

Evaluating Long-Term Effects of a Playground Redesign on Children's Physical Activity Levels during Recess

Dr. Nicky Ridgers & Prof. Gareth Stratton

REACH Group

Liverpool John Moores University

Introduction

- Promotion of physical activity a public health priority
- Sedentary behavior a modifiable risk factor
- Traditional interventions: social & individual factors
- Physical environment changes suggested (Wechsler et al., 2000)
- Role of school in promoting healthy behaviours important (Cavill et al., 2001)
- Opportunities for activity in school: PE and recess (Sarkin *et al.*, 1997)
- In the UK, recess occurs 2-3 times a day, 5 days/wk, 39 wk/yr (Stratton, 1999)
- Recess provides daily supplement to PE - children can engage in regular physical activity

Recess Physical Activity Research

- 9 intervention studies published 1970-2006
- 5 European (3 UK) and 4 United States studies
- Intervention summary:
 - Playground markings: 11-13% ↑ MVPA, ~ 4.5% ↑ VPA
 - Playground markings: 6.1% ↑ REE, 35% ↑ TEE
 - Daily break periods: ↑ PA pre-post-test, ↓ PA mid-post
 - Games equipment: ↑ MVPA and VPA during lunchtime
 - Fitness breaks (FB): MVPA and VPA ↑ in FB than playtime
- Main caveat: Longest follow-up has been three months
- Question mark over sustainability of interventions

Ridgers et al (2006)

Aim of Study

- The aim of the study was to:
 - Explore the 6-month effects of a playground markings intervention on boys' and girls' recess physical activity levels



Zoneparc Playground

<p>Red Zone:</p> <ul style="list-style-type: none"> • Eng... • basket... • Often fenced 	<p>Blue (Action) Zone:</p> <p>Target work, fitness & skills</p> <p>Clocks, hopscotch, jump lines, agility snakes</p>	<p>Out) Zone:</p> <p>ord games,</p> <p>oard games</p> <ul style="list-style-type: none"> • Seating provided
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The map shows a playground layout with a central 'freeway' and a 'Body Circuit' on the left. The 'BLUE ZONE' (top and right) contains 'skill snakes', 'ringang', 'Multi grid (1.25m sq)', 'Body Circuit', 'Wall', and 'cricket trainer (20.1m long)'. The 'RED ZONE' (bottom) contains 'reach & jump' and 'wall targets'. A vertical dimension of '26 metres' is indicated on the left side.

Zoneparc Playground



Method

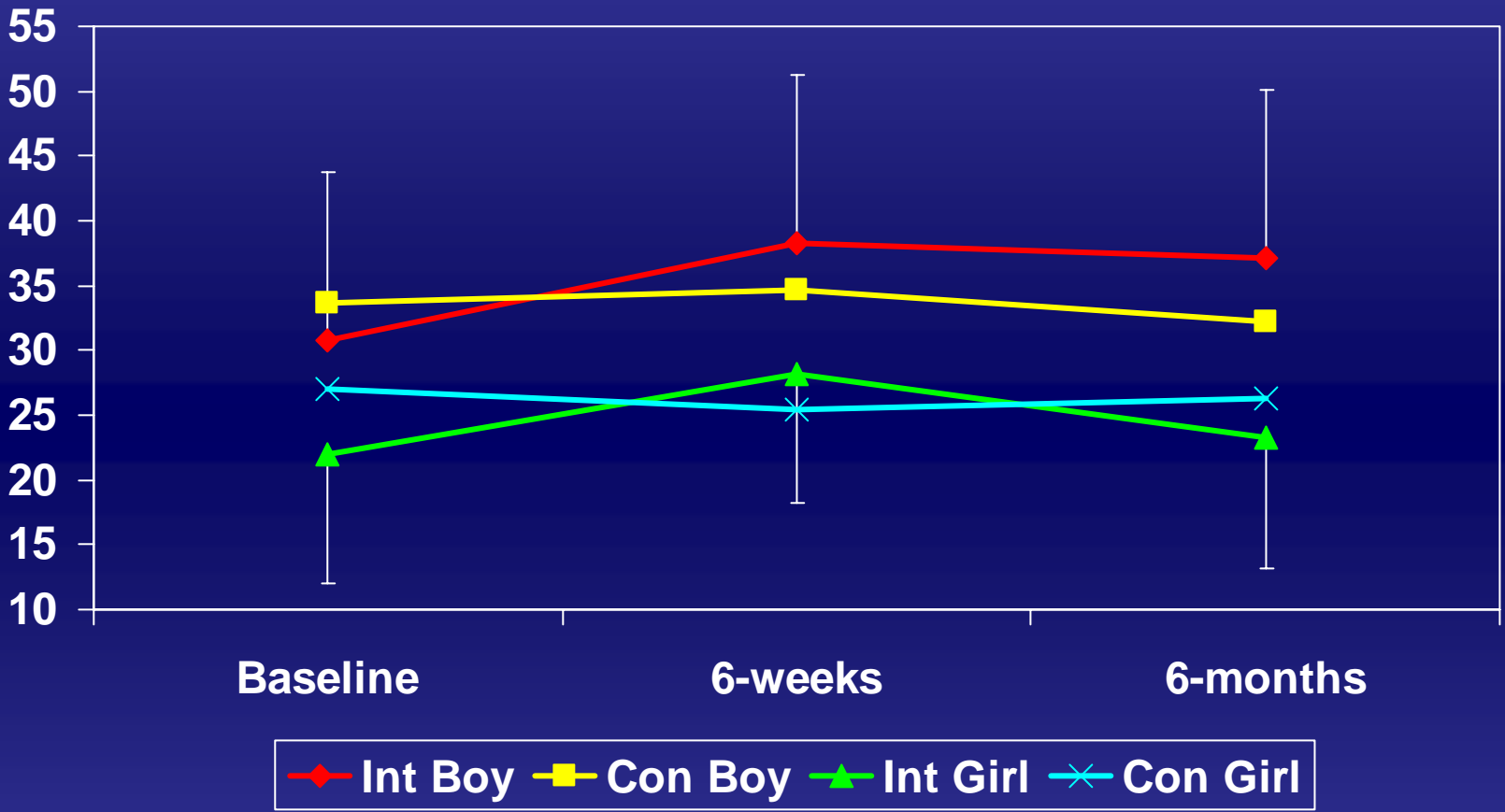
- 298 children (149 boys, 149 girls) from 26 elementary schools (15 intervention, 11 control)
- Physical activity quantified using uni-axial accelerometer (Actigraph 7164, MTI Health Services) - epoch length = 5 s
- Threshold values identified by Nilsson et al (2002) used to determine time spent in MVPA and VPA during recess
- Total percentage time spent in MVPA & VPA used in the analyses
- Baseline, 6-weeks and 6-months post-intervention data collected
- Intervention occurred between March & July 2004



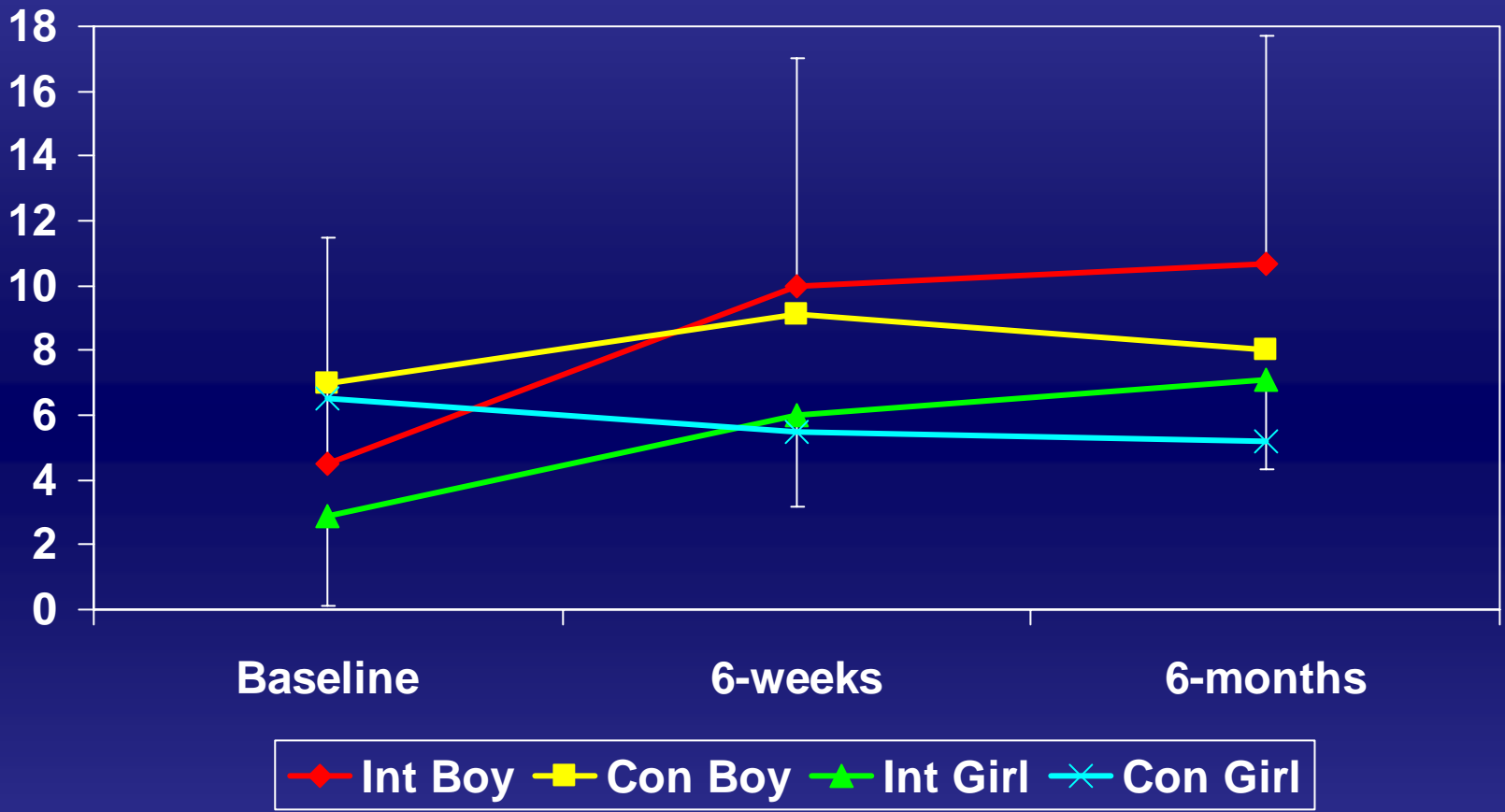
Method - Data Analyses

- Multilevel modeling (analysis) used to analyse data (MLwiN 1.10)
- Three level structure: follow-up measure (level 1), pupil (level 2) & school (level 3)
- Two analyses conducted:
 - Crude analysis: Effect of intervention when controlling for baseline physical activity and time
 - Adjusted analysis: Determine intervention effect when controlling for covariates identified a priori (age, sex, BMI, play duration, baseline physical activity, time)
- Intervention x time interaction term also constructed
- Separate analyses conducted for MVPA and VPA

Raw Score Results – MVPA



Raw Score Results – VPA



Results

	Crude Model		Adjusted Model	
	β (95% CI)	<i>p</i> -value	β (95% CI)	<i>p</i> -value
MVPA	5.68 (1.41, 9.96)	<0.01***	4.53 (0.59, 8.47)	0.03**
VPA	2.47 (0.75, 4.19)	<0.01***	2.32 (0.71, 3.93)	<0.01***
Intervention x time	2.08 (-0.02, 4.18)	0.05*	2.82 (0.67, 4.97)	0.01**

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Discussion

- Positive effect of intervention over time
- Intervention children engage in 4.5% and 2.3% more MVPA and VPA than control children respectively
- Intervention suitable stimulus for increasing and sustaining physical activity across time
- 4.5% increase = 3.5 mins/day, 17.5 mins/wk, ~11 ½ hrs/yr
- Intervention x time interaction for VPA
- VPA negatively related to body fat
- Intensity of physical activity may be important in the prevention of childhood obesity (Ruiz et al., 2006)

Discussion

- Physical environment, such as multicolor playground markings, associated with higher physical activity levels (Davison & Lawson, 2006).
- Present study lends support to this
- Children becoming accustomed to physical activity cues and opportunities provided
- Supportive physical environment influencing physical activity
- Recess - ideal non-curriculum opportunity to promote activity in school-aged children

Conclusion

- The results suggest that playground markings and physical structures are an effective method for significantly increasing and sustaining children's recess physical activity levels 6-months post-intervention.



Nicky Ridgers: n.ridgers@ljmu.ac.uk

Hierarchical Data Structure

