

Fifth National Physical Activity Conference 13-15 Oct 2005

The Young and the Restful (Re-Visited) - The Effects of Recreational Choices and Demographic Factors on Children's Participation in Sport.

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ABSTRACT

The increasing incidence of obesity among children and young adults is of major concern to governments. This has led to the conduct of a range of current research to support the development of policies and programs to address this issue. These include addressing the question of the amount of time children spend on sedentary activities such as watching television and playing computer games; whether there are socio-economic factors that are associated with non-participation in sport or physical activities; and whether it is possible to define a typology of and to classify children based on an analysis of their recreational choices.

To further inform this debate we present the findings of a statistical analysis of information collected in the Australian Bureau of Statistics survey of Children's Participation in Selected Culture and Leisure Activities. This survey, conducted in 2003, collected information on participation in organised out-of-school hours sport, in cultural activities (music, singing, dancing and drama lessons) and a range of leisure activities - arts and crafts, reading, watching television, playing electronic and computer games, bike riding and skateboarding or rollerblading. Information on the family type of the household (one parent, couple etc), labour force status of the parent(s) and the socio-economic index of advantage/disadvantage was also compiled.

Through a multivariate logistic regression model, we quantify a number of associations between participation in organised sport and participation in the other leisure activities, together with some socio-economic characteristics of participants. The model estimates the likelihood of participation given the explanatory variables and so enables those with low levels of participation to be better defined. This in turn enables the development and targeting of policies aimed at increasing participation in sport and related physical activities.

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THE YOUNG AND THE RESTFUL (REVISITED) – THE EFFECTS OF RECREATIONAL AND DEMOGRAPHIC FACTORS ON CHILDREN’S PARTICIPATION IN SPORT

INTRODUCTION

Participation in organised activities is an important element of a child's social development with cultural activities enriching the learning process and contributing to current and future wellbeing. Participation in organised sport, as a subset of broader physical activity, is also important for the development of motor coordination skills, teamwork and physical fitness. As an aspect of physical health, participation in physical activity is directly related to current concerns over the incidence of obesity in the child population.

To inform policy development in these areas, the Australian Bureau of Statistics (ABS) conducts a Survey of Children's Participation in Selected Culture and Leisure Activities. Information is collected on participation in organised sport, organised culture activities (music, singing, dancing and drama lessons) and leisure activities (skateboarding or rollerblading, bike riding, watching television or videos, playing computer or electronic games, other computer and Internet use, art and craft activities and reading for pleasure). Questions are also asked about the number of times and the hours that the child participated in sport and cultural activities and the hours spent on the leisure activities. The survey was conducted in 2000 and 2003 and is being repeated in early 2006.

This paper is an update of findings presented in a paper at the Australian Social Policy Conference in July 2005. That paper examined the key characteristics of child participants and non-participants in organised sport, and sought to identify whether there are any trade-offs between time spent on sport and time spent on other recreational activities. The earlier paper focused on the first issue - participation and non-participation - while this update adds some supplementary data on the duration and frequency of participation for those children who played organised sport.

The analysis uses the results from the 2003 survey and originates from an agreed work program negotiated between the ABS and the Standing Committee on Recreation and sport (SCORS) Research Group (SRG). SRG consists of representatives from the Sport and recreation agencies in each state and territory, the Australian Sports Commission and the Commonwealth Department of Communications, Information Technology and the Arts and who have a partnership agreement with the ABS relating to the collection of statistics and research into sport and related recreational physical activity.

SRG currently has priorities that focus on participation in sport and physical recreation by children and adults and the barriers and motivators for participation. In regard to children, the interest relates to participation in both organised and non-organised physical activity and on the other recreational activities that compete for a child's time. The results from the survey are thus a key source of information that enables both SRG and other users to develop programs relating to participation in sport and physical activity by children.

Children's participation in sport and physical activity

Governments and health authorities continue to express concern about the increasing levels of obesity and physical inactivity in the child population and the consequent long-term health problems as children develop into adulthood. Research has indicated that the proportion of overweight Australian children doubled and the proportion that was obese tripled between

1985 and 1995 and that currently, the indication is that around 24% of boys and 26% of girls are overweight or obese (Magarey et al, 2001, Dollman et al, 1999). There is also the continuing debate about the relative impacts of diet and lifestyle as opposed to exercise, although all agree that it is a surfeit of energy intake over energy use that is the cause of the problem.

At the same time, children now have access to a wide range of developmental and recreational activities and there is some expectation that they will devote appropriate amounts of time to a range of these as well as complete homework, undertake some paid or unpaid work or assist with household chores. It has been reported that children do manage to find time for a range of activities and that they see these as coexisting rather than being exclusive (MacDougall et al, 2002). Being time-poor is not only a characteristic of busy adults and there is still the issue of whether they are choosing an appropriate lifestyle for a developing childhood. This is clearly expressed in the research that has addressed the amount of time children spend on screen-based activities such as watching television and videos and playing computer and electronic games rather than more active recreational activities. For example, it has been reported that over half of all children aged 5–14 years are spending more time watching television and videos than in the school classroom and that the main competitor for physical activity is screen time (Olds et al, 2004). Related research has drawn the link between television viewing in childhood and being overweight, unfit and having raised cholesterol in adulthood (Hancox et al, 2004) and that the incidence of obesity is highest among children who watch four or more hours of television a day and lowest among children watching an hour or less a day (Anderson et al, 2001).

The results of this and other research and the subsequent concerns over children's activity patterns have led to the recently released national guidelines for physical activity by children.

Physical Activity recommendations for Children and Youth:

- 1. Children and youth should participate in at least 60 minutes of moderate to vigorous intensity physical activity every day.*
 - 2. Children and youth should not spend more than 2 hours per day using electronic media for entertainment (eg computer games, Internet, TV), particularly during daylight hours.*
- (Australian Health Ministers Council, 2004).

The ABS children's participation survey can provide data on screen-based activities, sport and other recreational pursuits that are relevant to these policy guidelines. However information to assist in understanding the behaviours - the barriers and motivators - behind participation are also important. There is a suggestion in the various policy statements from government recreation agencies that it is easier to encourage and facilitate more exercise than it is to change eating habits; although it is noted that health agencies put considerable effort into promoting healthy eating - both by children and adults. Clearly, both programs aimed at exercise and programs aimed at diet require information on behaviour and attitudes.

Programs to facilitate and increase participation in sport have many of the attributes of other social marketing campaigns. Social marketing theory recognises that in order to influence lifestyle behaviour, an understanding of motivation as well as behaviour is needed. It also recognises that it is important to first identify the target groups and that even within participation groups, different children and different groups of children have different reasons and at different times for participating or not participating in sport or physical activity. The Australian Sports Commission recognised this in a review of community sport programs *"...Target Populations could be quite easily identified but that the delivery of physical activity*

was not generally tailored specifically to the identified groups." (Cormack, 1999) as did the South Australian Child and Youth Health study into obesity (Vaska and Volkmer, 2004) that was publicly reported on in 2005 "... we have vast differences in different areas of the State ... There was nothing in the world that we could find that would lead us to expect this ... It shows us one size fits all won't necessarily work" (The Advertiser, 18 Feb 2005).

It is hoped that the results of the children's participation survey and this analysis can be used to assist in identifying and quantifying target groups - in this case children with low levels of participation in organised sport - and contribute to understanding the nature of sport and recreational activities undertaken by children.

METHODOLOGY

Survey of Children's Participation in Selected Culture and Leisure Activities

The survey was conducted in April 2003 as a supplement to the monthly labour force survey. The scope of the survey was children aged 5-14 years who were usual residents in private dwellings and information was obtained from any responsible adult in the household who was asked to respond for up to three children in the household. Where there were more four or more children in this age range, three children were randomly selected for the survey.

The survey was conducted over a two-week period with information collected on the hours of participation relating to the most recent two school weeks prior to the interview and information on the frequency of participation relating to the previous twelve months. About 80% of the interviews were conducted by telephone with the remainder being face-to-face interviews.

The monthly labour force survey is a multi-stage area sample of private dwellings (of about 30,000 houses, flats, etc.) and a list sample of non-private dwellings (hotels, motels, etc.). This covers about 0.45% of the population of Australia. Both urban and regional areas of all state and territories are included in the sample but very remote parts of Australia are excluded. The exclusion of these areas has only a minor effect on the aggregate estimates, with the exception of estimates for the Northern Territory where children aged 5-14 years living in very remote areas account for 22% of the population of children aged 5-14 years.

The response rate for the survey was 95.1% and this enabled information to be collected about the activities of 8,900 children living in the surveyed households. A ratio estimation procedure was then applied to the data to conform to an independently estimated state by age by sex distribution and so derive the final estimates.

The information on participation in organised sport was collected by asking an open question:

"The next few questions are about participation in sports organised by a school, club or association outside school hours"

"Since this time last April, has ... played or trained for a sport outside school hours?"

The question was restricted to organised out-of-school sport as this was able to be easily understood by respondents. It is also an activity that generally requires support from the parents and commitment by the child and so represents a behaviour that can be reported by the parents.

An open question was then asked about the sports in which the child participated with subsequent questions about the hours in the past two weeks and the number of times in the last twelve months that the child participated in each of up to three sports. The questions on organised culture activities (music, singing, dancing and drama), on leisure activities (skateboarding or rollerblading, bike riding, watching television or videos, playing computer or electronic games, art and craft activities and reading for pleasure) and on other computer and Internet activities were specifically prompted.

Further information on the survey, including the standard error of the estimates, is included in the publication Children's Participation in Selected Culture and Leisure Activities (ABS catalogue no 4901.0).

Multivariate analytical method

A multiple logistic regression analysis has been used. This estimates the odds (or likelihood) of an event occurring given a set of explanatory variables. In this case, the likelihood of children participating in organised out-of-school sport, given selected leisure activities and socio-economic-demographic variables is modelled. The second part of the analysis seeks to identify any associations with either duration or frequency of participation, and is undertaken with non-participants removed from the model.

The dependent variable

Even though the model focuses on participation in organised sport rather than a broader category of physical activity, information on some of the other activities collected in the survey might be considered to complement, or be a substitute for, participation in organised sport. Dancing is another important organised physical activity more commonly undertaken by girls. The 2003 data on sport, on its own, shows that boys have a much higher rate of participation than girls (68.6% and 54.2% respectively). However, when dancing is taken into account, the rates of participation in sport and/or dancing are 69.0% for boys and 64.3% for girls. The dependent variable has therefore been specified to include participation in organised sport and/or organised dancing.

The other leisure activities in the survey also include "active" components, eg bike riding and skateboarding or rollerblading. However these have not been included in the dependent variable due to their non-organised nature which did not fit with the overall construct being assessed. The relationship of these variables to participation in organised sport was tested in the model as explanatory variables.

In using logistic regression analysis, the dependent variable is defined with only two categories and was therefore specified as:

- *Participation - whether the child participated in organised sport or organised dancing at all in a 12-month period.*

References in this report to "participation in organised sport" consequently include participation in organised dancing unless otherwise stated.

The base case

The specifications for the base case sought to identify an average or typical situation and also the likely significance of other items relative to this. Results from the model are all expressed relative to this base case and it should be noted that a different base case does not change any results; only what the explanatory variables are relative to. The base model was specified as:

- A male child, aged eight to eleven years;
- Living in NSW;
- In the middle or third SEIFA quintile;
- In a couple family where one parent was employed;
- Where the child and the parents were born in Australia;
- The child did not participate in any cultural activities (music, singing or drama);
- Did not participate in bike riding, skateboarding or rollerblading;
- Did not play any computer games;
- Used a computer or the Internet at home and
- Spent less than twenty hours in the previous two weeks watching television or videos.

The explanatory variables

All the data items collected in the survey were tested in the model to examine their association with participation in organised sport. However, only those variables that had a significant effect were included in the final model. Variables that were not significant and have been excluded are "reading for pleasure" and "arts and crafts."

The explanatory variables included in the model are all expressed as categorical variables that define particular groups. The categories used for the explanatory variables are those which have been found to provide the best fit in the multivariate model (sometimes after repeated testing using different groupings). An example of this is age, where the categories included are 5-7 year olds and the 12-14 year old age group (8-11 year olds form part of the base case). These groups have been chosen based on how differently various combinations behaved statistically in relation to sport participation, how many observations were in each group as well as attempting to retain consistency with other reports.

Another example of a grouping is the variable "hours watching television or videos". In the model, this variable was grouped into the broad categories of "up to 20 hours", "20-39" hours and "40 or more hours" watching television or videos over the past 2 weeks. For up to twenty hours in the past two weeks, there is no significant association with participation in sport and so this was included in the base case and the explanatory variables defined as 20-39 hours and 40 hours or more.

The socio-economic index of relative advantage/disadvantage (SEIFA) derived from the 2001 Census is also included in the model. The value of the index included in the model is expressed in quintiles, that is, the index values are ranged into five classes. In the second part of the analysis, non-participants were excluded and the data on duration and frequency were modelled as ranged variables. Hours were specified as three or more, five or more and ten or more hours in the previous two weeks, and number of times as 13 or more, 27 or more, 53 or more and 105 or more times in the previous twelve months. Overlapping ranges were deliberately chosen to identify any associations between the explanatory variables and increasing duration or frequency of participation. Each of these ranges requires a separate logistic model - three for duration and four for frequency. Including the initial model of any participation, there are a total of eight sets of data available from the overall analysis.

The duration and frequency data were also modelled as continuous variables. That is, the information on hours participated and number of times participated was modelled from 1 to 99 hours and from 1 to 999 times respectively. However, this did not provide a good statistical fit

and so only the ranged variables were used for the analysis of duration and frequency of participation.

The final variables chosen are shown in table 1 and the participation rates for these are included in the appendix.

Table 1: Explanatory and base case variables

SOCIO-DEMOGRAPHIC VARIABLES
Age 5-7 years 8-11 years (base case) 12-14 years
Sex Female Male (base case)
Family type and employment status of parents Couple family, both parents employed Couple family, neither parent employed Couple family couple, one parent employed (base case) Single parent family, employed Single parent family, not employed
Birthplace of child Child born overseas Child born in Australia (base case)
Birthplace of parents Parents born in non-English Speaking Countries Parents born in Australia or English speaking country (base case)
Socio-Economic Indicator For Areas (SEIFA) SEIFA 1 st (lowest) quintile SEIFA 2 nd quintile SEIFA 3 rd quintile (base case) SEIFA 4 th quintile SEIFA 5 th (highest) quintile
State or Territory NSW (base case) VIC QLD SA WA TAS NT ACT

Table 1 (cont): Explanatory and base case variables

LEISURE ACTIVITY VARIABLES
Playing computer games, hours in last 2 weeks No participation (base case) Played computer games 1-4 hours Played computer games 5 hours or more
Use of computer or Internet at home in last 12 months Did not use a computer or Internet at home Used a computer or Internet at home (base case)
Watching TV or videos, hours in last 2 weeks Watch TV 0-19 hours (base case) Watch TV 20-39 hours Watch TV 40 hours or more
Physical recreation
Skateboarding and rollerblading, hours in last 2 weeks No participation (base case) Skate 1-4 hours Skate 5 hours or more
Bike riding, hours in last 2 weeks No participation (base case) Ride bikes 1-4 hours Ride bikes 5 hours or more
Culture activities, hours in last 2 weeks No participation (base case) Culture activities 1-4 hours Culture activities 5 hours or more

Interpretation

The model identifies the key associations between sport participation (the dependent variable) and a range of socio-demographic and other characteristics (the explanatory variables), with the output being an odds table showing the likelihood of participating in sport compared to a base case. For example, a child aged twelve to fourteen years has an odds ratio of 0.79. That is, the odds of participation for a twelve to fourteen year old is 0.79 times that of a child with the base case characteristics - in this model, a child aged eight to eleven years and taking into account participation in the other leisure activities and the socio-economic characteristics. Values less than one are associated with lower levels of participation - children with these characteristics are less likely to participate in sport or dancing. Odds ratios of more than one mean that these children are more likely to participate, and odds ratios that are not significantly different from one indicate that children with these characteristics are equally as likely to participate as children defined in the base case.

The odds ratio for each explanatory variable takes into account the effect of the other variables. For example, the association between sport participation and parental employment (also an indicator of socio-economic status) given by the odds ratio for this variable already accounts for the effects of other socio-economic indicators, eg the SEIFA quintiles.

The dependent variable of participation in sport or dancing is defined as any participation over the previous twelve months whereas the explanatory variables that are based on other recreational activities relate to whether these were undertaken in the previous two weeks.

When interpreting the model, it is assumed that the two-week "snapshot" for which participation in these other activities is reported is indicative of participation over the previous twelve months and so can be extrapolated to enable the relationship with sport participation to be understood. The association between the explanatory variables and the frequency and duration of participation in sport (number of times over the previous twelve months and hours in the previous two weeks) requires further analysis and is the subject of phase two of this project.

RESULTS

The results of the model for the dependent variable of participation are summarised in table 2. This shows the odds ratio or likelihood of participating in sport for each of the explanatory variables relative to the base case. They are presented in order of their relative importance in relation to increasing or decreasing participation. The comments following are presented in the same order.

More detailed data from the model, including the confidence limits for the odds ratios and the size of each estimate are included in the appendix.

Table 2: Odds ratios for participating in sport

Rank order	Odds ratio
Couple family, neither parent employed	0.39
Single parent family, parent unemployed	0.51
Did not use a computer or the Internet at home	0.55
Child born overseas	0.58
Parent(s) born in non-English speaking country	0.60
SEIFA - 1 st (lowest) quintile	0.61
Age 5-7	0.61
Female	0.69
Queensland	0.72
Aust Capital Territory	0.73
TV or videos 40 hours or more	0.78
Age 12-14	0.79
Single parent family, parent employed	0.84
TV or videos 20-39 hours	0.89
Northern Territory	not significant
SEIFA - 2 nd quintile	not significant
Tasmania	not significant
Bike riding 5 hours or more	not significant
SEIFA - 4 th quintile	not significant
Skateboarding/rollerblading 5 hours or more	not significant
Played computer games 5 hours or more	not significant
South Australia	not significant
Victoria	not significant
Western Australia	1.19
Culture activities (excl dancing) 5 hours or more	1.24
Played computer games 1-4 hours	1.28
Bike riding 1-4 hours	1.30
Skateboarding/rollerblading 1-4 hours	1.50
Couple family, both parents employed	1.52
Culture activities (excl dancing) 1-4 hours	1.59
SEIFA - 5 th (highest) quintile	1.74

Family type and parental employment

Where both parents were employed, 72% of children participated in organised sport or dancing compared to 32% of children in couple families where neither parent was employed. Similarly, in one-parent families where the parent was working, 66% of children participated in sport compared to 44% of children where the single parent was not working.

The multivariate results confirm that there is a strong association between family type and the employment status of parent(s) and participation in organised sport. Children in couple families where both parents are working have a high odds ratio (1.52) and are more likely to participate than children in couple families with one parent working. On the other hand, children in couple families where neither parent is working have the lowest odds of participating (0.39). In single parent families where the parent is employed, children are also less likely to participate (odds ratio of 0.84) and less likely again where the single parent is not working (odds ratio of 0.51).

These results indicate that the employment status of the parents has a greater impact on the likelihood of participation compared with whether the child lives in a one parent or two parent family.

Socio-economic index of advantage/disadvantage

Amongst families in the highest SEIFA quintile, 81% of children participated in some organised sport or dancing, while for families in the lowest quintile, 52% of children participated.

The multivariate model shows a strong relationship between SEIFA and participation with the most advantaged quintile having an odds ratio of 1.74 compared to 0.61 for the lowest quintile. This result is consistent with the association between family type and parental employment and participation and should not be surprising given that employment is one of the factors included in the index of advantage/disadvantage. However, as the multivariate model accounts for the unique contribution of each variable, this is not simply a duplication of the effect of parental employment, but rather an indication that SEIFA must be contributing to the likelihood of participation in some other way.

Screen-based activities

Of the three screen based activities included in the analysis, the use of a computer or the Internet at home has the strongest relationship with sport participation, followed by hours playing computer games and the hours spent watching television or videos. Children who use a computer or the Internet at home as well those spending some time playing computer games are more likely to be participants in organised sport, while the reverse is true for children who watch television.

Use of a computer or the Internet at home

The majority of children used a computer or accessed the Internet at home. However there were a group of children for whom it was reported in the survey that they did not use a computer nor access the Internet at home (note that these children could have used a computer or accessed the Internet at other locations, eg at school or a library). These numbered 482,000 or 18% of the child population. Of this number, 45% participated in organised sport or dancing and this group were less likely to participate in sport (odds ratio of 0.55) after taking account of all the other variables.

Playing computer games

A total of 70% of all children played computer games in the last two school weeks preceding interview with the mean time spent playing these being 9.0 hours for boys and 5.3 hours for girls. The model shows that those who played these games for up to five hours per fortnight are more likely to play sport (odds ratio of 1.28) than those who did not play these games at all. However children who played computer and electronic games for more than 5 hours are equally as likely to participate in sport.

Watching television or videos

The survey showed that nearly all children (98.2%) spent some time watching television or videos with the mean hours spent on this activity in the previous two school weeks being 22.3 hours for boys and 21.4 hours for girls. Over a third (967,000 or 37%) watched television for 20-39 hours and 380,000 or 14% watched for forty hours or more. The model shows that there is an association between participation in sport and watching television or videos, with those children who watch for 20-39 hours being less likely to participate (odds ratio of 0.89). Those watching for more than 40 hours are even less likely to participate (odds ratio of 0.78).

Birthplace

Relatively small numbers of children were identified as being born overseas (166,000 or 6% of the child population) or as being from families where the parents were born in an overseas non-English speaking country (325,000 or 12%). These children, however, had noticeably lower overall rates of participation (49% for children born overseas and 39% where the parents were born in an overseas non-English speaking country). Both variables have a significant association with participation with these children being less likely to participate in sport (odds ratios of 0.58 and 0.60 respectively). There may be cultural as well as settlement reasons behind this lower tendency to participate and information such as year of arrival, country of birth, language/proficiency in English and settlement issues would assist in further examination of this target group.

Organised cultural activities

There is a significant association between participation in organised cultural activities and participation in organised sport with those involved in cultural activities for 1-4 hours per fortnight being more likely to participate (odds ratio of 1.59) in organised sport or dancing. Those who were involved in these activities for five hours or more also were more likely to participate (odds ratio of 1.24).

Age and sex

The age and sex differences are clear with girls being less likely than boys to participate in sport and those in the younger and older age groups (5 to 7 years and 12 to 14 years) also being less likely to participate (odds ratios of 0.61 and 0.79 respectively).

Physical recreation activities

Bike riding and skateboarding or rollerblading, when undertaken for modest amounts of time (one to five hours) has a positive association with participation in sport or dancing. Children involved in skateboarding or rollerblading for 1-4 hours are more likely to participate in organised sport or dancing (odds ratio of 1.50). Similarly, children who participate in bike riding for 1-4 hours are more likely to participate (odds ratio of 1.30).

Children who participate in bike riding, skateboarding or rollerblading for five hours or more are equally likely to participate in sport as those who do not undertake these activities at all.

States and territories

There are no significant differences in the odds ratios of participation by children within the states and territories other than for children in Western Australia and Queensland - children in Western Australia are more likely to participate (odds ratio of 1.19) and those in Queensland are less likely (odds ratio of 0.72). These states also have the highest and lowest rates of participation overall (71.5% and 59.0% respectively).

The situation with respect to the Australian Capital Territory requires some discussion. The raw data show that children in the ACT have an overall rate of participation in sport or dancing of 66%, which is similar to the average of 66.5% for all states and territories. The model however, suggests that children in the ACT are less likely to participate (odds ratio of 0.73). This apparent contradiction is related to the socio-economic characteristics of those in the ACT. Put simply, the higher incidence of relative advantage in the ACT, taking into account the other explanatory variables, suggests that children in the ACT probably ought to have a higher rate of participation. This is illustrated by examining the odds ratios for the states with SEIFA removed (table 3).

Table 3: Odds ratios for participation in sport - state and territory and the effect of SEIFA

	Odds ratio	
	With SEIFA	Without SEIFA
Victoria	1.09*	1.09*
Queensland	0.72	0.67
South Australia	1.02*	0.96*
Western Australia	1.19	1.16*
Tasmania	0.97*	0.80
Northern Territory	0.75*	0.83*
Aust Capital Territory	0.73	1.09*

* insignificant at the 95% confidence level

From this it can be seen that SEIFA has little impact when comparing the states, except for the ACT and Tasmania. Excluding SEIFA, the likelihood of participating in the ACT is much closer to one, whereas those in Tasmania become less likely to participate. This suggests that socio-economic effects that ordinarily tend to decrease the likelihood of participation do not have the same influence in Tasmania when compared to the other states.

Duration and frequency of participation

The second part of the analysis sought to identify any characteristics that may be associated with varying levels of participation. This used the information on the hours of participation in sport (over the previous two weeks) and the number of times participated over the previous twelve months.

As outlined in the methodology, three separate analyses were undertaken with different cut-off points for hours of participation in a two week period, and four analyses with different cut-off points were undertaken to examine frequency of participation in the last twelve months. These analyses excluded non-participants, so they only examined the way in which the explanatory variables related to the hours or frequency of participation for those who participated.

Table 4 below shows the overall direction of the results for the duration and frequency analyses, and compares this to the results from the participation model. In a small number of

cases, the different cut-off points used (i.e. 3 hours or more, 5 hours or more, etc. and 13 times or more, 27 times or more, etc.) resulted in relationships with opposing directions. These "mixed" results were found for "single parent not employed" and for "hours spent on computer games" in the duration models.

The categories that showed a consistent decreasing or increasing probability of greater hours or frequency of participation are labelled accordingly. However, the table does not distinguish between those categories where the findings were consistent for all three duration analyses or all four frequency analyses, and those categories where the finding was only present for one or two of the analyses. The table is intended to show only the general direction of any relationship and not the size or extent of this. The detailed odds ratios for each of the seven models are included in the appendix.

Table 4: Significance and direction of relationship of explanatory variables across eight analyses

Variable	Participation	Duration	Frequency
SOCIO-DEMOGRAPHIC VARIABLES			
Age			
5-7 years	Decreasing	Decreasing	Decreasing
8-11 years (base case)	--	--	--
12-14 years	Increasing	Increasing	Increasing
Sex			
Female	Increasing	Increasing	Increasing
Male (base case)	--	--	--
Family type and employment status of parents			
Couple family, both parents employed	Increasing	Increasing	Increasing
Couple family, neither parent employed	Decreasing	Increasing	Decreasing
Couple family couple, one parent employed (base case)	--	--	--
Single parent family, employed	Decreasing	NS	NS
Single parent family, not employed	Decreasing	Mixed	Decreasing
Birthplace of child			
Child born overseas	Decreasing	Decreasing	Decreasing
Child born in Australia (base case)	--	--	--
Birthplace of parents			
Parents Born in Non English Speaking Countries	Decreasing	Decreasing	Decreasing
Parents Born in Australia (base case)	--	--	--
Socio-Economic Indicator For Areas (SEIFA)			
SEIFA 1 st (Lowest) Quintile	Decreasing	NS	NS
SEIFA 2 nd Quintile	NS	Decreasing	NS
SEIFA 3 rd Quintile (base case)	--	--	--
SEIFA 4 th Quintile	NS	Decreasing	Decreasing
SEIFA 5 th (Highest) Quintile	Increasing	Decreasing	Decreasing
State or Territory			
NSW (base case)	--	--	--
VIC	NS	NS	Decreasing
QLD	Decreasing	NS	Decreasing
SA	NS	NS	NS
WA	Increasing	NS	NS
TAS	NS	NS	Increasing
NT	NS	NS	NS
ACT	Decreasing	NS	NS

Table 4 (cont): Significance and direction of relationship of explanatory variables across eight analyses

LEISURE ACTIVITY VARIABLES	Participation	Duration	Frequency
Playing computer games, hours in last 2 weeks			
No participation (base case)	--	--	--
Played computer games 1-5 hours	Increasing	Mixed	Decreasing
Played computer games 5 hours or more	NS	Mixed	NS
Use of computer or Internet at home in last 12 months			
Did not use a computer or Internet at home	Decreasing	Increasing	NS
Did use computer or Internet at home (base case)	--	--	--
Watching TV or videos, hours in last 2 weeks			
Watch TV 0-19 hours (base case)	--	--	--
Watch TV 20-39 hours	Decreasing	NS	NS
Watch TV 40 hours or more	Decreasing	NS	NS
Skateboarding and rollerblading, hours in last 2 weeks			
No participation (base case)	--	--	--
Skate 1-5 hours	Increasing	Decreasing	Decreasing
Skate 5 hours or more	NS	NS	NS
Bike Riding, hours in last 2 weeks			
No participation (base case)	--	--	--
Ride Bikes 1-5 hours	Increasing	NS	Decreasing
Ride Bikes 5 hours or more	NS	NS	NS
Culture activities , hours in last 2 weeks			
No participation (base case)	--	--	--
Culture Activities 1-4 hours	Increasing	NS	NS
Culture Activities 5 hours or more	Increasing	Decreasing	NS

Decreasing: category related to decreased likelihood of participation or decreased hours or frequency of participation, relative to the base case

Increasing: category related to increased likelihood of participation or increased hours or frequency of participation, relative to the base case

Mixed: category related to increased likelihood of participation or increased hours or frequency of participation for some hours or frequency cut-off points, but decreased likelihood of participation or decreased hours or frequency of participation for other cut-off points, relative to the base case

NS: not significant

The results show that the age of the child has the most consistent and significant relationship to how often and how many times children participate in organised sport and dancing. Younger children participate less often and for fewer hours, relative to older children. In addition, children from families where both parents are employed have increasing probabilities of participating for more hours or more often; and boys are more likely to participate at greater frequency and duration. Similarly, children who were either born in Australia, or had parents born in Australia or in English speaking countries, were shown to participate for greater hours and more often. All of these findings are consistent with the earlier participation model in that these variables are significantly related and show an association with participation in the same direction, that is, an increasing likelihood of participation.

However, some explanatory variables, significant in the original participation model, were not significant in the duration and/or frequency analyses. The number of hours spent doing other cultural activities, the use of a computer or the Internet at home, and the number of hours spent riding a bike had no relationship to the duration of organised sport participation.

Also of note is that, although watching television or videos for 40 hours or more in the two-week reference period is associated with a lower likelihood of participation in any sport (odds ratio of 0.78), the number of hours that children spent watching television had no relationship to either the duration or frequency of organised sport participation.

This is an interesting finding that might challenge the conventional wisdom that children trade-off time on active and creative leisure activities for hours on screen-based activities and on television in particular. Clearly there is not a causal relationship between watching television and not participating in sport (children do not participate in sport because they watch too much television) and while television viewing may be an example of a preferential activity for some, it might simply be a case of displacement activity for others. To this end it is noted that the survey results indicate that the average hours spent watching television and videos is similar for participants in sport as well as non-participants (22 hours in the two-week reference period). Clearly, further analysis is required of the complete range of activities undertaken by children who are not participants in sport in order to place in perspective the relative impact of television hours on participation in sport.

SUMMARY

Arising from these results it is possible to define a number of socio-demographic characteristics of non-participants, which taken together could form the basis for defining target groups and the development of targeted policies and programs that aim to increase participation in organised sport. These groups, in order of significance according to the results of the model are:

- Children in families with unemployed parents or in a single parent family with an unemployed parent;
- Children born overseas or having a parent born in an overseas non-English speaking country;
- Children from households with a lower overall socioeconomic status (as measured by the Socioeconomic Index For Areas- SEIFA);

The results show that age and sex also have a moderate relationship with participation. Girls are less likely to participate than boys, even when organised dancing (a more popular activity among girls) is included in the analysis. Children in the younger (5-7 years) and older (12-14 years) age groups are also less likely to participate than those in the middle childhood years (8-11 years).

It is perhaps understandable that very young children are less likely to participate in organised sport, given that sport is generally an activity that is undertaken by older children as they develop their physical coordination abilities. Other physical recreation activities, such as informal play, may be considered more appropriate for the younger age groups, but no data was available to assess other forms of physical play in this analysis.

While the socio-demographic variables mentioned above have a strong relationship with participation, after accounting for these factors, other activity variables also had associations. Of particular interest to policy makers are the sedentary screen based activities, such as watching television and videos, using computers or the Internet and playing computer games. The findings of this analysis show that these activities do have a relationship with children's sport participation, but the different types of screen based activities had different, and seemingly contradictory, relationships.

Of the three screen based activities included in the analysis, the use of a computer or the Internet at home has the strongest relationship with sport participation, followed by hours playing computer games and the hours spent watching television or videos. Children who use a computer or the Internet at home as well as those spending some time playing computer games are more likely to be participants in organised sport, while the reverse is true for children who watch television or videos for very long hours.

Children spent many more hours watching television or videos than playing computer games and this analysis shows that those children who watched television for forty hours or more, out of school hours in a school fortnight (14% of the child population), would be a particularly important target group for policies and programs that aimed to increase sport participation. Some of these children however do manage to find time for sport but, for many others, the sheer volume of hours spent watching television could explain the reduced likelihood of participation in sport, simply because there would be little time left for involvement in other activities.

On the other hand, children who play computer games for 1-4 hours are more likely to participate in sport and those spending more than five hours on this activity are just as likely to participate in sport as those who not have access to these games at all. Perhaps if children spent forty hours playing computer games (or any other kind of sedentary activity) then this would lead to a result similar to that for watching television. However, on average, children do not spend as much time on other individual activities, compared to watching television and videos.

In contrast, children who participate in moderate levels of different leisure activities are more likely to participate in sport. For example, participation in bike riding or skateboarding for up to five hours in the previous two weeks is positively related to participation in sport. Similarly, children who are involved in organised cultural activities (drama, singing and music lessons or performances) are more likely to participate in sport.

Even moderate levels of watching television seem to have no negative impact on sport participation and moderate levels of participation in a range of activities do not seem to compete with each other with there being no evidence of time trade-offs. Indeed, it appears that there are some children who are simply likely to be involved in a range of different activities. Conversely, there are groups of children who have no involvement in many of the defined recreational activities and it is these children who should be the target for policies and programs that aim to increase participation.

With both duration and frequency of participation, the results show that the age of the child has the most consistent and significant relationship. Younger children participate less often and for fewer hours, relative to older children. This could be an indication of commitment shown by older children once participating, or it could also be a reflection of physical ability and confidence that increases with age. Other associations with increasing likelihood of participating for more hours or more often were found for children from families where both parents are employed, children who were born in Australia or had parents born either in Australia or in English speaking countries, and boys. Some explanatory variables, however, although having an association with the likelihood of any participation, showed no association with increasing duration or frequency of participation. These variables include the use of a computer or the Internet at home, the number of hours spent watching

television or videos, the number of hours spent doing other cultural activities and the number of hours spent riding a bike.

This analysis of the children's participation survey provides some insights into the characteristics of participants and non-participants. However, when interpreting these findings it should be remembered that the survey focused on organised sport and dancing only. The survey did not collect information on some other kinds of physical activity such as physical play or walking. However, the analysis did show that bike riding and skate boarding or rollerblading are positively related with sport participation. Hence, for most children (except perhaps for the youngest children), the inclusion of other forms of physical activity is not likely to have a major impact on these results. Most importantly, if there were to be any relationship at all, we might expect that children doing moderate amounts of physical play or walking are also more likely to be sport participants (as was found with bike riders) and the characteristics of non-participating target groups would be unlikely to change if other physical activities were included in the analysis. The main exception to this might be young children for whom other forms of play may be more critical in early development, and may be done undertaken instead of organised sport.

Overall, the results of this analysis show that there are some clear socio-demographic characteristics associated with non-participation in sport and that large numbers of hours spent watching television or videos are also associated with non-participation. This helps us to target policies and programs for the 33% of children who do not participate in sport and who may benefit from increased participation. However, of the 67% of children who do participate in sport, we cannot assume that they participate enough to realise a health benefit. Of these children, 36% participated for only a small number of hours (two hours or less). In the next phase of this project, further analysis will be undertaken to examine the relationship between the same set of explanatory variables used here and the frequency and hours of organised sport participation among children.

APPENDIX

Table 1: Odds ratios and confidence limits for participation and non-participation

Variables	Participation		Non-participation	
	Odds ratios			
		95% confidence limits		
		Lower	Upper	
Age 5-7	0.61	0.54	0.69	1.64
Age 12-14	0.79	0.70	0.89	1.27
Female	0.69	0.62	0.76	1.45
Couple family, both parents employed	1.52	1.35	1.71	0.66
Couple family, neither parent employed	0.39	0.31	0.49	2.56
Single parent family, parent employed	0.84	0.71	1.00	1.19
Single parent family, parent not employed	0.51	0.43	0.60	1.96
SEIFA - 1 st (lowest) quintile	0.61	0.53	0.71	1.64
SEIFA - 2 nd quintile	0.88*	0.75	1.04	1.14*
SEIFA - 4 th quintile	0.94*	0.79	1.12	1.06*
SEIFA - 5 th (highest) quintile	1.74	1.45	2.08	0.57
Child born overseas	0.58	0.47	0.70	1.72
Parent(s) born in non-English speaking country	0.60	0.54	0.68	1.67
Played computer games 1-4 hours	1.28	1.13	1.44	0.78
Played computer games 5 hours or more	1.00*	0.89	1.14	1.00*
Did not use a computer or the Internet at home	0.55	0.49	0.61	1.82
TV or videos 20-39 hours	0.89	0.80	0.99	1.12
TV or videos 40 hours or more	0.78	0.68	0.90	1.28
Culture activities (excl dancing) 1-4 hours	1.59	1.33	1.89	0.63
Culture activities (excl dancing) 5 hours or more	1.24	1.01	1.53	0.81
Bike riding 1-4 hours	1.30	1.15	1.46	0.77
Bike riding 5 hours or more	0.90*	0.79	1.02	1.11*
Skateboarding/rollerblading 1-4 hours	1.50	1.29	1.73	0.67
Skateboarding/rollerblading 5 hours or more	0.96*	0.81	1.15	1.04*
Victoria	1.09*	0.94	1.26	0.92*
Queensland	0.72	0.62	0.83	1.39
South Australia	1.02*	0.86	1.22	0.98*
Western Australia	1.19	1.00	1.40	0.84
Tasmania	0.96*	0.78	1.19	1.04*
Northern Territory	0.75*	0.53	1.06	1.33*
Australian Capital Territory	0.73	0.56	0.94	1.37

* insignificant at the 95% confidence level

Table 2: Explanatory and base case variables, participation in organised sport or dancing

Size of the estimate for each variable				
Variable	No participation	Any participation	Total	Participation rate
	('000)			%
Age 5-7	325.2	451.3	776.5	58.1
Age 8-11	300.9	771.4	1,072.3	71.9
Age 12-14	254.7	544.1	798.8	68.1
Male	420.2	937.4	1,357.6	69.0
Female	460.6	829.3	1,289.9	64.3
Couple family, both parents employed (a)	309.4	998.2	1,307.6	76.3
Couple family, one parent employed	223.4	410.0	633.4	64.7
Couple family, neither parent employed	91.1	48.1	139.2	34.6
Single parent family, parent employed	92.7	179.5	272.2	65.9
Single parent family, parent not employed	164.2	130.8	295.0	44.3
SEIFA - 1 st (lowest) quintile	354.4	382.9	737.3	51.9
SEIFA - 2 nd quintile	212.5	376.9	589.4	63.9
SEIFA - 3 rd quintile	121.8	278.3	400.1	69.6
SEIFA - 4 th quintile	121.9	267.2	389.1	68.7
SEIFA - 5 th (highest) quintile	103.3	428.3	531.6	80.6
Child born in Australia	806.5	1,675.4	2,481.9	67.5
Child born overseas	74.4	91.2	165.6	55.1
Parents(s) born in Aust or English speaking country	697.9	1,624.5	2,322.4	69.9
Parent(s) born in non-English speaking country	183.0	142.1	325.1	43.7
Did not play computer games	306.6	470.4	777.0	60.5
Played computer games 1-4 hours	254.4	655.8	910.2	72.1
Played computer games 5 hours or more	319.8	640.5	960.3	66.7
Did not use a computer or the Internet at home	264.9	214.8	479.7	44.8
Used a computer or the Internet at home	616.0	1,551.8	2,167.8	71.6
TV or videos less than 20 hours	406.0	894.0	1,300.0	68.8
TV or videos 20-39 hours	328.5	638.7	967.2	66.0
TV or videos 40 hours or more	146.4	233.9	380.3	61.5
No culture activities	755.4	1,320.6	2,076.0	63.6
Culture activities 1-4 hours	57.3	209.0	266.3	78.5
Culture activities 5 hours or more	68.1	237.1	305.2	77.7
No bike riding	356.5	646.2	1,002.7	64.4
Bike riding 1-4 hours	270.8	748.1	1,018.9	73.4
Bike riding 5 hours or more	253.5	372.5	626.0	59.5
No skateboarding	712.2	1,330.8	2,043.0	65.1
Skateboarding/rollerblading 1-4 hours	92.9	305.5	398.4	76.7
Skateboarding/rollerblading 5 hours or more	75.7	130.4	206.1	63.3
New South Wales	285.0	595.7	880.7	67.6
Victoria	195.2	451.6	646.8	69.8
Queensland	214.7	310.7	525.4	59.1
South Australia	63.8	131.6	195.4	67.3
Western Australia	75.7	192.3	268.0	71.8
Tasmania	23.2	42.4	65.6	64.6
Northern Territory	8.7	14.2	22.9	62.0
Australian Capital Territory	14.5	28.1	42.6	66.0
Australia	880.9	1,766.6	2,647.5	66.7

Table 3: Duration and frequency of participation in organised sport or dancing

Size of the estimate for each variable	Number ('000)	%
Hours participated in last two weeks		
2 hours or less (b)	627.5	35.5
3-4 hours	395.3	22.4
5-9 hours	429.1	24.3
10 hours or more	314.7	17.8
Number of times participated in last 12 months		
1-12 times	184.5	10.4
13-26 times	189.3	10.7
27-52 times	487.6	27.6
53-104 times	528.7	29.9
105 times or more	376.5	21.3
Australia	1,766.6	100.0

(a) excludes families where parental employment status is not known

(b) some children may have participated in the last twelve months but did not participate in the previous two weeks

Table 4: Odds ratios for duration of participation in sport or dancing (hours in previous two weeks)

	Participation (in any sport)		
	3 hours or more	5 hours or more	10 hours or more
	Odds ratios		
Age 5-7	0.57	0.45	0.30
Age 12-14	1.18	1.33	1.67
Female	0.77	0.74	0.77
Couple family, both parents employed	1.31	1.27	1.13
Couple family, neither parent employed	1.00	1.42	0.98
Single parent family, parent employed	1.07*	1.09*	1.03*
Single parent family, parent not employed	0.97	1.10	1.24
SEIFA – 1 st (lowest) quintile	0.91*	0.99*	1.00*
SEIFA – 2 nd quintile	0.97*	1.02*	0.87
SEIFA - 4 th quintile	0.75	0.82	0.95
SEIFA - 5 th (highest) quintile	0.75	0.78	0.87
Child born overseas	0.85	0.89	0.98
Parent(s) born in non-English speaking country	1.07	0.97*	0.84
Played computer games 1-5 hours	1.10	0.95	0.91
Played computer games 5 hours or more	1.21	1.07	0.70
Did not use a computer or the Internet at home	1.09	1.05	0.80
TV or videos 20-39 hours	0.88*	0.86*	1.17*
TV or videos 40 hours or more	0.86*	0.75*	0.69*
Culture activities 1-4 hours	1.12*	0.81*	1.13*
Culture activities 5 hours or more	0.84*	0.68*	0.78
Bike riding 1-5 hours	0.74*	0.66*	0.65*
Bike riding 5 hours or more	0.85*	0.91*	1.01*
Skateboarding/rollerblading 1-5 hours	1.12	0.91	0.75*
Skateboarding/rollerblading 5 hours or more	0.69*	0.76*	0.47*
Victoria	0.98*	1.10*	0.66*
Queensland	0.90*	0.91*	0.79*
South Australia	0.82*	0.78*	0.62*
Western Australia	1.11*	0.92*	1.00*
Tasmania	1.60*	1.59*	1.49*
Northern Territory	0.97*	1.11*	1.01*
Aust Capital Territory	1.21*	1.07*	0.95*

* insignificant at the 95% level

Table 5: Odds ratios for frequency of participation in sport or dancing (times in previous twelve months)

	Participation (in any sport)			
	13 times or more	27 times or more	53 times or more	105 times or more
Age 5-7	0.46	0.48	0.50	0.45
Age 12-14	1.09*	1.09*	1.22	1.46
Female	0.37	0.51	0.53	0.59
Couple family, both parents employed	1.29	1.18	1.33	1.02*
Couple family, neither parent employed	0.57	0.58	0.84*	0.33
Single parent family, parent employed	0.86*	0.87*	1.10*	0.98*
Single parent family, parent not employed	0.61	0.64	0.79	0.77*
SEIFA – 1 st (lowest) quintile	1.06*	1.12*	0.95*	1.04*
SEIFA – 2 nd quintile	0.94*	0.90*	0.84*	0.86*
SEIFA - 4 th quintile	0.81*	0.87*	0.86*	0.73
SEIFA - 5 th (highest) quintile	1.17*	1.08*	0.82*	0.66
Child born overseas	1.12*	0.74	0.74	0.83*
Parent(s) born in non-English speaking country	0.79	0.92*	0.91*	0.85*
Played computer games 1-5 hours	1.13*	1.08*	1.14*	0.77
Played computer games 5 hours or more	1.00*	1.11*	1.04*	0.83*
Did not use a computer or the Internet at home	1.05*	1.04*	1.05*	0.92*
TV or videos 20-39 hours	1.12*	0.91*	0.86*	1.07*
TV or videos 40 hours or more	1.02*	0.92*	0.89*	1.16*
Culture activities 1-4 hours	0.92*	0.86*	0.83*	0.79*
Culture activities 5 hours or more	0.60*	0.71*	0.72*	1.08*
Bike riding 1-5 hours	0.65	0.71	0.67	0.52
Bike riding 5 hours or more	0.94*	0.95*	0.97*	0.87*
Skateboarding/rollerblading 1-5 hours	1.03*	1.21*	0.95*	0.75
Skateboarding/rollerblading 5 hours or more	1.04*	1.27*	0.81*	0.79*
Victoria	1.29*	0.95*	0.91*	1.05*
Queensland	0.94*	0.89*	0.95*	0.81
South Australia	0.89*	0.78*	0.93*	0.70
Western Australia	1.05*	1.18*	0.95*	1.02*
Tasmania	1.10*	1.08*	1.29	1.25*
Northern Territory	0.92*	0.88*	0.87*	0.87*
Aust Capital Territory	0.97*	0.95*	0.95*	0.98*

* insignificant at the 95% level

Acknowledgements

The preparation of this paper has been a joint effort involving the Analytical Services Branch and the National Centre for Culture and Recreation Statistics (NCCRS) of the ABS. Lewis Conn was responsible for the statistical modelling of the data and Tammie Smallacombe for the literature review. I should like to acknowledge their contributions and also those made by Lisa Conolly, the Director of NCCRS, for her support in interpreting the findings.

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References

Anderson R, Crespo C, Bartlett S, Cheskin L and Pratt M (2001). 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. *Journal of the American Medical Association*. 279 (12), 1999; 938-942.

Australian Bureau of Statistics (2004). *Children's Participation in Cultural and Leisure Activities* (cat no 4901.0).

Australian Bureau of Statistics (2003). *Information Paper, Census of Population and Housing, Socio-Economic Indexes for Areas, Australia, 2001* (cat no 2039.0).

Australian Health Ministers Council (2004). *Physical Activity Guidelines*.
<http://www.health.gov.au/mediarel/yr2004/jointcom/jc007.htm>

Cormack S (1999). *Australian Community Sport and Recreation at a Glance*. Australian Sports Commission.

Dollman B, Olds T, Norton K and Stuart D (1999). The evolution of fitness and fatness in 10-11 year old Australian children; changes in distributional characteristics between 1985 and 1997. *Pediatric Exercise Science*, 11, 108-121.

Hancox R, Milne B, and Poulton R (2004). Association between child and adolescent television viewing and adult health: a longitudinal birth cohort study, *The Lancet*, 364, pp. 257-262.

MacDougall C, Schiller W and Darbyshire P (2002). *A research study of physical activity and children*, South Australia Department of Human Services.

Magarey A, Daniels L and Boulton T (2001). Prevalence of overweight and obesity in Australian children and adolescents: reassessment of 1985 and 1995 data against new standard international definitions. *Medical Journal of Australia* 174:561-4.

Olds T, Dollman B, Ridley K, Boshoff K, Hartshorne S and Kennaugh S (2004). *Children and Sport*, Australian Sports Commission.

The Advertiser, Adelaide 18 Feb 2005, reporting on the South Australian Child and Youth study into regional patterns of childhood obesity - published in Vaska V and Volkmer R (2004). Increasing prevalence of obesity in South Australian 4-year olds: 1995-2002. *Journal of Paediatric Child Health* 40:353-5.