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Walking To School: Incidental Physical Activity in the Daily Occupations of Australian Children

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ABSTRACT

Children's participation in physical activity is declining, and nowhere is this more apparent than in the incidental activity of walking to school. The aim of this pilot study was to examine the extent to which Australian children walked to and from primary school, and to survey parents to identify factors influencing this behaviour. Parents of 164 students in Grades 1–7 (mean age 9.1 ± 2.02 years) from a primary school comprising 360 students responded to a questionnaire regarding psychosocial and environmental factors thought to influence the means by which their children went to and from school. Results indicated that parent perception of the importance of physical activity, parents' individual history of transport to school as well as distance from school were the most statistically significant factors determining children's involvement in walking to and from school. The results of this study highlight the attitudes and experiences of parents in determining the extent to which children are involved in non-motorized access to school. Also implicated are organizational policies about geographical school regions. While this study is limited to one school community, further study is recommended with others to better confirm findings by examining socioeconomic, geographic and policy variables. Occupational therapists are challenged to examine ways in which incidental physical activity can be increased in the lives of young children.

Key words: health promotion; school communities; children's physical activity

Introduction

Occupational therapists have traditionally provided services to individual children in schools, addressing particular problems related to occupational performance (Sahagian Whalen, 2003). However, in keeping with the American Occupational Therapy Association position paper on the promotion of health and the prevention of disease and disability (AOTA, 2001) it is timely to examine how therapists can become more involved in health promotion in school communities. A key component of the physical and psychosocial well-being of children is the reported decline in their involvement in physical activity (Fox and Riddoch, 2000).

Despite the documented benefits of regular physical activity, a significant percentage of school-aged children fails to meet recommended daily levels for the maintenance of health (Fox and Riddoch, 2000). Lifestyles are becoming more sedentary, as a result of and in response to the changing demands of the occupational roles of children in contemporary society (Lumsdon and Mitchell, 1999). It is during their early school years that children are considered their most active, and this is also the era in which long-term lifestyle patterns can be established (Booth, 2000; Cale and Almond, 1992). One aspect of the daily occupations of children in which physical activity appears to have receded is the incidental activity involved in walking to school (Zaccari and Dirkis, 2003). The present study aims to explore the factors that are mediating this decline in Australian children.

Physical activity is critical to normal growth and development in childhood (Pate et al., 2000). Evidence suggests that engagement in physical activity during childhood and adolescence reduces risk factors associated with the development of chronic diseases (Baranowski et al., 2000). That is, more active children are found to have higher peak bone density, lower adiposity, and improved cardiovascular and pulmonary health in comparison to less active peers (Boreham and Riddoch, 2001; Pate et al., 2000). The health benefits of exercise have also been tracked from childhood into adulthood (Booth, 2000; Trost et al., 1999), so it is important that adequate physical activity becomes an integral part of childhood occupations (Boreham and Riddoch, 2001; Carlin et al., 1997; Trost et al., 1999).

Debate continues over what constitutes an 'adequate' amount of physical activity. It is agreed that physical activity does not need to be strenuous to be beneficial (Lumsdon and Mitchell, 1999; Rafferty et al., 2002). Regular participation in walking has been found to be important for both cardiovascular and psychological health (Murphy et al., 2002; Rafferty et al., 2002). To this end, the National Heart Foundation of Australia (2001) recommends that adults and children be involved in a minimum of 30 minutes of moderate intensity activity, such as brisk walking, every day.

Today's reality is different. Time spent watching television, playing with computer games and on the Internet is supplanting that previously devoted to spontaneous and planned physical activity (Anderson et al., 1998; Booth, 2000; Trost et al., 1999). In addition, the incidental activity involved in walking to shops and school, climbing stairs in buildings, opening garage doors by hand and getting up to change the television channel has also declined as a result of labour-saving alternatives such as cars, escalators, elevators and remote controls. As a result, there are many situations in which children expend less energy on incidental activities than would previously have been the case. The view that children are leading a less active lifestyle is supported by the high prevalence of obesity in 10–17 year olds. National Heart Foundation of Australia (2001) statistics show that 21% of boys and 23% of girls in this age group are over weight. Although it is difficult to determine if obesity is increasing over time, these high rates alone are cause for concern. As well as posing health concerns (Baranowski et al., 2000), obesity is a factor in the onset of social discrimination or bullying (Boreham and Riddoch, 2001). Therefore, it is important to encourage children to incorporate physical activity into their daily routine from a young age, and to maintain such habits for life (National Heart Foundation of Australia, 2001).

A study by the National Center for Chronic Disease Prevention and Health Promotion (2002) in the United States investigated barriers to children walking and cycling to school. Among the children in the 611 households surveyed, approximately 11% walked and 3% cycled; 33% took public transport and 50% used private transport. Identified barriers to walking, in order of importance, included distance (55%), traffic (40%), weather conditions (25%), personal safety (20%) and other factors (25%). Only 16% of parents reported an absence of barriers. Among them, a significant portion allowed their children to walk (64%) or cycle (21%) to school at least once a week. Hence, reduction of identified barriers (perceived or real) could facilitate an increase in the numbers of children walking and cycling to school (National Center for Chronic Disease Prevention and Health Promotion, 2002).

A similar English study by Young Transnet (2002) surveyed 40,000 primary and secondary school students online about their travel to and from school and found that approximately half walked or cycled, and the other half used public or private transport. The main barriers identified to walking to school included distance, heavy traffic, unsafe road crossings, lack of company, poor footpath condition and lack of lockers.

Local authorities use research findings such as the above to help facilitate children's independent access to schools within local communities. Traffic concerns can be addressed, safe routes can be mapped, and involvement of parents in 'Walk to School' programmes can be implemented in response to identified concerns (National Center for Chronic Disease Prevention and Health Promotion, 2002).

Why focus on walking to and from school? As well as increasing levels of physical activity, walking helps to increase independence, physical development and self-confidence (Cycling Promotion Fund, 2002). As a secondary benefit, it might also decrease the number of cars on the road; so alleviating both traffic and pollution worries among parents (Carlin et al., 1997). The habits formed in children from walking to school could also carry over into other incidental activities, such as walking to the shops or to the park. The social aspect of walking to school is also beneficial, since it can help facilitate neighbourhood interactions among both adults and children (National Center for Chronic Disease Prevention, 2002). 'Walk to School Day' is an international event organized as a safe and fun way to encourage children to make walking a part of their daily

routine (Pedestrian Council of Australia, 2003). Yet occupational therapists have had limited professional involvement in health promoting activities such as walking to school. With better information, they can work with school communities, town planners and local authorities to address the barriers to more activity-friendly environments for children. School, as one of the most important community resources for children and their families, is an obvious place to start.

Method

The aim of the present study was to ascertain whether or not children under favourable circumstances walked to school and why. To this end, the study was exploratory and correlational with a dichotomous dependent variable walking/not walking to school becoming the cornerstone of the analysis. Demographic, social and environmental information was sought by way of explanatory independent variables.

Participants

Participants were 164 students in Grades 1–7 (Mean age 9.1 ± 2.02 years), from a metropolitan state primary school in Brisbane, Australia. They comprised 76 boys and 88 girls. All children attending the school were invited to participate. Situated in a middle to upper middle class residential area (Australian Bureau of Statistics, 2000), this school had a number of features that could be considered facilitative of children walking, based on ecological models (Saelens et al., 2003). First, it had limited traffic concerns. Apart from a major road on one boundary the remainder of street access routes were quiet and residential. Second, the surrounding topography was relatively gentle with only a few streets where the gradient was in excess of 1:14. Finally the school had recently been promoting a walk-to-school programme, which had the support of the local council. The only factor that could mitigate against ambulatory access was that the school had a broad geographical catchment area. Therefore while the majority of children lived within a 5 km radius, there were some who lived up to 15 km away. It should be noted that in Australian public schools there is generally no school transport provided.

Measures

Survey information was collected using categories defined by the National Center for Chronic Disease Prevention and Health Promotion (2002) and Young Transnet (2002). As no targeted survey was in existence, validity was based on the findings from these two studies. Parents were asked to identify factors they felt facilitated or hindered their child walking to and from school. The survey took approximately 15–20 minutes to complete. It consisted of 34 items, which required either a multiple-choice response or a judgement using a rating scale. Questions comprised demographic information about the child and family, such as the child's name, age, grade, address, number of siblings, approximate distance lived from the school and parents' hours of work. With respect to children walking to school, parents were asked to comment on a range of psychosocial and environmental concerns. The psychosocial factors related to safety, the demands of extra-mural commitments and availability of a walking companion. These elements were rated on a 4-point scale, with 1 indicating great concern and 4 no concern. Environmental factors, such as traffic, school bag weight, available shelter, footpath condition and pollution, were also rated on a 4-point scale as outlined above. Children's level and enjoyment of physical activity were assessed using a 5-point scale (1 = very high, 2 = high, 3 = average, 4 = low, 5 = very low) and the importance of physical activity to the parents was rated using a 3-point scale (1 = very important, 2 = somewhat important, 3 = not important).

The survey was administered to a small sample ($n = 10$) of parents on two occasions, one week apart to determine test–retest reliability. For all the items where a rating scale was utilized intra-class correlations were calculated and reached a highly acceptable level of between 0.89 and 0.99.

Procedure

After obtaining ethical clearance from the Ethics Committee of the School of Health and Rehabilitation at The University of Queensland and approval from the school principal, surveys were distributed to the parents of all children by inclusion in the weekly newsletter. A letter of explanation of the study accompanied the survey, providing background and contact information. Parents were requested to return the surveys to the school within

two weeks, and reminders were issued in the newsletter. In total 360 surveys were distributed and 164 returned (a response rate of 46%). Upon receipt of the surveys, the names of participants were replaced by codes to ensure confidentiality.

Data analysis

Descriptive (means and standard deviations) and inferential statistics were calculated using SPSS for Windows version 11.0. Initially, Chi square tests were used to determine statistical significance between the proposed barriers and whether or not children walked to school. Logistic regression was then employed to analyse further the dichotomous dependent variable, walking to school. The dependent variable had two levels; walking to school at least once per week, and never walking to school. In this case backward logistic regression was used to model the log odds ratio of the child ever walking to school. Individual explanatory variables were tested and removed using a backward step process.

Results

The mean number of days walked to school in a week by all the children was 1.00 ± 1.62 . With respect to walking home, the mean number of days was 1.16 ± 1.69 . The frequency with which children from individual grades walked to and from school is summarized in Table 1. There was no statistical difference on the basis of age or gender for either walking to school or home from school. For the purpose of further analyses, therefore, performance was collapsed across both. As walking to school was significantly associated with walking home from school, subsequent analyses adopted the former as the dependent variable.

Psychosocial factors

Psychosocial factors found to impact on whether children ever walked to or from school (at least once per week) were: parents' perception of the importance of physical activity; whether parents themselves had walked to school; whether parents worked; parental concern about children walking without the company of another child; concern about a child's personal safety; and concern about outside commitments (i.e. music lessons, sporting activities). These results are summarized in Table 2.

Backward logistic regression analyses using the likelihood ratio test were then carried out to determine the relative impact of these psychosocial factors on whether children ever walked to or from school (i.e. using the dichotomous dependent variable). Parent concern about children walking without the company of another child, identification of outside commitments and whether parents worked, respectively, had the least significance (see tables for statistics). Two psychosocial factors were found significantly to impact on walking to school: whether both parents had themselves walked to school and whether both parents considered physical activity important (see tables for statistics).

TABLE 1: Means and standard deviations of number of days walked to and from school for each grade

Grade ^a	Students	Walk to school ^b		Walk home ^b	
		Mean	(SD)	Mean (SD)	
1	28	1.32	(1.81)	1.21	(1.81)
2	19	1.16	(1.90)	1.26	(1.97)
3	21	0.57	(1.12)	0.67	(1.24)
4	24	0.58	(1.21)	0.58	(1.32)
5	27	1.26	(1.85)	1.30	(1.84)
6	24	0.83	(1.52)	1.58	(1.77)
7	21	1.19	(1.75)	1.48	(1.66)
^a Grade at primary school					
^b Number of days walked to/from school per week, range 0–5					

TABLE 2: Summary table of Chi square analysis of psychosocial factors impacting on children walking to school

Factor	χ^2	df	p
Both parents working	6.2	2	0.05
Child's level of physical activity	0.9	4	0.9
Child's enjoyment of physical activity	1.4	3	0.7
Whether parents walked to primary school	6.8	1	0.009
Stated importance of physical activity to parents	7.3	1	0.007
Parent concern about child's personal safety	9.3	3	0.03
Parent concern about lack of adult company	0.05	1	0.8
Parent concern about lack of child company	6.4	1	0.01
Outside commitments	11.7	4	0.02
Child's attendance at after-school care	10.5	5	0.06

Environmental factors

Environmental factors found to have a statistically significant impact on walking to or from school were parent concern about traffic and distance lived from the school (see Table 3). Distance was divided into three categories (≤ 1 km, 1.1–3 km, > 3.1 km), and percentages of children walking for each distance category were 61.5% (n = 45); 26.7% (n = 16); and 7.9% (n = 3), respectively. The mean distance the children lived from the school was 3.0 ± 3.89 km, and 140 children (85%) lived within a 5.0 km radius of the school.

A two-sided Chi square test revealed parental concern about 'other factors' not listed in the survey had a statistically significant impact on the number of days children walked to or from school. These other factors were as diverse as perceived level of maturity of the child to lack of appropriate public transport. There was therefore no single issue but a range of smaller ones that parents identified in this category.

Using the backward elimination procedure to determine the relative impact of these environmental factors, distance was found to have a substantial impact on walking to school. 'Other factors' also influenced walking to school but, as indicated above, they are difficult to interpret. Table 4 summarizes these results.

TABLE 3: Summary table of Chi square analysis of environmental factors impacting on children walking to school

Factor	χ^2	df	p
Distance	45.5	1 0	0.000
Concern about traffic	14.6	3	0.002
Concern about school bag weight	6.1	3	0.1
Concern about available outside shelter	0.2	1	0.7
Concern about manned crossings	0.1	1	0.7
Concern about pollution	1.8	3	0.6
Concern about other factors	16.4	1	0.000

TABLE 4: Summary table of logistic regression analysis of psychosocial and environmental factors affecting child's walking to school

Predictors	OR	CI ^a	p	
Whether parents walked to primary school	0.31	0.77–1.25	0.07	
Parents' importance of physical activity	0.38	0.17–0.86	0.02	
Walking distance	0.54	0.35–0.74	0.001	
Other factors	0.32	0.13–0.80	0.01	
Model summary				
	-2 Log likelihood	Cox & Snell R ²	Nagelkerke R ²	df
(Step 4)	125.6	0.3	0.4	1
^a CI = 95% confidence interval				

Discussion

By way of a voluntary survey we undertook to determine the extent to which young Australian schoolchildren are currently walking to and from school in what was identified as a favourable social and environmental context. Results could therefore represent those of a self-selected group of respondents and cannot be assumed to be representative of the target school community as a whole or of other schools. It was determined that, from the 164 responses, only 64 children (39%) ever walked to school. This finding is similar to the results reported by Zaccari and Dirkis (2003) for children of similar ages in a Sydney school community. The tendency for children to walk to school is seemingly low and, based on the current findings, only occurs on average once per week.

As with studies in the US and England (National Center for Chronic Disease Prevention and Health Promotion, 2002; Young Transnet, 2002) the distance children lived from school was found to have the most significant impact on walking to school. The lack of a defined proximal geographic catchment for the school in this study may therefore have had a major bearing on the results. While most primary schools in Brisbane have a distinct and localized catchment area, this school did not due to the presence of a special education unit. While none of the respondents indicated that his or her child had a disability and may therefore have self-selected out of the survey, the fact that parents of children outside the immediate vicinity also chose to send their children to this school and not to a closer school may have influenced the findings. What we do not know is what are reasonable distances for children to walk at various ages. This insight, coupled with information on public transport availability and road systems, would help to inform communities about the accessibility of schools.

The literature suggests that the choice to use non-motorized transport (walking or cycling) is largely driven by proximity and connectivity (directness of travel) (Frank, 2000). While proximity considers straight line distances between venues, connectivity characterizes the ease of moving between origin and destination within the existing street and pathway structure. Connectivity is high when streets are laid out in a grid pattern and there are few barriers (e.g. walls, roads). By contrast, low connectivity is found in the layout of some modern suburbs, which utilize few intersections and have a number of cul de sacs (Randall and Baetz, 2001). In this study parents were asked to estimate proximity; it would be useful in future studies also to look at connectivity as a covariate in the analysis. Methods to evaluate pedestrian connectivity have been developed (Randall and Baetz, 2001) and should be considered in further research. The more information that can be provided to enhance our understanding of the various health benefits of different design features, the more accessible the environment will be for everyone.

Apart from the distance from school, parents' own perceptions of significant factors impacting on their children walking to school were identified. They included parents' own history of transport to school, perceptions of the importance of physical activity in their own lives and those of their children, concerns about traffic, and concerns about personal safety. As in a number of other studies, what has emerged here is that the views held by parents can have a significant impact on the physical lifestyles

of their children (Lindquist et al. 1999). The importance of parental attitude and modelling shows that any attempt to increase incidental physical activity in children needs to adopt a family focus. Once convinced of the benefits of increasing the amount of exercise that their children can gain by walking, parents can also serve as a powerful lobby group with local authorities to improve paths, traffic conditions and general safety concerns.

Future directions

Occupational therapists need to look beyond working with individuals in school settings to looking at ways in which they can maximize occupational performance for communities. With respect to incidental physical activity this means collaborating with town and transport planners to advocate the importance of accessible and participation-friendly environments. In extending the current investigation we have some clear directions. First, controlling for factors such as topography and physical barriers, a comprehensive series of pan-metropolitan studies of children walking to school needs to be mounted. They should investigate residual elements such as socioeconomic status, household routine (e.g. parent drop-offs en route to work; non-working parent/s with spare transport capacity), car ownership, influence of family supporters, routing and frequency of public transport, previous accidents and injuries and so on. In this way, the jigsaw of variables including climate, ethnicity, urban population density and income can be assembled.

Extensions of walking studies could, of course, be envisaged, as older children cycle or take public transport to cover greater distances to and from school (Carlin et al., 1997). Either of these transit modes is more physically demanding than just being driven. Allied studies can thus be beneficial in designing policy interventions. It is useless to propose ill-researched remedies or those that are likely simply to be ineffective or inefficient. Targeted measures are always the most prospective, developed either in situ in school communities or as a follow on from wider metropolitan health education and transportation policies (e.g. walk to school/work campaigns, encouragement of use of public transport, restrictive measures on car use or, more broadly, densification and urban consolidation programmes).

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