

Insights from the Evidence Base

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Our agenda

- Physical activity: A complex behaviour
- Environments/opportunities to facilitate physical activity
- Measurement and evaluation of physical activity interventions
- Forest School
- Summary

Physical Activity: Definitions and guidance

Physical Activity:

“Any bodily movement produced by the skeletal muscles that substantially increases energy expenditure” Howley, 2001.

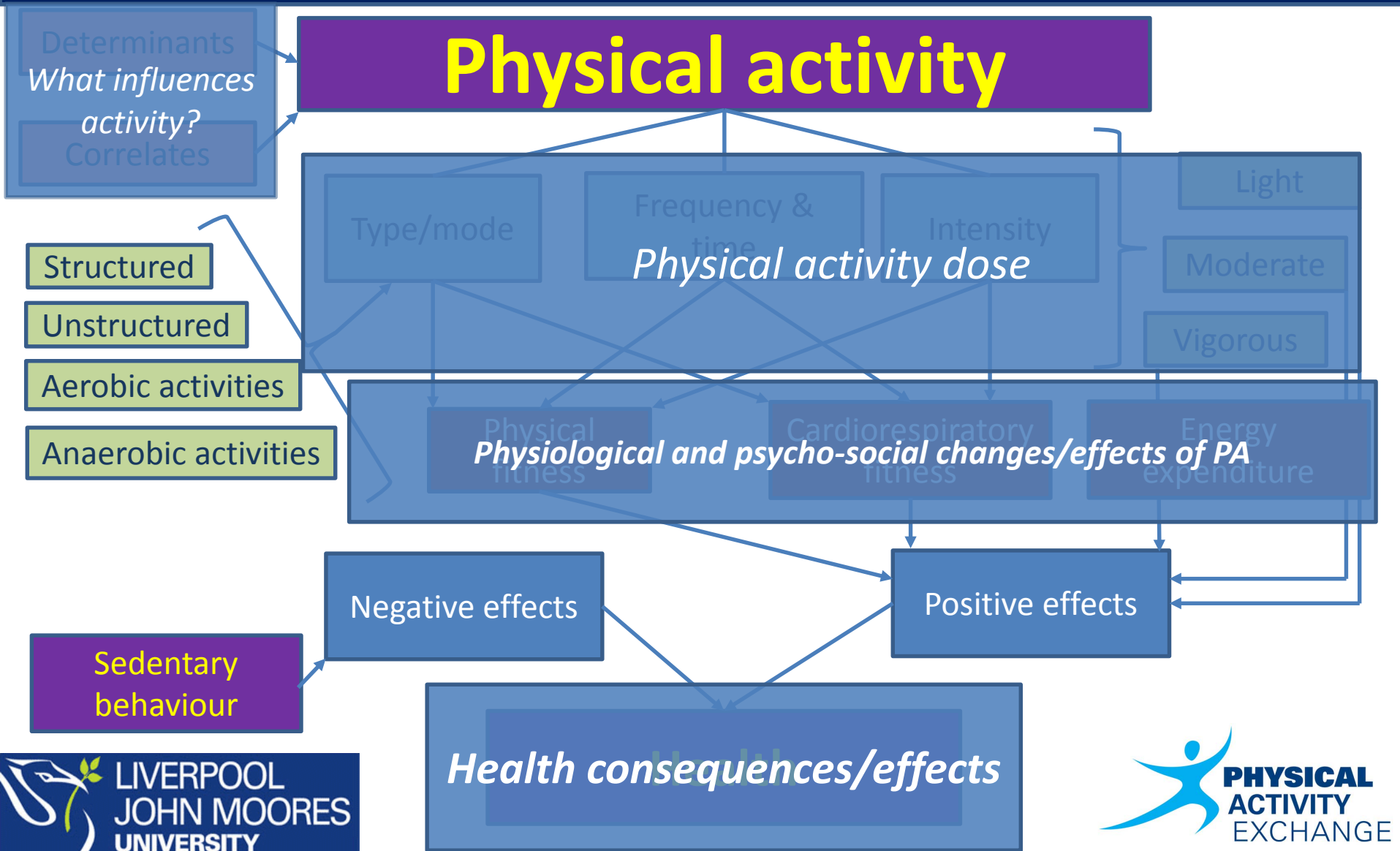
Sedentary behaviour [from the Latin *sedere* meaning ‘to sit’]:

“A distinct class of behaviours (e.g. sitting, lying) characterized by little physical movement and low energy expenditure” Tremblay *et al.*, 2011.

Chief Medical Officers guidelines:

<https://www.gov.uk/government/publications/uk-physical-activity-guidelines>

Physical Activity: A complex behaviour



Children's PA & Health

Insufficient physical activity increases disease risk in children

Despite this, not enough children meet 60mins MVPA every day and levels of cardiorespiratory fitness have declined substantially in recent years.

cardiorespiratory fitness

TABLE 2. Adjusted mean [SEM] clustered risk, CRF, and BMI Z-score by physical activity group controlling for gender, somatic maturation, and accelerometer wear time

Variable	Inactive (n = 49)	Active (n = 18)	p-value
Clustered risk score	0.49 [0.53]	-1.74 [0.88]	P = 0.04
			P = 0.03
			P = 0.14
			P < 0.01

TABLE 3. Adjusted mean [SEM] clustered risk, CRF, and BMI Z-score by physical activity group controlling for gender, somatic maturation, and accelerometer wear time

Variable	Unfit (n = 36)	Fit (n = 31)	P-value
Clustered Risk score	1.23 [0.60]	-1.66 [0.65]	P < 0.01
BMI Z-score	1.10 [0.15]	0.01 [0.16]	P < 0.01
Sedentary time (min)	530.77 [6.53]	492.33 [7.06]	P < 0.01
MVPA (min)	43.01 [4.03]	63.06 [4.36]	P < 0.01

Activity Measurement: **How** are children active?

- We are often concerned with *how active* children are.
- But, *children's activity patterns* influence how we measure PA within this population.
- Children's activity is sporadic, characterised by short bouts of high intensity activity, interspersed with periods of light activity and sedentary behaviour [Baquet et al., 2007]
- Children take part in a wide range of activities in a range of settings, so it is difficult to capture every activity bout.
 - Structured and un-structured
- Children have different preferences, barriers, facilitators and views about PA.
 - Difficult to capture using quantitative measures.

A combination of measures provides the best coverage.

When are children active?

- Boys are more active than girls at all ages and PA intensities [Sherar et al., 2007].
- Physical activity declines significantly with age [Trost et al., 2002].
- Children are usually more active on weekdays than weekends.
- Though most active children maintain activity levels at weekends [Fairclough et al., 2015].

Environments and Opportunities for children to be active

Schools & Physical Activity

- *Before school* – school is mandatory
 - Infra-structure – teachers, facilities, curriculum
 - *Recess periods* for 40+wk
 - *PE & curriculum time* opportunity, but
 - >50% of daily MVPA accrued at school [Fairclough *et al.*, 2008;]
 - *After school*
- Lots of opportunities for PA*

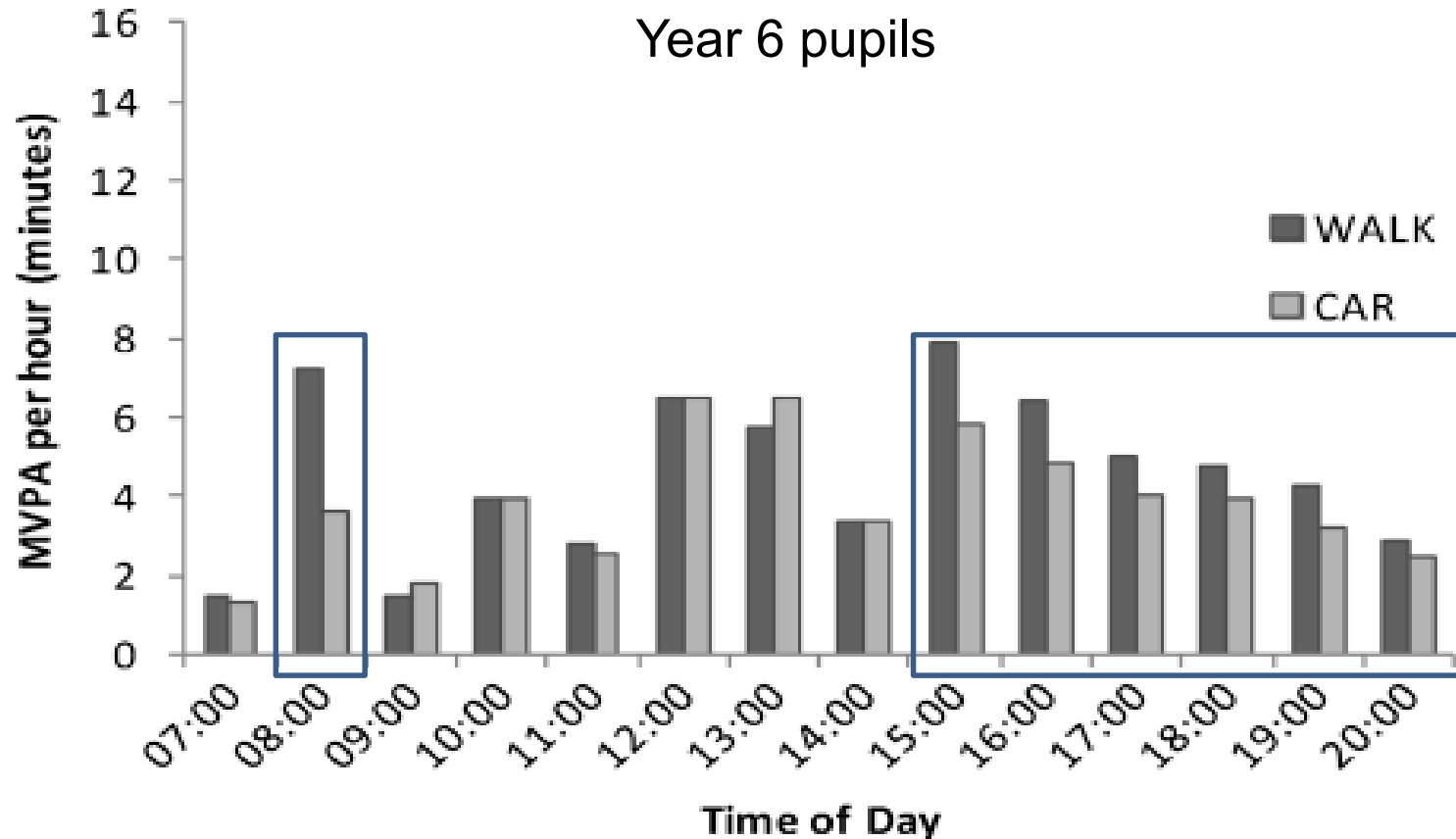


Before/after-school: Active school travel

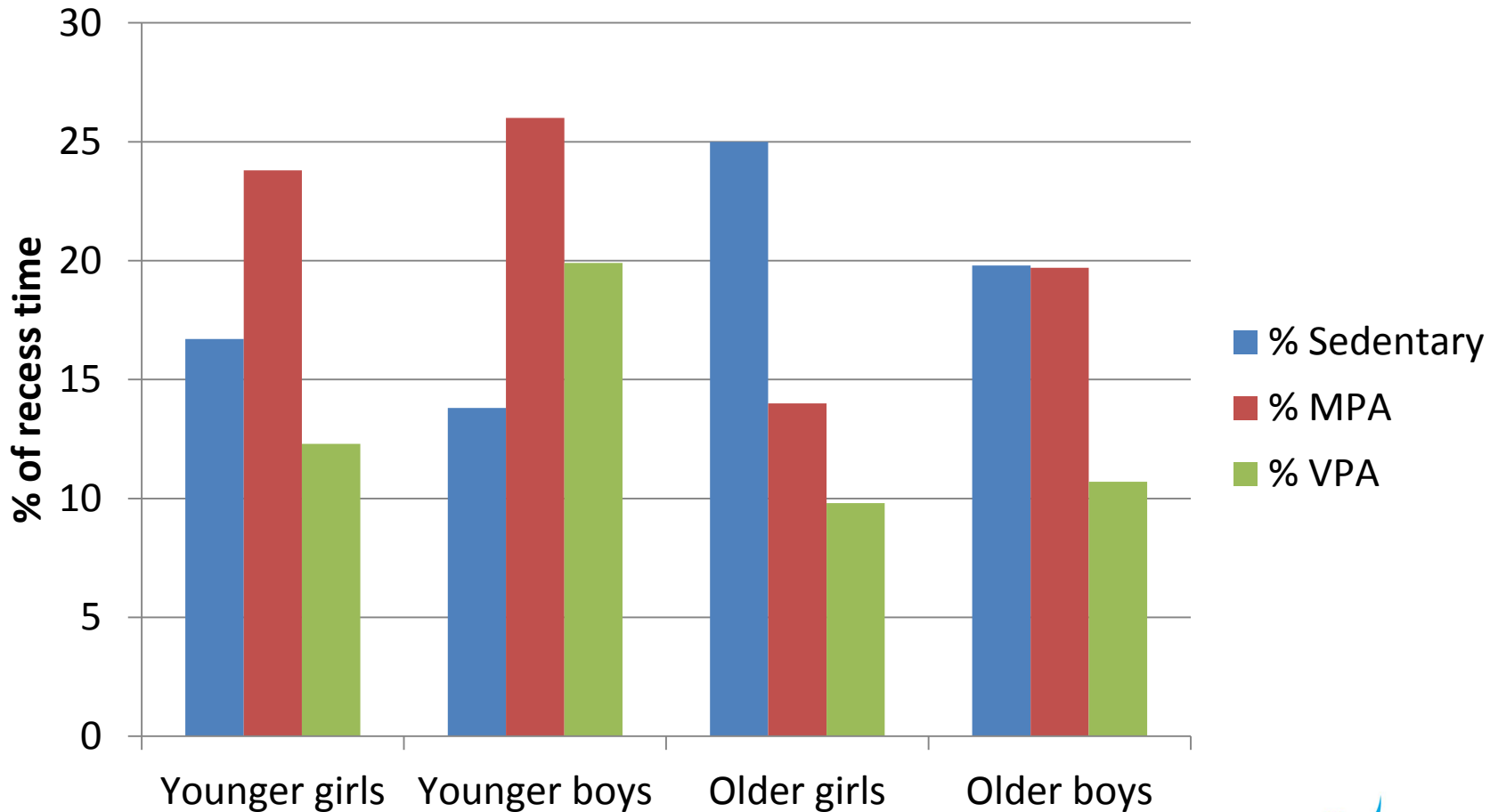
- Walking, cycling or combination with passive transport
- Active travel is simple, free and sustainable
- Decline in active travel over time
- Health Survey for England 2012:
 - Around 2/3s of children walk or cycle to /from school at least once a week
 - High school pupils spend ~17 min/day actively commuting.

How much PA does active school travel contribute?

- Cooper et al 2012: The PEACH Project

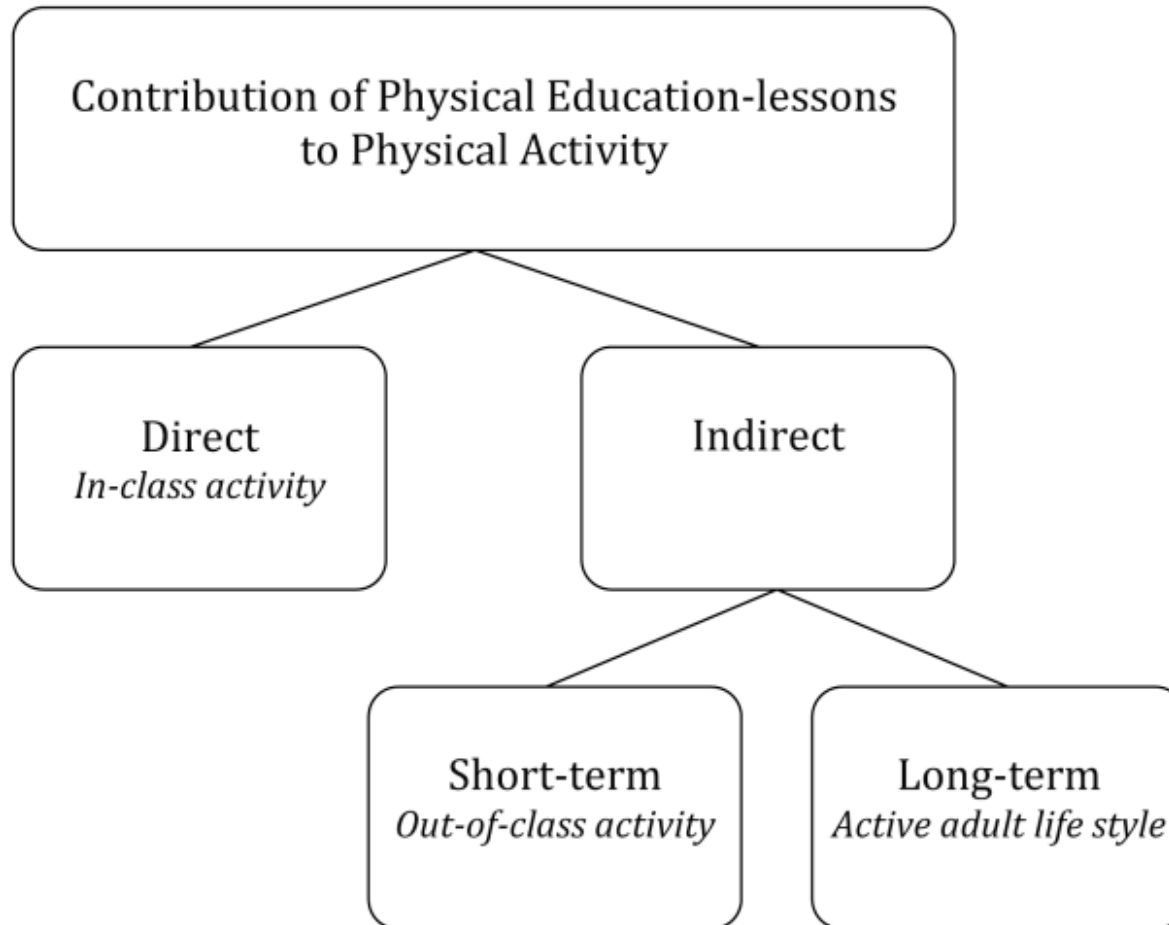


Children's recess PA & SB [Ridgers et al., 2012]

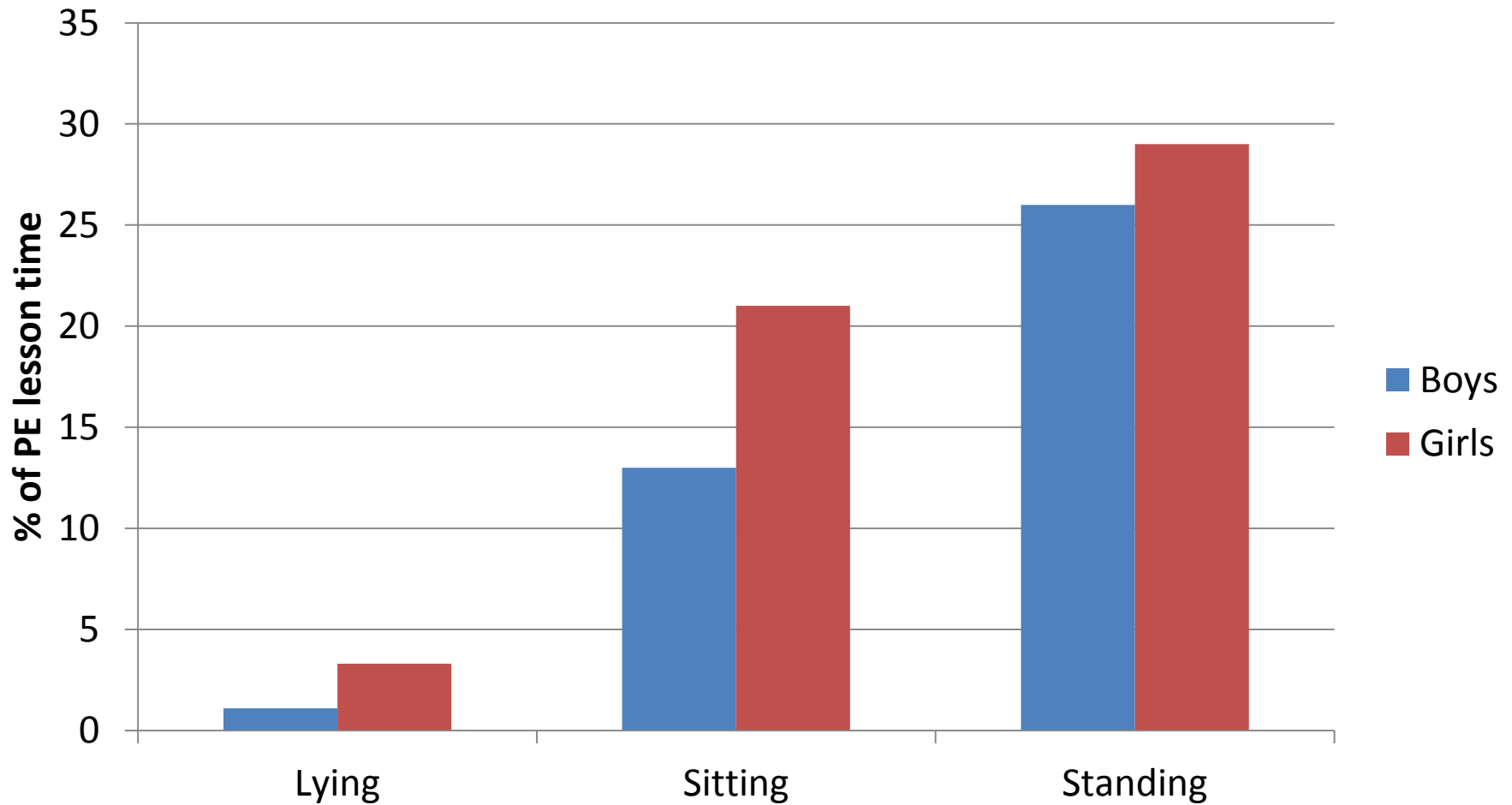


Physical activity promotion through PE

[Slingerland & Borghouts, 2011]



SB & inactivity in PE [Mersh & Fairclough, 2010]



After-school

- After-school period [up to 6.30pm] termed 'critical hours' for young people's PA and SB [Atkin et al., 2008]
- Between $\frac{1}{3}$ and $\frac{1}{2}$ of young people's PA may occur during this period [Tudor-Locke et al., 2006; Hager, 2006]
- Significant discrepancies in PA occur between the most and least active young people at this time [Fairclough et al., 2012]

How can we measure PA and its impact on children?

Subjective Assessments of Activity: Surveys

Strengths

- Low cost, can be used on a large scale.
- Give general information on physical activity levels.
- Also provide context (e.g. setting and type).
- Some useful surveys: PAQ-C & PAQ-A [Kowalski et al., 1997]
Youth Activity Profile [Saint-Maurice et al., 2014].

Limitations

- Often provide scores rather than minutes of activity.
- Rely on participants understanding the question.
- Rely on accurate recall.
- Less precision than objective methods and usually overestimate activity.

Objective Assessment of Physical Activity: Accelerometers

- Small sensors that are commonly worn at the hip or wrist.
- Measure acceleration in 1-3 planes and convert these signals to minutes of activity.
- Reliable and valid for use in children.
- Provide detailed data.
 - Quantifies time spent across the activity intensity continuum.
 - Filter data by specific times, days, segments.
- Requires specialist software and training.
- Research decision making important in data processing.
- Monitors are expensive: ~£180 per device.

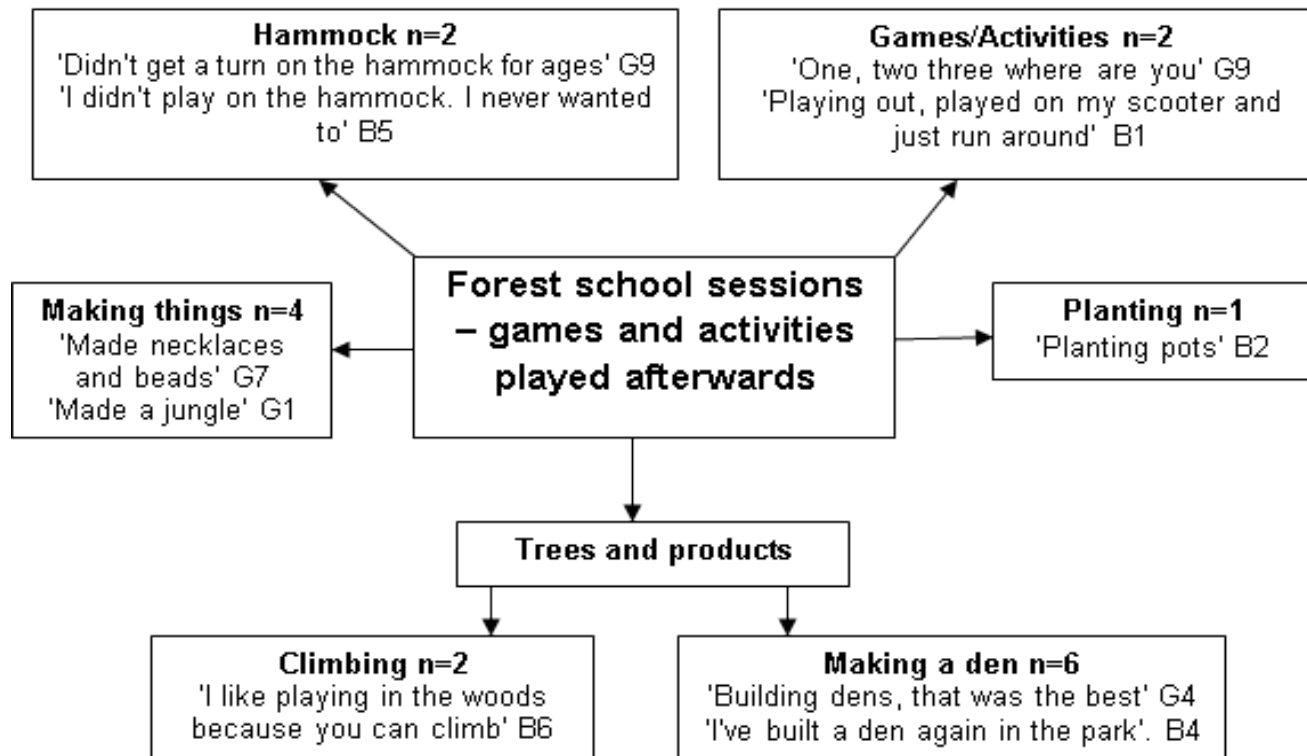


Qualitative research

- Formative
 - Compliance to device wear, e.g McCann et al [under review]; intervention design MackIntosh et al [2011]; Downs et al [2013]
- Evaluation of interventions
 - Ridgers et al, [2012] Knowles et al [2013]
- ‘Childs voice’
 - Focus groups, write and draw (WDST), creative methodologies

Qualitative research

Ridgers, N., Knowles, Z. & Sayers, J. [2012]



Qualitative research



Child as a 'change agent'

- Child targeted intervention can create secondary reach
 - Child as a 'change agent'
 - Ridgers [2012] Forest School
 - Houghton et al [2014] Active play intervention for Fathers/male carers and their pre school children
- Citizen science projects
 - PPI, public engagement agenda

Forest Schools

- Used the Physical Activity Questionnaire for Children [Kowalski et al., 1997] to examine PA levels pre and post intervention.
- Used accelerometers mid-intervention to examine the activity 'dose' from Forest Schools.
- Qualitative focus groups and write and draw techniques
- Results demonstrated:
 - Mean MVPA = 73.2 minutes on a Forest School day, 68.2 minutes on a PE school day, 67.6 minutes on a weekend day and 65.7 minutes on a normal school day.
 - Children participated in significantly more LPA on Forest School days in comparison to a regular school day and a weekend day.
 - Children participated in significantly more MPA Forest School day than on a regular non-PE school day.
 - However, children were also significantly more sedentary on Forest School days than weekends, but slightly less sedentary than on P.E. and normal school days.
 - No differences in pre-post intervention in PAQ score.

Austin et al [in review].

Forest School- Write and Draw

FIG

Sex: girl M/F
Age: 6

1. What I like about Forest School is...



Summary

- Evidence base regarding natural environments as PA environments is limited
- Interventions can be designed to promote PA amongst other benefits and create reach beyond the target beneficiary
- Measurement needs intervention and population appropriate methods
- Commitment to robust evaluation within the planning stages
 - Research partners

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