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**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 (70%) 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 screen-time in a usual week. Odds ratios (OR) and 95% confidence intervals (95% CI) examined odds of meeting recommendations for physical activity (>60 minutes/day) and screen-time (\leq 120 minutes/day) 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 the odds of meeting physical activity and screen recommendations. Despite living in disadvantage, some children do well in terms of meeting these recommendations.

Keywords: 3 to 10 MESH-heading *keywords*

Socioeconomic disadvantage; urban/rural; accelerometer; weight status

Introduction

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

Methods

Procedure

This study drew on data collected as part of the baseline assessment of the READI (Resilience for Eating and Activity Despite Inequality) study. The methods employed in this 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 disadvantaged areas) (Australian Bureau of Statistics 1998) were randomly selected. Women aged between 18-45 years living in each suburb (n=150) were selected from the electoral roll to receive a survey (total n=11,940). Consent was received from 4,934 women (41% response rate). Those 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 the administration of measures.

Measures

Socio-demographic variables

Mothers reported their highest level of education (collapsed into: 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. Area of residence (urban vs rural) was determined during the sampling process.

Child's height and weight

During the home/school visit, children's height (to the nearest 0.1cm) and weight (to the nearest 0.1kg) 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 (zBMI) and children's weight status (not overweight, overweight/obese) was calculated (Cole et al. 2000).

Screen-time

Mothers reported the amount of time their child spent watching TV, using the computer and playing electronic games in a typical week and total average minutes/day was calculated (Salmon et al. 2006). Children who met current Australian recommendations for screen-time of ≤ 120 minutes/day were determined.

Moderate-to-vigorous intensity physical activity

Children wore a Manufacturing Technologies Inc. (MTI) accelerometer (Actigraph Model AM7164-2.2C) for eight consecutive days during waking hours. During the home/school visit, children were fitted with the accelerometer on their right hip. Inclusion criteria were at least four valid days (10 - 18 hours of wear time) including at least one weekend day. Average minutes/day spent in MVPA was calculated (Troost 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 socio-demographic characteristics of the sample and time spent in MVPA and screen-time and are presented in Table 1.

INSERT Table 1 here

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.

INSERT Table 2 here

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 factors associated with odds of meeting recommendations; 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 behaviors.

Consistent with the present findings, age-related cross-sectional differences in physical activity from childhood to adolescence 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 behaviors among rural children are scarce; one previous study showed similar findings (Booth et al. 2006). Poorer access to screen-based technologies such as the internet in rural areas (Australian Bureau of Statistics 2008) may contribute to these differences. Given the paucity of studies that have examined screen-based behavior in this population, further research is required.

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 validity and reliability was adequate (Salmon et al. 2006). Further, as mothers responded to a mail-out survey there may also be selection bias present. Strengths include the use of objective measures of children's physical activity and weight status, and the inclusion of children living in both urban and rural areas.

Conclusion

In conclusion, this study has identified characteristics of resilient children that may be important to examine in future research, both when trying to understand correlates of behavior, as well as when designing interventions for key target groups of children.

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Conflict of interest

The authors declare no conflict of interest.

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