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Brief Original Report

Socio-demographic characteristics of children experiencing socioeconomic disadvantage who meet physical activity and screen-time recommendations: The READI study

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ABSTRACT

Objective: To identify socio-demographic characteristics of children from socioeconomically disadvantaged neighbourhoods who meet physical activity and screen recommendations.

Method: Children aged 5–12 years ($n = 373$; 45% boys) were recruited in 2007 from socioeconomically disadvantaged urban and rural areas of Victoria, Australia. Children's physical activity, height and weight were objectively measured. Mothers reported their highest level of education, and proxy-reported their child's usual screen-time. Odds ratios (OR) and 95% confidence intervals (95% CI) examined odds of meeting physical activity (>60 minutes/day) and screen (≤120 minutes/day) recommendations according to socio-demographic characteristics.

Results: Approximately 84% of children met physical activity and 43% met screen recommendations. Age was inversely associated with odds of meeting physical activity and screen recommendations, and overweight/obese status was associated with lower odds of meeting screen recommendations (boys: OR = 0.39, 95%CI = 0.16–0.95; girls: OR = 0.47, 95%CI = 0.26–0.83). Among boys, living in a rural area was positively associated with meeting screen recommendations (OR = 3.08, 95%CI = 1.42–6.64). Among girls, high levels of maternal education were positively associated with meeting screen recommendations (OR = 2.76, 95%CI = 1.33–5.75).

Conclusion: Specific socio-demographic characteristics were associated with odds of meeting physical activity and screen recommendations. Identifying factors associated with such 'resilience' among this group may provide important learnings to inform future physical activity promotion initiatives.

Introduction

The health benefits of children's physical activity are well known (Biddle et al., 2004), and evidence of adverse health outcomes associated with children's participation in sedentary behaviours is emerging (Rey-Lopez et al., 2008). Health authorities recommend that children spend 60 minutes or more in moderate- to vigorous-intensity physical activity (MVPA) everyday (Commonwealth Department of Health and Ageing, 2004), and spend no more than 2 hours/day in screen-based pursuits for entertainment (Commonwealth Department of Health and Ageing, 2004). Importantly, much of the evidence suggests that compliance with these recommendations is poor (Commonwealth Department of Health and Ageing, 2004; Nader et al., 2008; Riddoch et al., 2007; Stamatakis et al., 2009).

There is some evidence of associations between socioeconomic disadvantage, physical activity and screen-time among children, regardless of whether individual-level (e.g. household income or maternal education) (Ball et al., 2009; Nader et al., 2008; Singh et al., 2009) or area-level measures (e.g. area deprivation) are used (Brodersen et al., 2007; Singh et al., 2009). It is therefore important to examine these behaviours among children experiencing socioeconomic disadvantage. It is also important to recognise that some children in that group are physically active, and some do participate in very little screen-time (Booth et al., 2006). These children could be described as 'resilient'; that is, they appear to defy the increased odds of inactivity and sedentary behaviours associated with socioeconomic disadvantage (Ball and Crawford, 2006). Identifying factors associated with such 'resilience' may provide important information about where future research should be targeted. The aim of this study was to identify the socio-demographic characteristics of children who meet physical activity and screen recommendations despite living in socioeconomically disadvantaged neighbourhoods.

Methods

Procedure

This study drew on data from the baseline assessment of the READI (Resilience for Eating and Activity Despite Inequality) study, conducted between July 2007 and June 2008. The methods employed in that study have been published previously (Cleland et al., 2010). Briefly, 40 urban and 40 rural suburbs in the lowest tertile of socioeconomic disadvantage (the most

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disadvantaged areas) (Australian Bureau of Statistics, 1998) were randomly selected. Women aged between 18 and 45 years living in each suburb ($n=150$) were selected from the electoral roll to receive a survey ($n=11{,}940$). Consent was received from 4934 women (41% response rate). Limited information is available regarding non-respondents; however a higher response rate was seen among rural compared to urban women (39% vs 34%). Women with a child aged 5–12 years were approached to participate, with 771 consenting (53% response rate). Mothers were mailed a survey and a reply paid envelope, the child's school or home was visited for measurement.

Measures

.Socio-demographic variables

Mothers reported their highest level of education (low = no formal qualifications, year 10 or equivalent; medium = Year 12 or equivalent, trade/apprenticeship, certificate/diploma; high = university degree or higher) and their child's date of birth. Urban or rural residence was determined during sampling.

.Child's height and weight

During the home/school visit, children's height (to the nearest 0.1 cm) and weight (to the nearest 0.1 kg) were measured using portable stadiometers and scales. The average of two consecutive measures was calculated. From this, children's age- and sex-adjusted body mass index *z*-scores were derived (*z*BMI) and children's weight status (not overweight, overweight/obese) was calculated (Cole et al., 2000).

.Screen-time

Mothers proxy-reported their child's TV viewing, computer and electronic game use in a typical week and total average minutes/day was calculated (Salmon et al., 2006). Children who met current Australian screen-time recommendations of ≤120 minutes/day were determined.

.Moderate-to-vigorous intensity physical activity

During the home/school visit, children were fitted with a Manufacturing Technologies Inc. (MTI) accelerometer (Actigraph Model AM7164-2.2C), worn on their right hip for eight consecutive days during waking hours. Inclusion criteria were at least four valid days (10–18 hours of wear time) including at least one weekend day. Average minutes/day of MVPA was calculated (Trost et al., 1998) then adjusted for proportion of wear time. Children who met the current Australian physical activity recommendations (≥60 minutes/day MVPA) were determined.

Statistical analyses

Stata/SE version 10.1 was used to perform logistic regression analyses to examine the odds of meeting recommendations for physical activity and screen-time, according to socio-demographic characteristics. Factors associated with the outcomes in bivariable analyses were entered into multivariable regression models. Analyses were stratified by sex, and all models adjusted for clustering by suburb (the sampling unit).

Results

After exclusions and missing data, the final sample comprised 373 (167 boys and 206 girls) children with complete data. The sample socio-demographic characteristics and time spent in MVPA and screen-time are presented in Table 1.

Table 2 shows the results of multivariable logistic regression analyses examining the socio-demographic factors associated with odds of meeting physical activity and screen recommendations. Among boys and girls, age was inversely associated with meeting physical activity and screen recommendations. Compared to urban boys, rural boys had higher odds of meeting screen recommendations. Girls whose mothers had high levels of education had higher odds of meeting screen recommendations than other girls. Overweight boys and girls were less likely to meet screen recommendations than non-overweight children.

Discussion

This study examined the socio-demographic characteristics of children experiencing socioeconomic disadvantage who met physical activity and screen recommendations. Approximately 84% of children met physical activity recommendations but only 43% met screen recommendations. This study identified several important factors; specifically age, rural residence, maternal education and weight status. These findings identify key target groups for whom further study of modifiable characteristics may be valuable, particularly in relation to sedentary behaviours.

Consistent with the present findings, age-related cross-sectional differences in physical activity have been reported previously (Sallis, 2000), and this finding was extended to screen-time. This is interesting as existing evidence of that association is mixed (Hoyos Cillero and Jago, 2010). It is plausible that as children get older, time spent using the computer for homework increases, thus accounting for the increased total screen-time. Screen-time also showed associations among rural boys, and although data examining sedentary behaviours among rural children are scarce; one previous study showed similar findings (Booth et al., 2006). Poorer access to screen-based technologies (e.g. the internet) in rural areas (Australian Bureau of Statistics, 2008) may contribute to these differences. Given the limited research that has examined screen-based behaviour in this population, further work is warranted.

Findings from the current study in relation to weight status (Marshall et al., 2004) and maternal education (Ball et al., 2009; Hoyos Cillero and Jago, 2010) are also consistent with previous research. These associations are particularly significant when considered in the context of this study, as all participants were recruited from socioeconomically disadvantaged areas.

The cross-sectional design limits inferences about causality, and the measure of screen-time was proxy-reported; although the psychometric properties were adequate (Salmon et al., 2006). Additionally, the measure of screen-time may not completely capture all components of sedentary behaviour. However a key aim of this study was to examine whether children met screen-time recommendations, and the behaviours measured are common screen-

Table 1
Socio-demographic and behavioral characteristics of children in the READI study[a].

	Boys ($n=167$)	Girls ($n=206$)
Age (years; mean, SD)	9.2 (2.1)	9.6 (2.0)
Geographic location (%)		
Urban	30	30
Rural	70	70
Child's *z*BMI (Body Mass Index) [mean (SD)][b]	0.6 (0.9)	0.5 (0.9)
Child's weight status (%)		
Not overweight	74	69
Overweight	17	20
Obese	9	11
Maternal education (%)		
Low	25	25
Medium	50	46
High	25	29
Moderate to vigorous physical activity [min/day] [mean (SD)]	195.0 (68.7)***	156.4 (62.9)
Screen-time [min/day] [mean (SD)]	160.0 (97.1)	141.9 (83.7)
Meeting physical activity recommendations (%)	89.2*	79.6
Meeting screen-time recommendations (%)	37.7	47.1

*$p<0.05$, ***$p<0.001$ between girls and boys.
[a] Recruited in 2007/2008 from urban and rural areas of Victoria, Australia.
[b] Standardised *z*-score of BMI.