SHORT REPORT

Do children from an inner city British school meet the recommended levels of physical activity? Results from a cross sectional survey using objective measurements of physical activity

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Questionnaire surveys suggest physical activity levels in children are low, particularly among children from deprived areas. Using accelerometers, it was found that children from a deprived inner city school were active at recommended levels and had similar levels of activity to children in other studies from more affluent populations. However, this finding was dependent on the threshold used to define moderate activity.

The prevalence of childhood obesity has increased by about three-fold in most industrialised countries over the last 10–20 years, and decreasing levels of physical activity are suggested to be a significant contributor.¹ Questionnaire based surveys suggest that progressively fewer children are meeting the minimum recommended levels, and that this decline is greater among children from more deprived backgrounds.² However, surveys using self reported measures underestimate habitual physical activity. Objective measurement using accelerometers provides accurate and detailed information on children's physical activity. No previous investigations using accelerometers have focused on children from deprived backgrounds. The aim of this study was to investigate the physical activity levels of children attending an inner city school in an area of deprivation, using objective monitoring. The results are part of a larger study, examining health behaviour in a deprived community.

METHODS

Data were collected between March and July 2004. Pupils aged 8–12 years, from year groups 4–6, were recruited from a primary school in one of the three most deprived wards in Bristol, which is also in the bottom 10% most deprived wards in the UK. This primary school was the only one serving the area under study. The pupils were from a range of ethnic backgrounds, with 50% of pupils eligible for free school meals. Physical activity was measured using an accelerometer (actigraph AM-7164; Manufacturing Technologies Inc., FL, USA) programmed to record data each minute. Accelerometers measure acceleration in the vertical axis and translate this into activity counts. The children were instructed to wear the accelerometers on a belt around their waist during waking hours for seven consecutive days. Participants were required to record at least 10 hours of measurement each day for at least four days (at least two of which had to be weekdays and two weekend days to allow comparisons in activity between week and weekends days), for inclusion in the analyses of counts of activity.³ Total daily moderate to vigorous intensity physical activity (>3 METs;

MVPA)) was calculated using age specific cut points.⁴ This was used to determine the percentage of pupils that met physical activity guidelines, operationalised as accumulation of 60 minutes of MVPA per day on a least five days a week.⁵ Thus to be included in these analyses pupils had to record at least 10 hours of measurement each day for at least five days.

The University of Bristol ethics committee approved the study and written informed consent from the parents of all participating children was obtained.

RESULTS

Of the 61 eligible pupils, one was refused parental consent, three failed to return the monitors, and five did not provide sufficient data. Fifty two children (26 boys, 26 girls, mean age 10.2 (0.7)) were included in the analysis.

Physical activity data are shown in table 1. Boys were more active overall and recorded more activity than girls during weekdays (mean difference was 169 accelerometer counts per minute (95% CI 83 to 256, $p < 0.001$), and 25 minutes of MVPA (95% CI –4 to 52, $p = 0.09$)). At the weekend, no gender difference was found. There was no difference between activity counts on weekdays and activity counts on weekend days ($p = 0.9$). Forty one (79%) children completed at least five days of measurement, and all (100%) achieved physical activity guidelines.

Our results were very much dependent on the use of age specific thresholds to define moderate to vigorous activity. While this approach is consistent with several other studies of similar aged children,^{4–6} other more general cut points have recently been proposed.⁷ When we repeated the analyses using the threshold proposed by Puyau *et al*, the proportion of children who were defined as active at recommended levels fell to just 7.2%.

DISCUSSION

The level of activity of the children in this study, who come from one of the most deprived areas in the country, is comparable with that of other populations where physical activity has been measured using the same criteria. For example, a study in English primary school children from more affluent areas found 98% of boys and 83% of girls achieved the same physical activity recommendations as used in our study.⁴ In the European Youth Heart Study, 97% of boys and 98% of girls from four European countries met these same recommendations,⁶ and similarly in American primary aged children, 92% of boys and 87% of girls achieved these UK recommendations.⁵ Although not directly comparable, the simple activity counts per minute data for weekdays, were similar to other studies.^{4–6} Boys were more active than girls in this study, which is also consistent with previous evidence.^{4–5} The fact that levels of activity were similar for

Table 1 Mean daily physical activity of primary school children from an inner city deprived school

	Mean (SD)		p value
	Boys (n = 26)	Girls (n = 26)	
Weekday			
Accelerometer counts per min	749 (181)	580 (117)	<0.001
Total daily MVPA (min)	165 (60)	140 (38)	0.09
Weekend			
Accelerometer counts per min	743 (215)	607 (124)	0.08
Total daily MVPA (min)	139 (88)	136 (55)	0.9

weekdays and weekends suggests that the neighbourhood in which these children live, their family environment, and the school all provide opportunities for activity.

The study was conducted in one geographically defined area during the spring and summer, therefore results may not be generalisable to other groups of children, and these levels of activity may not represent activity levels throughout the year. The similarity in activity levels between our study population and those from more affluent populations provides preliminary evidence that attending a school in a deprived, ethnically diverse neighbourhood does not lead to low levels of physical activity in childhood. However, to truly determine whether deprivation does affect activity levels, direct comparisons between children from affluent and deprived areas need to be made within the same study. We have shown that the proportion of children defined as meeting recommended levels of activity is very much dependent on the threshold used for defining moderate to vigorous activity with accelerometer readings. When we used the threshold that has been to date most commonly used, the vast majority of the children would be defined as active at recommended levels; use of a different and recently proposed threshold⁷ resulted in the majority of children being defined as not sufficiently active. Further research is required to determine both the most appropriate recommendation for activity levels in children and the best way to assess this.

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REFERENCES

- 1 **Department of Health.** *At least five a week. Evidence on the impact of physical activity and its relationship to health. A report from the Chief Medical Officer.* London: Department of Health, 2004, <http://www.dh.gov.uk/assetRoot/04/08/09/81/04080981.pdf> (accessed 21 October 2004).
- 2 **Andersen RE, Crespo CJ, Bartlett SJ, et al.** Relationship of physical activity and television watching with body weight and levels of fatness among children: results from the third national health and nutrition examination survey. *JAMA* 1998;**279**:938–42.
- 3 **Trost SG, Pate RR, Freedson PS, et al.** Using objective physical activity measures with youth: how many days of monitoring are needed? *Med Sci Sports Exerc* 2000;**32**:426–31.
- 4 **Cooper AR, Page AS, Foster LJ, et al.** Commuting to school: are children who walk more physically active? *Am J Prev Med* 2003;**25**:273–6.
- 5 **Pate RR, Freedson PS, Sallis JF, et al.** Compliance with physical activity guidelines: prevalence in a population of children and youth. *Ann Epidemiol* 2002;**12**:303–8.
- 6 **Riddoch CJ, Andersen LB, Wedderkopp N, et al.** Physical activity levels and patterns of 9 and 15 year old European children. *Med Sci Sports Exerc* 2004;**36**:86–92.
- 7 **Puyau MR, Adolph AL, Vohra FA, et al.** Validation and calibration of physical activity monitors in children. *Obes Res* 2002;**10**:150–7.