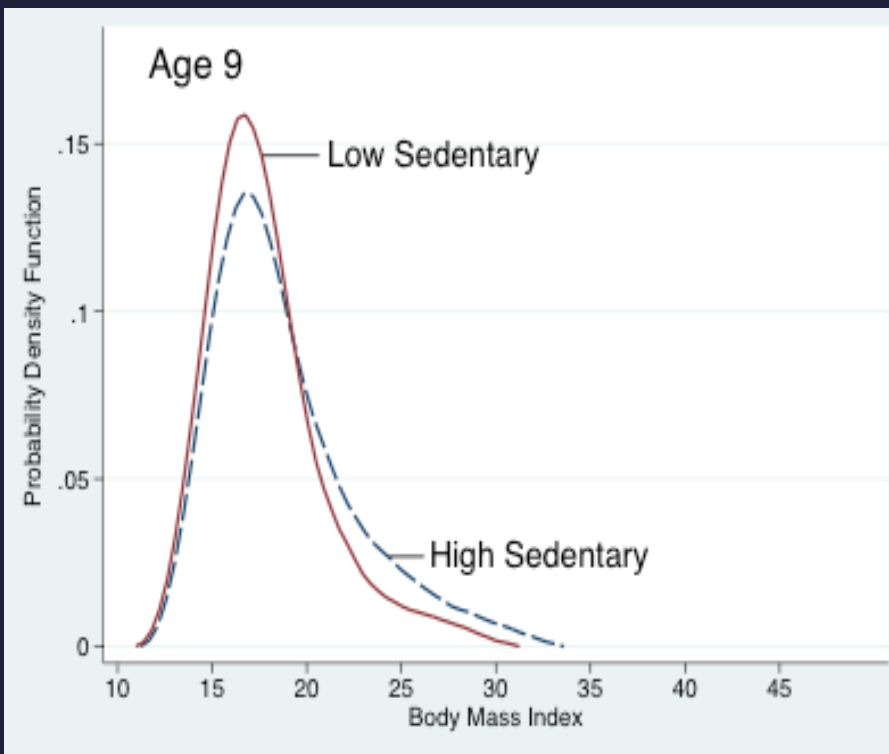
10th Percentile
9y: 3.8 hrs/d
11y: 4.1 hrs/d
12y: 5.4 hrs/d
15y: 5.4 hrs/d

90th Percentile
9y: 7.0 hrs/d
11y: 7.7 hrs/d
12y: 8.2 hrs/d
15y: 10.5 hrs/d

Sedentary Behavior & BMI



- BMI distributions



Sedentary Behavior & BMI



- Summary

- Reducing the time children spend in sedentary behavior at the population level could shift the upper tail of the BMI distribution to the left.
- The association between sedentary behavior and BMI remained after adjusting for MVPA, sleep quality and health eating scores.
- Increased energy expenditure with less time spent in sedentary behavior is a likely mechanism to explain the observations.

Systematic review of sedentary behavior & health indicators in school-aged children & youth



- Tremblay et al. *Int J Behav Nutr Phys Act* 2011 8:98
 - Health indicators
 - Body composition
 - Fitness
 - Metabolic syndrome & cardiovascular disease
 - Self-esteem
 - Pro-social behavior
 - Academic achievement
 - 232 studies, most used TV viewing time
 - Children & youth ages 5-17

Results



- Sedentary behavior > 2 hrs/wk associated with
 - Unfavorable body composition
 - Decreased fitness
 - Lower self-esteem scores & pro-social behavior
 - Lower academic achievement
- Metabolic syndrome & CVD - ↑ TV time associated with ↑ health risk, but insufficient evidence
- Meta-analysis of RCTs with change in BMI (n=4)
 - ↓ TV time is associated with ↓ BMI, -0.89 kg/m²

