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Active Commuting to School and Association with Physical Activity and Adiposity among US Youth

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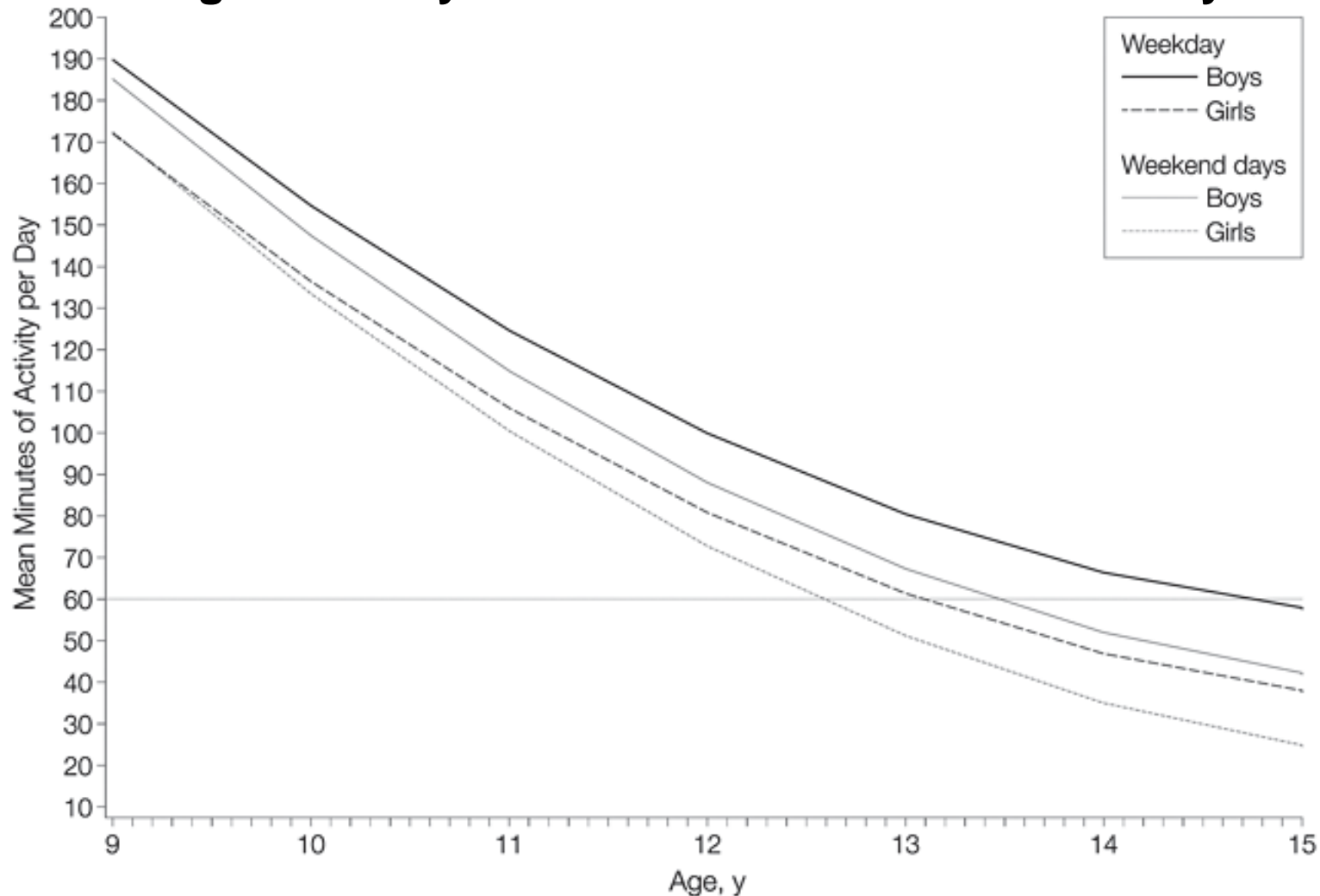
Background



- Increasing childhood physical activity (PA) to prevent childhood obesity
 - Healthy People 2010
 - American Heart Association
 - American Cancer Society
 - 2008 Physical Activity Guidelines for Americans

Decline in Physical Activity

Average Weekday and Weekend Minutes of MVPA by Gender



Nader, P. R. et al. JAMA 2008;300:295-305.

Active Commuting to School (ACS)

- ACS and PA: 28 more minutes MVPA (Lee 2008)
 - Self/parent reported PA (16 of 25 studies)
- ACS and adiposity: mixed findings
 - Compensation for increased PA of ACS by decreasing other types of PA?
- Limitations of previous studies:
 - Small or regional samples
 - PA subjectively measured by recall
 - None controlled for dietary energy intake



Hypotheses

1. ACS positively related to MVPA
2. ACS inversely related to adiposity

NHANES 2003-2004

- Continuous series of cross-sectional surveys conducted by CDC
- Complex, stratified, multistage, probability cluster sampling design
- Nationally representative sample of the civilian, non-institutionalized US population
 - Surveillance for Healthy People 2010

Methods

■ Subjects

- Inclusion: 12-19 years old (in school)

 - Age range for questions on ACS

■ Main outcome measures (adiposity)

- BMI-z score

- sum of triceps + subscapular skinfolds (mm)

Outcomes

- MVPA: Accelerometers (Actigraph 7164)

- Valid Day: ≥ 10 hours of wear
- Data used if ≥ 4 valid days of wear
- 1-min epochs
- MVPA threshold set at 4 METs
- **Mean total min. MVPA/day**
- **Before- and after school min. MVPA/day:**
Mon-Fri 6:30 to 9 am and 2:30 to 4 pm



Covariates

- Age
- Gender
- Race/ethnicity
- Poverty to income ratio
- Dietary energy intake (kcal)
 - Mean of two, 24-hour dietary recalls using USDA Automated Multiple Pass Method

Main Exposure: ACS (min/d)

- Over the past 30 days, have you walked or bicycled as part of getting to and from work, or school, or to do errands? (yes/no)
- Over the past 30 days, how often did you do this? (times per day, week, month)
- On those days when you walked or bicycled, about how long did you spend altogether doing this? (minutes)

Analyses: DV=MVPA

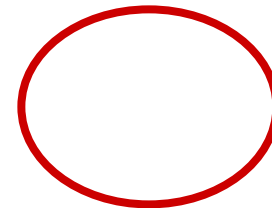
- Multivariate linear regression
 - Independent variable: ACS
 - Dependent variable: MVPA (total daily or before- and after-school)
 - Covariates: sociodemographics and energy intake (kcal)

Analyses: DV=Adiposity

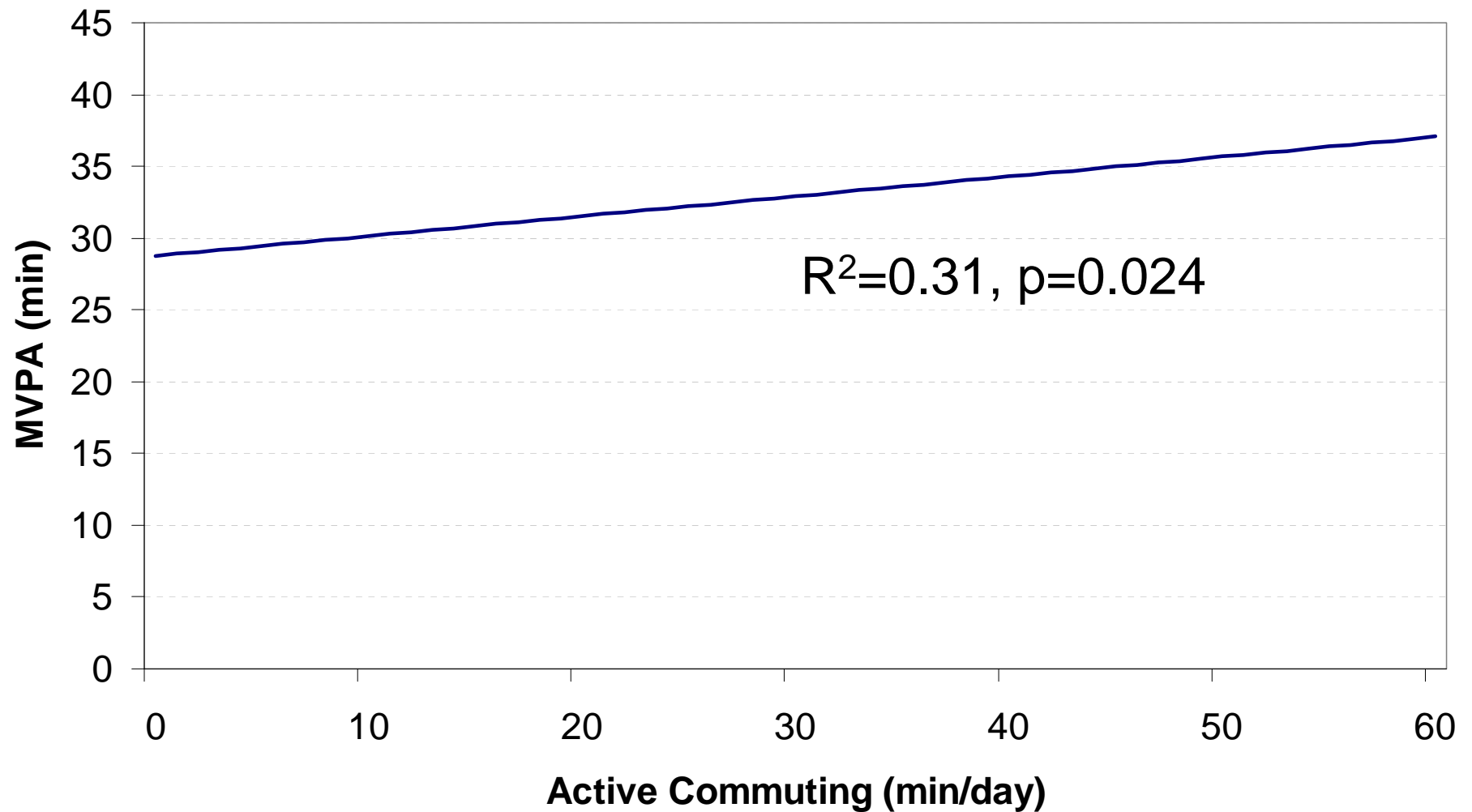
- Multivariate linear regression
 - Independent variable: ACS
 - Dependent variable: BMI-z score or skinfolds
 - Covariates: sociodemographics and energy intake (kcal)
 - $\alpha = 0.05$ for significance

Participants

Characteristics	n	% (SE)
Gender		
Female	379	48.6 (1.7)
Race/Ethnicity		
Non-Hispanic White	198	64.7 (5.2)
Non-Hispanic Black	276	15.2 (2.3)
Hispanic	276	12.3 (3.1)
Other	39	7.8 (2.0)

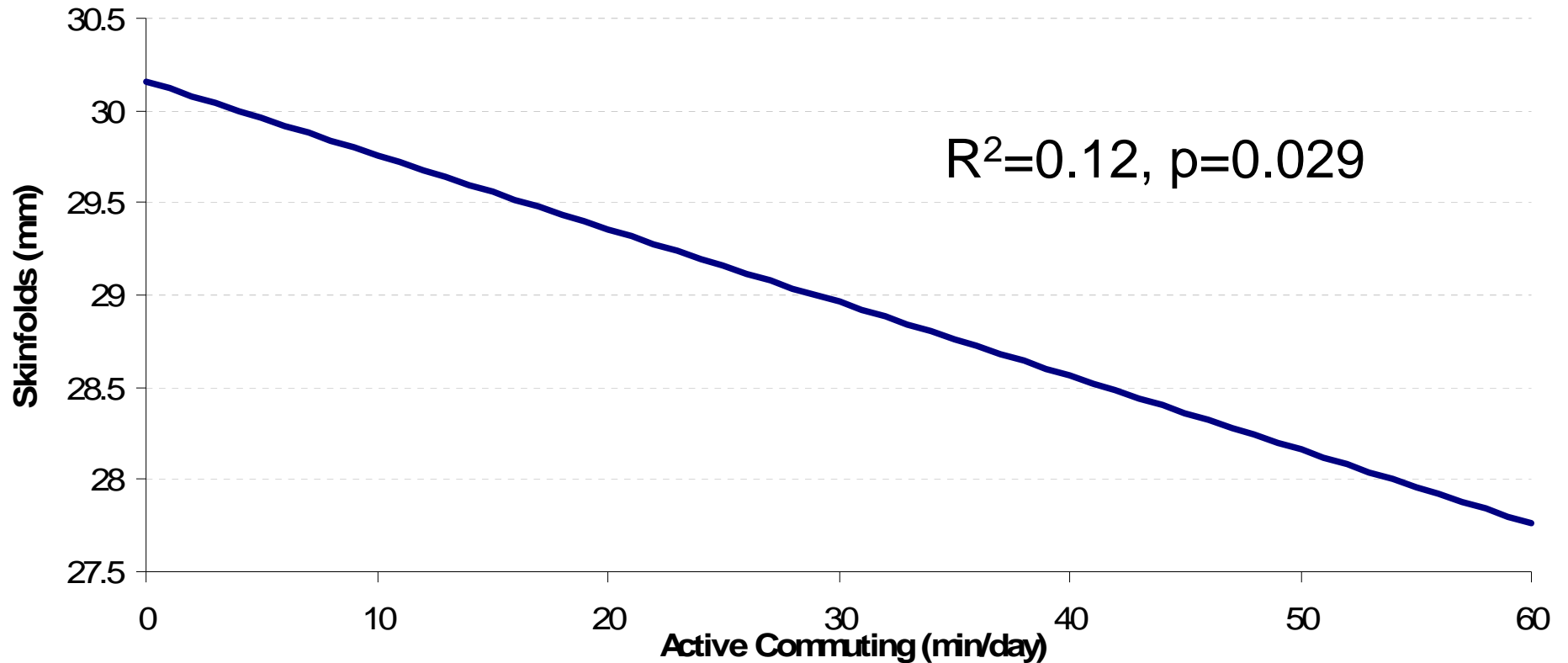


Results: Daily min. MVPA



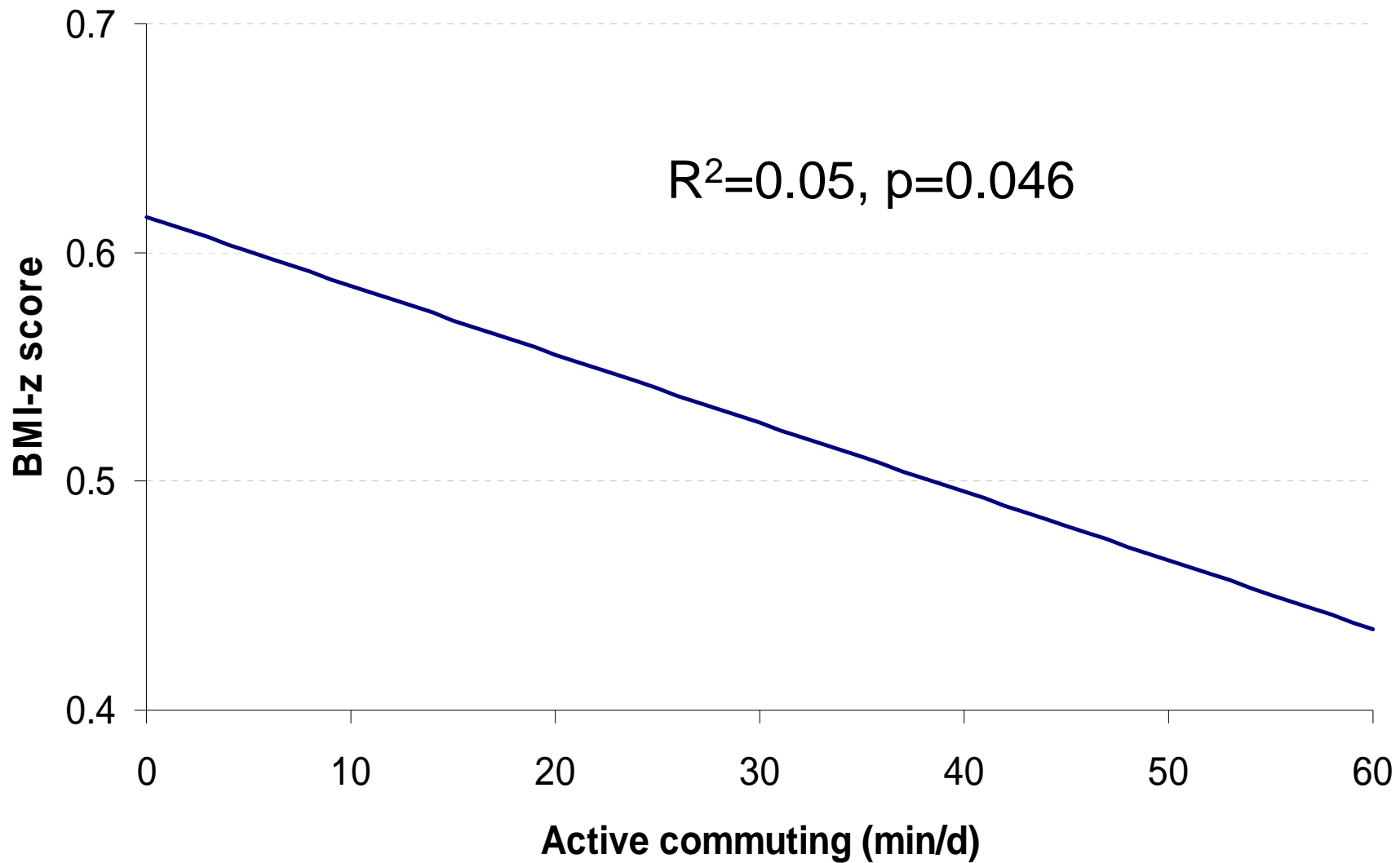
*controlling for age, gender, race/ethnicity, and income, and energy intake

Results: Skinfolds



*controlling for age, gender, race/ethnicity, and income, and energy intake

Results: BMI-z score



*controlling for age, gender, race/ethnicity, and income, and energy intake

Strengths

- Nationally representative sample
- Objective measure of physical activity
- Controlled for energy intake (kcal)
 - MVPA model $R^2 = 0.31$

Limitations

- Cross-sectional
- No data on distance from school, built environment, neighborhood safety
- Main exposure assessed by recall

Implications

- ACS as potential means to broadly improve physical activity and prevent obesity among US youth
- Need for RCTs to assess ACS and impact on physical activity and adiposity

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