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**LOS BARRIOS Y ESCUELAS APOYAN LA ACTIVIDAD FISICA DE
LOS NIÑOS EN LAS ESCUELAS PRIMARIAS DE LA REGION
BARWON SUROESTE EN VICTORIA, AUSTRALIA**

**SCHOOL AND NEIGHBOURHOOD SETTINGS SUPPORT PHYSICAL
ACTIVITY IN PRIMARY SCHOOL CHILDREN FROM THE
BARWON SOUTH-WEST REGION OF VICTORIA, AUSTRALIA**

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RESUMEN

La prevalencia de obesidad en los niños australianos es alta y parece ser que los bajos niveles de actividad física pueden estar contribuyendo a este problema. El propósito de este estudio fue examinar 1) el comportamiento de los niños frente a la actividad física 2) la infraestructura de los barrios y las escuelas que probablemente influyen en la actividad física de estos niños. Con ayuda del computador, se realizaron entrevistas telefónicas a los padres de 1711 niños de 5 y 12 años de edad en 18 escuelas primarias, localizadas en la región sur-occidental del estado de Victoria en Australia llamada Barwon. Las entrevistas fueron usadas para coleccionar información demográfica de los barrios, comportamiento infantil y percepciones de la vecindad. Entrevistas a los representantes de las escuelas capturaron información acerca de la infraestructura para la actividad física. En promedio, los niños pasaron 73 minutos más jugando afuera que las niñas después del horario escolar. La mayoría de los niños en general participaban en por lo menos una actividad programada semanal y aproximadamente la mitad utilizaban métodos activos para transportarse a/desde la escuela. Acerca de los barrios, los padres reportaron que tenían buena disponibilidad a deportes, actividad física/programas de danza, acceso cercano a por lo menos un espacio abierto para jugar y que generalmente se sentían seguros. Los representantes de las escuelas reportaron que la mayoría de las escuelas estaban comprometidas a la actividad física y que tenían por lo menos un programa de actividad física, también reportaron, que las escuelas tenían suficiente personal capacitado para enseñar educación física y que tenían adecuadas instalaciones y equipos para realizar actividad física. La mayoría de los niños estuvieron regularmente activos y reunieron las recomendaciones de actividad física en Australia. La composición de los barrios y escuelas por la mayor parte apoyaron la actividad física, sin embargo el desarrollo de pólizas escritas, aplicación obligatoria de la educación física, instalaciones internas para la actividad física, y las percepciones de seguridad de la vecindad son áreas que podrían ser mejoradas.

Palabras claves: Actividad física, actividad física después del horario escolar, educación física, deporte, niños.

ABSTRACT

The prevalence of obesity in Australian children is high and low levels of physical activity may be contributing to this problem. The purpose of this study was to examine 1) children's physical activity behaviours, and 2) aspects of the neighbourhood and school settings that may influence children's physical activity. A computer assisted telephone interview of parents of 1711 5-12 year old children from 18 schools across the Barwon South-Western region of Victoria, Australia was used to collect demographic, child behaviour and neighbourhood perceptions data. Interviews with representatives of schools captured information about the school environment for physical activity. On average, children spent 73 minutes playing outside after school with boys spending more time playing outside than girls. Most children participated in at least one organised weekly activity and about half used active methods of transport to/from school. For their neighbourhood, parents reported good availability of sport, physical activity/dance programs, nearby access to at least one open-space for play and generally feeling safe. School representatives reported that most schools were committed to physical activity, had at least one physical activity policy, sufficient staff qualified to teach physical education, and adequate facilities and equipment for physical activity. Most children were regularly active and met Australian physical activity recommendations. Neighbourhood and school settings were mostly supportive of physical activity however development of written physical activity policies, enforcement of mandated physical education, better indoor play facilities and increased perceptions of neighbourhood safety are areas for improvement.

Keywords: physical activity, after school play, physical education, sport, children.



INTRODUCTION

In Australia, over 20% of children aged 7-15 years are overweight or obese and the prevalence of obesity in this age group doubled in the ten years from 1985 to 1995 (Magarey, 2001). Recent national data (Australian Bureau of Statistics, 2011; Commonwealth Scientific Industrial Research Organisation, Preventative Health National Research Flagship, & University of South Australia, 2008) and our own surveys of primary school children (Sanigorski et al., 2007) show that about one in four are overweight or obese. Childhood obesity is a major public health concern because physical, metabolic and psychosocial problems are increasingly common in obese children (Lobstein et al., 2004; Puhl & Latner, 2007; Weiss et al., 2004). Moreover, many of these problems persist into adulthood. Given the difficulties treating established adult obesity, it is not surprising that attention has now been directed towards intervention and prevention in children (Steinbeck, 2001).

Recent epidemiological trends in obesity indicate the primary causes of the problem can be attributed to the environment and obesity-promoting behaviours since the escalating rates of obesity are occurring in a relatively constant gene pool (Fox, 2004; Molnair & Livingstone, 2000). Physical activity plays an important role in the aetiology of obesity as a major contributor to energy expenditure and there appears to be general agreement in the literature that children suffering obesity are less likely to participate in all forms of physical activity (Page et al., 2005; Steinbeck, 2001). It has been reported that the frequency of active transportation to and from school and the amount of weekly physical education has declined (van der Ploeg et al., 2008; Salmon et al., 2005). In addition, children (and adults) now spend more time engaged in sedentary activities such as watching TV, playing electronic and computer games and using the internet (Molnair & Livingstone, 2000; Salmon et al., 2011). Thus, it is likely that efforts to increase physical activity will help prevent obesity (Hills et al., 2007; Steinbeck, 2001).

In Australia, government guidelines recommend that children aged 5-12 years should engage in at least 60 minutes of moderate to vigorous physical activity each day (Department of Health and Ageing, 2004). According to these guidelines, walking and cycling as well as active play are examples of moderate

intensity activities. These activities may also contribute to accumulated levels of vigorous physical activity (Department of Health and Ageing, 2004). Victorian State government authorities have also indicated support for physical activity via physical education and sport in schools. In 1993, the Department of Education and Training proclaimed that "physical education and sport is not an optional extra in government schools" and mandated time requirements for physical education and sport according to year level (i.e., 20-30 mins/day for prep-year three, three hours/week for years four-six) (Department of Education and Training (Victoria), 2005).

Obesity is a multi-factorial condition with wide-ranging causes including genetic, social, cultural, behavioural and environmental factors (Parsons et al., 1999; Wyatt et al., 2006). It has been postulated that a major reason why some children's physical activity levels are low is because their environment is not supportive for physical activity (Griew et al., 2010; Sallis & Glanz, 2006; Trapp et al., 2012). The importance of creating supportive environments achieved formal recognition with the Ottawa Charter in 1986 (Ottawa Charter for Health Promotion, 1986), and since, many environmental models have been developed. Understanding obesity incorporates environmental, biological and behavioural factors (Egger & Swinburn, 1997). Swinburn and colleagues (Swinburn et al., 1999) developed a framework that can be used to dissect obesogenic environments. The framework (see table 1) is examined according to two axes, these being two sizes of environment including micro- and macro-levels, and four types of environment being physical; economic; political and socio-cultural and can be used to investigate how obesity promoting, or obesogenic an environment is.

The aims of this paper were to: (1) examine children's physical activity-related behaviours including time spent playing outside, involvement in organised activities after school, sport and physical education at school, and mode of transport to/from school; and (2) examine aspects of the physical, policy and socio-cultural environment within the neighbourhood and school settings that may influence the physical activity levels of children.



Table 1. Examples of micro-environment settings and physical, economic, political and socio-cultural environment types for physical activity

	Type			
	Physical	Economic	Political	Socio-cultural
Schools	Availability of equipment Adequate facilities	Costs associated with equipment, facilities and staff	Policies for physical activity	Physical activity supported and encouraged Staff as role models
Neighbourhoods	Safety for movement and activity Security/risk associated with movement and activity			
Households	Availability of equipment	Cost associated with physical activity		Support for physical activity
Workplace				Physical activity supported and encouraged

METHODS

Survey design and participants

Participants were recruited from a regionally representative sample of 18 primary schools (15 Government, 2 Catholic, 1 Private) in the Barwon South-Western region of Victoria. Data were collected as baseline measurements in schools involved as either intervention or comparison schools in a community-based intervention project during the period March, 2003 to September, 2004. The overall response rate was 49% (intervention: 58%; comparison 44%). Written consent was obtained from parents or guardians of all participants and the study was approved by the Deakin University Human Research Ethics Committee, the Victorian Department of Education, Employment and Training, and the Catholic Education Office.

Anthropometry

Children's weight and height were measured at school in accordance with standard methods for the collection of anthropometric data in children (Davies et al., 2001) by trained researchers. All measures were taken in light clothing and without shoes. Weight was measured to the nearest 0.05kg using electronic scales (A&D Personal Precision Scale UC-321) and height was measured to the nearest 0.1cm using a portable stadiometer (PE87 Portable Stadiometer). Two measurements were recorded for each parameter and where there was disagreement (>0.1kg; >0.3cm) a third measure was recorded.

Gender was recorded and age was calculated using date of birth and date of data collection.

Socio-demographic characteristics

Local area socio-economic status (SES) was based on the Socio-Economic Index for Areas (SEIFA). This index of relative socio-economic advantage/disadvantage, which is based on data collected from the 2001 Australian census of population and housing and incorporates variables such as income, education, occupation, living conditions, access to services and wealth, was the specific index used (Australian Bureau of Statistics, 2001). The SEIFA classification was based on geographic postal area. Higher scores on the Index indicate that an area has a relatively high proportion of people with high incomes or a skilled workforce, and also a low proportion of people with low incomes and relatively unskilled workforce.

Computer Assisted Telephone Interview (CATI)

Parents of participating children completed a Computer Assisted Telephone Interview (CATI). For most children, the CATI was conducted within three weeks of the recording of the anthropometric measurements. The interview was conducted by a trained interviewer on a day (Tuesday–Saturday) and time nominated by the parent (or guardian). The CATI consisted of sections with questions focused on household demographics, child nutrition and physical activity related behaviours and the neighbourhood environment. Questions from the CATI survey



related to physical activity captured the amount of time children spent playing outside after school yesterday and usually, children's involvement in organised games, sports or dance (outside school hours), and the mode of transport for children to/from school 'yesterday' and 'usually'. There were also a number of questions that captured some of the physical aspects of the neighbourhood environment that may influence the child's level of physical activity, including the availability of parks and parent's perceptions of safety.

School informant interview

We used key informant interviews to capture physical (e.g., adequacy of sporting and active play equipment), policy (e.g., adoption of physical activity policies) and socio-cultural (e.g., teachers modelling physically active behaviours) elements of the school environment. This consisted of a structured interview with 2-3 members of the school staff that covered general information about the school, as well as information relating to food services, nutrition and physical activity. Interviews were completed in a single session of approximately 45 minutes in duration and were conducted by research staff trained in survey interview methods. For each question one response was recorded. Where there was disagreement, staff discussed the issue until consensus was reached.

Statistical analysis

To address aim one, five measures were analysed: amount of time children spent outside after school *yesterday* (continuous variable), level of time children *usually* spent outside after school, number of times each week that children were involved in organised games, sports, or dance, outside of school hours, and for children living within 1.5 kms from their school, the main mode of transport to get to/from school *yesterday* and *usually* (categorical variables). For the categorical variables, we reduced the number of categories (to two): level of time spent outside usually (< 1 hour; ≥ 1 hour); weekly involvement in after school activities (less than one/week; one or more/week); transport to school yesterday and usually ("active" [walk, cycle]; "inactive" [car, bus]). Summary statistics were computed for the continuous (mean ± standard deviation) and categorical (frequency counts, percentages) variables. BMI was computed and

weight status determined using standard international methods (Cole et al., 2000). Analysis of Covariance (ANCOVA) was used to test for differences on outside play yesterday for the child's gender, weight status (healthy weight; overweight/obese) and local area SES (SEIFA quartile) adjusting for child's age, time of year (average daylight hours/month), and maternal education (not completed year 12; completed year 12 or higher). Differences in usual outside play, involvement in games, sport or dance, as well as mode of transport to/from school yesterday and usually with the same demographic variables were assessed using Chi-square tests. The proportion of children meeting the current Australian recommendations for children's daily physical activity was computed using the outside play *yesterday* and *usually* measures, along with a computed daily activity variable derived by summing the *usual* amount of time playing outside (reported time in 30 min intervals) with involvement in organised activities (based on 30 mins per activity and then divided by 7) and weekly PE (using the mean of the reported time across all schools as an estimate for each year level). Descriptive analyses (percentages, means) were used to summarise elements of the neighbourhood and school environments. Statistical significance was accepted at $p < .05$ and all analyses were conducted using SPSS version 17.0 (SPSS Inc.).

RESULTS

Sample and respondent characteristics

Table 2 shows the anthropometric and socio-demographic characteristics of the children in this study. The mean age of the sample was 8.7 years (SD=1.9), 26.3% were either overweight or obese according to the IOTF classifications and there was an over-representation of children from the lowest SEIFA quartile and an under-representation of children from the highest quartile according to state wide averages. The breakdown of parent respondents (n=1274) for the CATI survey revealed that mothers were the most frequent respondents (87.6%), followed by fathers (11.3%), and step-parents or guardians (1.2%). The school interview surveys were completed by staff from the 18 primary schools. Teachers were the most frequent (77%) key



informants followed by deputy principals (6%), and then welfare/guidance (4%) and other (13%) staff.

Table 2. Characteristics of child sample

	n (%)
<i>Overall sample</i>	1711 (100.0)
<i>Gender</i>	
Male	839 (49.0)
Female	872 (51.0)
<i>Weight status</i> ^a	
Healthy weight	1259 (73.8)
Overweight	324 (19.0)
Obese	124 (7.3)
<i>Maternal education</i>	
Didn't complete high school	768 (45.3)
Completed high school/TAFE/Degree	929 (54.7)
<i>Paternal education</i>	
Didn't complete high school	822 (50.3)
Completed high school/TAFE/Degree	811 (49.7)
<i>Area SES</i>	
SEIFA ^b quartile 1[≤25%]	652 (38.4)
SEIFA quartile 2[26%-50%]	514 (30.3)
SEIFA quartile 3[51-75%]	370 (21.8)
SEIFA quartile 4[>75%]	162 (9.5)

^a Using IOTF criteria (Cole et al. 2000); ^b SEIFA: Index of relative socio-economic Advantage/Disadvantage from 2001 Australian census, High quartile=high socio-economic status

Gender, weight status, area SES and activity

The mean time spent playing outside after school *yesterday*, and level of time spent playing outside after school *usually* as well as involvement in organised games, and mode of transportation to/from school *yesterday* and *usually* is shown in table 3. On average children spent just over one hour playing outside after school, with boys spending more time outside than girls ($p<.001$). There were no differences in amount of outside play for either weight status or area SES. Similar trends were observed for the outside play after school *usually* measure. Parents reported that most children usually spent one hour or more playing outside after school. Levels of usual outside play was not associated with weight status but was associated with the child's gender ($\chi^2=17.0$, $p<.001$) and area SES ($\chi^2=8.2$, $p<.05$); boys and children from the lower and middle SEIFA quartile areas usually spent more time playing

outside. Most children participated in at least one form of organised sport or activity each week. Level of participation was not associated with either gender or weight status but was associated with area SES ($\chi^2=12.7$, $p<.01$); children from the two higher SEIFA quartiles were more frequently involved in organised activities.

Just under half of all school children used some form of active transportation (i.e., walk, bicycle) to get to/from school on the previous day and just over half usually used active modes of transport. The Chi-square tests revealed associations with gender (*yesterday*: $\chi^2=5.9$, $p<.05$; *usually*: $\chi^2=5.2$, $p<.05$); and area SES (*yesterday*: $\chi^2=24.5$, $p<.001$; *usually*: $\chi^2=16.9$, $p<.001$); boys and children from the lowest and highest SEIFA quartiles were more likely to use active methods of transport to and from school. Child weight status was not associated with either of the school transport measures (see table 3). Since some primary schools don't permit children from early year levels to ride to/from school we computed method of transport for a subset of children from grades 4-6 only. Levels of active transportation based for this subset ($n=373$) increased to 58% and 64% respectively for both the *yesterday* and *usually* measures.

Recommended levels of activity

The proportion of children meeting the current Australian recommendations for a minimum of 60 minutes of daily physical activity was 57% and 72% of children based on the *yesterday* and *usual* outside play (on school days) measures respectively. The proportion increased to 85% for the composite variable that included an estimate for involvement in organised sport and school physical education. It should be noted that for the analysed sample, even this latter figure is likely to underestimate the true proportion meeting the recommendation as the estimated amount of daily activity does not include other forms of activity (e.g., active transport, play before school, activity during school recess periods) that may contribute substantially to the total daily physical activity.



Table 3. Parent reported outside play after-school, involvement in organised games, sport and dance, and active transport to/from school for sample and for gender, weight status and area-level socioeconomic status subgroups (n and percentage in parentheses unless indicated otherwise)

Measure	All	Gender		Weight status ^c		SEIFA ^d quartile			
		Male	Female	Healthy weight	Overweight-obese	Q1	Q2	Q3	Q4
<i>Outside play yesterday (mins) mean^a ± s.d.^b</i>	72.8 ± 65.3	78.4 ± 65.1 ^h	67.4 ± 65.1	71.6 ± 65.3	75.6 ± 65.4	73.3 ± 67.0	68.9 ± 67.4	75.3 ± 65.5	78.7 ± 66.7
<i>Outside play usually</i>									
< 1 hr/day	474 (27.8)	194 (23.2) ^h	280 (32.2)	365 (29.1)	109 (24.4)	181 (28.0) ^f	128 (24.9)	104 (28.2)	59 (36.4)
≥ 1 hr/day	1231 (72.2)	641 (76.8)	590 (67.8)	890 (70.9)	337 (75.6)	466 (72.0)	386 (75.1)	265 (71.8)	103 (63.6)
<i>Involved in organised games sport, or dance</i>									
< 1/wk	452 (26.5)	217 (26.0)	235 (27.1)	328 (26.2)	123 (27.5)	181 (27.8) ^g	148 (29.0)	92 (25.1)	25 (15.4)
≥ 1/wk	1252 (73.5)	619 (74.0)	633 (72.9)	924 (73.8)	325 (72.5)	471 (72.2)	363 (71.0)	275 (74.9)	137 (84.6)
<i>Transport to/from school yesterday^e</i>									
Active	425 (45.8)	227 (49.9) ^f	198 (41.9)	317 (45.8)	107 (45.7)	213 (45.7) ^h	84 (40.0)	40 (36.0)	86 (63.7)
Inactive	502 (54.2)	228 (50.1)	274 (58.1)	375 (54.2)	127 (54.3)	253 (54.3)	126 (60.0)	71 (64.0)	49 (36.3)
<i>Transport to/from school usually^e</i>									
Active	481 (51.2)	253 (55.1) ^f	228 (47.7)	351 (50.2)	129 (54.4)	247 (52.4) ^h	90 (42.7)	53 (47.3)	89 (64.5)
Inactive	456 (48.7)	206 (44.9)	250 (52.3)	348 (49.8)	108 (45.6)	224 (47.6)	121 (57.3)	59 (52.7)	49 (35.5)

^a Adjusted for age, time of year (daylight hours) and household SES (maternal education); ^b s.d.: standard deviation; ^c Using IOTF (Cole et al., 2000); ^d SEIFA: Index of relative socio-economic advantage/disadvantage from 2001 Australian census, High quartile (Q4)=high socio-economic status; ^e Living within 1.5 kms from school (n=940); ^f p<.05; ^g p<.01; ^h p<.001

Settings

Tables 4 and 5 summarise key measures for the physical, policy, and socio-cultural aspects of the environment for the neighbourhood and school settings respectively as they relate to facilitating (or impeding) childhood physical activity.

Considering the neighbourhood environment first (table 4), the findings indicated that there was good availability of sport, dance, or physical activity programs for most children and that most children had access to at least one park or open-space for play.

The percentage of residential streets having footpaths on at least one side of the road was moderate but substantially higher (73.8%) for those children living near (i.e., ≤1.5 km) their school. Overall parents indicated that the neighbourhood environment was mostly safe for children to move around and to play during the day. Consistent with this, parents also indicated that the relative risk posed by a number of neighbourhood factors was low, although the perceived risk of being injured from a traffic accident was notably higher (see table 4).



Table 4. Summarised results for neighbourhood setting measures as reported by parents of school children (n=1711)

Measure	% ^a
Availability of sport, dance, physical activity games/programs considered good	79.2
Have at least one park/open-space within 10 minutes walking distance from house	84.9
Have footpaths on at least one side of the street	57.9
Neighbourhood rated as safe for child to walk alone during the day	90.5
Closest park or open space rated as safe for a young child to play in	83.6
Neighbourhood rated as safe for a 12 yo child to cycle during the day	81.6
Risk of being injured from a traffic accident rated as low	32.0
Risk from strangers (eg. assault, abduction) rated as low	69.7
Risk from other children (eg. bullying, theft of property) rated as low	77.6
Risk of attack from animals (eg. dogs) rated as low	67.0
Risk of injury from the physical environment (eg. ponds, lakes, cliffs, holes) rated as low	73.6

^a In most instances percentages are based on n=1711 but this number varied slightly for some questions

Findings for the school environment were encouraging although there were still areas for improvement (see table 5). Most schools indicated they had at least one policy concerning physical activity and about half the time these policies were written. Ratings of effectiveness of the policies revealed that just under half were rated as very effective. Furthermore, the level of priority for physical activity, the modelling of physical activity behaviours by teachers, and the strength of schools' links with community and sporting groups were all rated as good. Just under one third of schools reported that they didn't have a teacher with professional physical education (PE) training and few schools indicated that they didn't have a teacher with other PE training/expertise. The amount of time dedicated to PE within the school curriculum is another important indicator of the school's commitment to physical activity. An average of 2.1 hours (SD=.5) of PE/sport each week was reported across all years for all schools; generally the amount of time dedicated to PE increased with year level. Overall, the percentage of schools meeting the mandated time requirements for PE/sport was low for

all year levels and particularly low for the preparatory (first) year through to year three. From a physical environment perspective all schools reported having adequate outdoor play facilities and adequate sporting and active play equipment but only 50% of schools indicated having an adequate indoor play area.

Table 5. Summarised results for school setting measures as reported by representatives of participating schools (n=18) (percentage unless indicated otherwise)

Measure	%
Physical activity policy	
School has written policy(ies)	55.6
School has unwritten policy(ies)	33.3
School doesn't have a policy	11.1
Physical activity policy(ies) considered very effective	44.0
Schools with adequate indoor play area	50.0
Schools with adequate outdoor play area	100.0
Schools with adequate sporting and active play equipment	100.0
Schools running other physical activity programs other than PE	100.0
Schools not having a teacher with PE degree	27.8
Schools not having a teacher with other PE training/expertise	11.1
Priority of physical activity at school ^{a, b}	1.7±.8
Hours devoted to PE/sport each week ^a	
Prep	1.9±.7
Years 1-2	1.6±.6
Years 3-4	2.1±.6
Years 5-6	2.6±.8
School year levels meeting mandated PE/sport requirement ^c	
Prep	22.2
Years 1-2	10.1
Years 3-4	33.3
Years 5-6	33.3
Teachers as role models by being physically active ^{a, b}	2.0±.8
Strength of links with community sporting and recreation groups ^{a, b}	1.8±.8
Overweight children at school are teased about their weight ^{a, d}	2.9±1.2

^a mean ± standard deviation; ^b 1 = very good, 5 = very poor; ^c based on: Prep-year 2 > 2 hrs/wk; years 3-4 > 2.5 hrs/wk; years 5-6 ≥ 3 hrs/wk; ^d 1 = strongly agree, 5 = strongly disagree



DISCUSSION

This study investigated physical activity among primary school children from the Barwon South-West region of Victoria, Australia and found that most children were sufficiently active and about half of the children living nearby to their school used active transport to get to/from school. Boys were generally more active than girls and physical activity levels differed according to socioeconomic status, although the nature of this relationship varied with the physical activity-related behaviour examined. Examination of the physical activity-related aspects of the children's school environment revealed that school settings were mostly supportive but a number of potential areas for improvement also existed.

Overall, our results indicate that most children were regularly and sufficiently active, meeting the Australian physical activity guidelines. These findings are encouraging particularly in light of recent concern about children being insufficiently active. Boys were found to be more active than girls, a finding that is consistent with previously reported trends (Commonwealth Scientific Industrial Research Organisation, Preventative Health National Research Flagship, & University of South Australia, 2008; Sallis et al., 2000), however girls were equally involved in organised games, sport and dance activities after school. Our study also revealed a consistent lack of differences in activity-related behaviours between those of healthy weight and those above a healthy weight, although there was a non-significant trend for higher levels of activity among overweight children. This latter finding is in accord with previous literature that has highlighted the complexity of the relationship between physical activity and weight status (Fox & Hillsdon, 2007). Even allowing for potential recall and social desirability biases as well as data reduction methods, it would seem that healthy weight and overweight children spend similar amounts of time engaged in physical activity-related behaviours.

The relationship between these indicator measures of physical activity and socioeconomic status was not linear or of a consistent pattern. These results indicate that the socioeconomic context had little influence on levels of after school physical activity for children from lower and middle SES areas, but did so for children from higher SES areas. Specifically children from high SES areas were more frequently engaged

in organised sports outside of school hours. This may be because organised activities cost money. One effect of this is that these children would have less time to engage in outside play although we also found that they spent equivalent time (*yesterday*) playing outside. Previous studies (e.g., Veitch et al., 2008) among children from metropolitan regions have reported higher proportions from high SES areas engaged in outside play at parks/playgrounds and street/footpath as well as indoor sports centres when compared with low and mid SES areas.

Children's mode of travel to and from school provides further opportunity for children to be physically active. We found that about half of all children either walked or cycled to school regularly, which is a higher proportion than those reported in similar studies where rates of active transport varied between 32-35% (Carlin et al., 1997; Harten & Olds, 2004) and 33-44% (van der Ploeg et al., 2008). Geographic differences across the respective survey regions may explain some of this variation. Differences in the method of report may also contribute to the observed discrepancy. We used parent report for the *yesterday* and *usually* transport to school questions while same-day recall by parents (Carlin et al., 1997), or children or parents (van der Ploeg et al., 2008), and previous-day recall reported by child (Harten & Olds, 2004) have been used in other studies. Similar to previous studies (Harten & Olds, 2004) boys in our study were more likely to use active transport however child weight status was not associated with the use of active (or inactive) method of transport to or from school.

We were also interested in determining the proportion of children who met the current recommended level of physical activity for Australian children (Department of Health and Ageing, 2004). Our results indicate that a very high proportion of children (85% based on the composite measure) met the recommendation of 60 minutes of moderate to vigorous physical activity each day. This figure could be regarded as a conservative estimate since our composite physical activity measure does not include physical activity occurring during periods other than after school (e.g., before school, during school), however it is higher than that reported using different methodology in the most recent Australian National Survey (Commonwealth Scientific Industrial Research Organisation, Preventative Health



National Research Flagship, & University of South Australia, 2008). While not discounting the possible influence of other factors (e.g., recall and social desirability biases), the figures are encouraging and suggest that most of the children participating in this survey were sufficiently active.

Another important aspect of our study was assessment of the neighbourhood and school settings in relation to supporting physically active behaviours among children. The findings related to the physical aspects of neighbourhoods were encouraging. Most children had at least one park/open-space nearby and in most instances this was considered to be safe for young children. Furthermore, most parents reported that there was good availability of organised sports and other physical activities in their neighbourhood. In terms of movement around the neighbourhood, most aspects were rated as safe however a considerable proportion of parents (>20%) perceived the level of risk for injury posed by most factors assessed (strangers, animals, other children and the physical environment) as moderate. However, more significantly parents believed that the risk of injury due to traffic accident was high, which was understandable in some of the geographic areas examined, which had high traffic and limited footpaths in some areas.

Analysis of the school setting revealed that most schools had some policies related to physical activity although only half the schools had written policies and the policies were largely rated as being ineffective at promoting children's physical activity. The physical environments of the schools were generally considered to be supportive of physical activity, although inadequate indoor areas for active play were found in half the schools. In addition, although the staff felt that their schools promoted children's physical activity in a number of ways, the proportion of schools meeting the mandated weekly requirement for sport and physical education was low, particularly for the younger year levels. It appears that departmental policies are insufficient in regard to directing physical activities at the individual school level meaning that there is considerable variation in activity levels of students from different schools (Griew et al., 2010) and that consequently schools may need to take on a stronger leadership role (Story et al. 2009). In addition the development of programs that encourage teachers to more

effectively model active lifestyles may also contribute to providing a more supportive environment for children to be active.

Our findings need to be viewed in relation to a number of limitations. First, as this is a cross-sectional study we can only examine associations and not causative pathways. Second, the response rate for children's involvement in the study was moderate (~50%) therefore these findings may not be representative of all children in the Barwon-South Western region or more generally regional Australia. Third, we do not have direct measures of children's physical activity and have only examined parent-reported physical activity related behaviours, which may also be limited by recall and social desirability bias. Similar measurement issues may also have occurred for the school informant interview. In addition, staff may have felt pressured not to make negative comments in front of other staff, particularly senior members.

CONCLUSIONS

Despite current community concerns about inactivity among Australian children, our findings present a much more positive picture and suggest that most primary school children are sufficiently active on a regular basis. Importantly however, we have identified a need for promoting engagement in physical activity by girls, and being considerate of the constraints of socioeconomic status of providing sufficient opportunities for children to be physically active.

There is a need for schools to adopt written physical activity policies that are effective and ensure that time is allocated in the school week for sufficient physical activity, consistent with the current government guidelines, and more generally help embed physical activity as a critical feature of the school curriculum and school culture. These policies should also reinforce the need for appropriately trained and motivated teachers having specialist physical education training who can provide the leadership and expertise needed to encourage and support children to be active. Having female physical education teachers on staff who can develop appropriate activities as well as model an active lifestyle would further assist in encouraging and supporting girls to be more active. In relation to the



wider neighbourhood, local government and other authorities need to consider how the amenity of neighbourhoods, and particularly low SES neighbourhoods, could be improved to support physical activity. Increased provision of footpaths, safe routes for children to walk and cycle and traffic calming and diversion around schools are areas still needing attention. Such improvements are also likely reduce parent's perceptions of neighbourhood risk. At the same time, appropriate health promotion messages are needed to help moderate parent's exaggerated perceptions of neighbourhood risk that acts as a significant barrier for child physical activity.

These efforts will increase the opportunities for all children to be regularly physically active and more generally encourage and support children to adopt active lifestyles.

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