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A great sporting nation? Sport participation in New Zealand youth

Hayley Wong

1st Year House Officer
Middlemore Hospital
Auckland

Timothy Olds

Alliance for Research in Exercise, Nutrition and Activity (ARENA)
University of South Australia

Ralph Maddison

National Institute for Health Innovation
School of Population Health
University of Auckland

Louise Foley

National Institute for Health Innovation
School of Population Health
University of Auckland

Hayley Wong is currently enjoying her first year as a house officer at Middlemore Hospital after completing medical school in Dunedin and Wellington. She completed a summer studentship under the supervision of Dr Louise Foley at the National Institute for Health Innovation at the University of Auckland.

ABSTRACT

Sport is a key avenue to promote regular physical activity and health in young people. The study aim was to describe sport participation in New Zealand young people. A national cross-sectional survey of young people aged 5–24 years ($n=2,503$) was conducted. Use of time, demographic and anthropometric data were analysed for participants aged 10–18 years ($n=1,308$) to identify patterns of sport participation. Overall, 894 (68%) participants reported engaging in sport. Average daily participation was 48 minutes of sport and 153 minutes of moderate-vigorous physical activity; sport participation therefore accounted for 31% of moderate-vigorous physical activity by time. Sport participation was higher in males than females, in younger (10–14 years) than older (15–18 years) participants, and in Pacific young people than in other ethnic groups. Pacific youth reported the highest participation in team-based sports but the lowest participation in individual-based sports. There were gender, age and ethnic differences in the most popular sports. Overall, sport participation contributed considerably to daily physical activity. Females were particularly 'at-risk' for lower sport participation, and may benefit from targeted intervention. The popularity of sports differed among demographic groups, suggesting it is important to ensure a range of sports are accessible to young people.

INTRODUCTION

The World Health Organization recognises that "physical activity is a fundamental means of improving the physical and mental health of individuals".¹ In young people (aged 18 years or younger), regular moderate-vigorous physical activity (MVPA) has been shown to have modest positive effects on physical and mental health, including blood pressure, blood lipids, cardiovascular fitness and psychological well-being.^{2,3} Sport is a distinct domain of physical activity "aimed at expressing or improving physical

fitness and mental well-being, forming social relationships or obtaining results in competition at all levels".⁴ Sport is a competitive, rule-governed activity that requires skill or effort, with primarily a leisure rather than work orientation.⁵ International guidelines for young people recommend at least 60 minutes of MVPA most days, which includes participation in sport, as well as other forms of physical activity including occupational-based activity and active transport.⁶⁻⁸

Since the 1970's patterns of physical activity have changed in high-income countries, from being mainly work or transport related to being leisure activities, such as sport.⁹ Therefore, sport participation is of increasing importance in determining an individual's MVPA and ultimately their health and well-being. One recent systematic review indicated a positive association between sport participation and children's physical activity levels, with children engaging in sport also more likely to maintain physical activity over time.¹⁰ Sport participation *per se* has also been linked with a variety of health outcomes. In obese children, a recent systematic review indicated that sport participation was associated with improved body composition and fitness, though another systematic review indicated mixed results regarding the relationship between sport and obesity prevention.^{10,11} Moreover, young people who engage in sports tend to experience less anxiety and depression.¹² Another recent systematic review found that team sport in particular, was associated with improved health outcomes compared to individual activities due to the social nature of the participation.¹³ Sport participation is associated with other positive health behaviours, for example abstinence from cigarettes and drugs, as well as providing opportunities for socialisation and the development of teamwork skills.¹⁴⁻¹⁶ Finally, sport participation in young people may predict a high level of adult physical activity, but this finding has been inconsistent.^{10,17,18} Demographic factors have been linked to sports participation. Low socio-economic status, being obese, being of an older age and being female are all related to lower sports participation.^{5,19,20}

Variable	PAL (METs)			Sport (min/day)			MVPA (min/day)		
	n ¹	Mean ²	SD ³	n ¹	Mean ²	SD ³	n ¹	Mean ²	SD ³
All	1308	1.73	0.3	1308	48.0	57.6	1308	153.4	100.4
Gender									
Male	702	1.78	0.4	702	56.7	63.1	702	165.6	103.4
Female	606	1.66	0.3	606	38.0	48.7	606	139.2	94.7
Age group									
10–14 years	825	1.77	0.3	825	55.0	58.1	825	172.2	98.2
15–18 years	483	1.65	0.3	483	36.0	54.8	483	121.1	95.8
Deprivation									
I (least deprived)	275	1.73	0.3	275	49.3	55.5	275	148.0	95.8
II	264	1.72	0.3	264	48.7	58.1	264	158.1	98.2
III	276	1.72	0.4	276	45.7	52.7	276	149.9	103.1
IV	216	1.71	0.3	216	47.1	59.4	216	154.7	98.1
V (most deprived)	272	1.74	0.4	272	48.6	63.1	272	155.3	105.9
Area									
Urban	1099	1.73	0.3	1099	48.4	58.6	1099	153.5	101.4
Rural	209	1.73	0.3	209	45.8	52.4	209	152.7	95.1
Ethnicity									
Māori	248	1.77	0.4	248	49.7	67.4	248	169.6	108.4
Pacific	107	1.71	0.3	107	52.6	54.5	107	139.4	80.2
NZEuro/Other	952	1.72	0.3	952	47.0	55.2	952	150.6	99.8
Weight status									
Underweight	61	1.73	0.3	61	44.3	53.0	61	160.7	106.5
Healthy	787	1.73	0.3	787	48.6	57.9	787	154.9	102.3
Overweight	303	1.72	0.4	303	47.9	56.3	303	147.3	91.8
Obese	147	1.71	0.3	147	49.0	62.4	147	160.2	104.5

¹Number of participants in each category;

²Weighted mean estimate;

³Standard deviation of the mean

MARCA – Multimedia Activity Recall for Children and Adolescents; METs – Metabolic Equivalents; mins – minutes; MVPA – moderate to vigorous physical activity; n – number; PAL – Physical Activity Level; SD – standard deviation.

Table 1: Self-reported daily participation in physical activity and sport (MARCA)

Research in New Zealand (NZ) young people has identified a large gap between sports interest and actual participation. For example, 47% of New Zealand females expressed interest in dance, whereas only 23% participated.²¹ This indicates that interventions are needed to convert this interest into participation. Preliminary experimental evidence suggests that organised sport interventions are beneficial for health. In one small study, overweight young people aged 9–11 years (n=21) undertook a six month after-school soccer programme. The placebo group completed after-school meetings about nutrition. Positive results on BMI, total physical activity, MVPA and desire to continue soccer were found.²²

To date, there has been no comprehensive description of use of time with respect to sport participation in NZ young people using nationally representative data. Description of current engagement, and the identification of groups 'at risk' for low sport participation will inform the development of interventions. Therefore, the aim of the present study was to describe sport participation in NZ young people aged 10–18 years. The specific objectives were to determine: (a) the extent of participation in sport; (b) the daily time (minutes) spent participating in sport and MVPA; (c) the average daily physical activity level (PAL); (d) the contribution of sport to meeting physical activity guidelines; (e) the popularity of team sports versus (vs.) individual sports; and (f) the most commonly-reported sports. Outcomes were examined by subgroups of interest (age group, gender, deprivation level, area [urban vs. rural], ethnicity and weight status).

METHODS

Design and participants

A national representative cross-sectional survey of NZ young people aged 5–24 years was conducted between September 2008 and May 2009. The survey was conducted according to the ethical principles in the Declaration of Helsinki and was covered by Statistics NZ Tier 1 ethical approval. Written consent and/or assent was obtained from all participants and their parent, depending on the age of the participant. Sport participation outcomes for participants aged 10–18 years are reported here. This subset of participants was selected for the description of sport engagement in a group at a similar life and developmental stage, and for comparison with international data.

A complex survey design involving stratified multi-stage sampling was used, with meshblocks (a defined geographic area) as the primary sampling unit. Within each meshblock, eligible households were identified and asked to participate. One young person was randomly chosen from each eligible household. The overall response rate was 55%, calculated as the total number of complete interviews divided by the total number of eligible households plus the estimated number of non-contact households that were eligible (i.e., estimated unobserved eligible). A total of 2,503 young people aged 5–24 years participated in the survey, which consisted of

18.8% Māori (indigenous population), 9.6% Pacific, 12.9% Asian and 71.4% NZ European. This is representative of the ethnic composition of the NZ population.²³ A total of 1,315 participants were aged 10–18 years.

Procedure

Data were collected during a face-to-face home visit and a subsequent telephone interview conducted 7–14 days after the home visit. During the home visit, height and weight were measured and data on demographics, self-reported physical activity (including sport participation) and sedentary behaviour were collected. During the telephone interview, additional self-reported data on physical activity and sedentary behaviour were collected.

Measures

Anthropometry

Height was measured to the nearest 0.1 cm with a stadiometer (Seca, 214, Hamburg, Germany) and weight was measured to the nearest 0.1 kg with a digital scale (Tanita, UM-070, Illinois, US) according to standard procedures.²⁴ BMI was calculated from the weight (kg) divided by height (m) squared. International Obesity Task Force classifications of body size were derived.²⁵

Self-reported sport participation

Self-reported sport participation was measured using the Multimedia Activity Recall for Children and Adolescents (MARCA).²⁶ The MARCA is a computerised use-of-time tool. All daily activities (including sleep) for the previous 24 hours are retrospectively recalled in chronological time slots of five minutes or more. Participants chose from a list of approximately 250 activities, each linked to an energy cost expressed in Metabolic Equivalents (METs) taken from existing compendia in young people and adults.^{27, 28} For most sports, participants rated the intensity of the activity as 'light', 'medium' or 'hard'. The MARCA has been shown to have adequate psychometric properties.^{26, 29} For the current survey up to four days of recall per participant were completed (two days at the home visit, and one to two days during the telephone interview).

"Sport" was defined as activities that involved physical activity, were rule-governed and competitive in nature.⁵ In producing the final sport

activity list, comparisons were made with a 2009 Australian survey that also used the MARCA, as well as the 2007/2008 Sport and Recreation NZ national survey.^{5, 6} Some activities were difficult to classify, for example, dance and surfing were included, but cycling was excluded as it was considered to be primarily a mode of transport rather than a sport. The MARCA data did not allow for differentiation between "organised" and "non-organised" sport. For example, both a formal, competitive game of soccer and a game in the backyard were coded as "soccer" on the MARCA.⁵ Sub-groups were created for "team sports" and "individual sports". A sport was defined as an individual sport if it was possible to play as an individual, otherwise it was classified as a team sport. For example, tennis was coded as an individual sport even though it can be played both individually and in pairs. MVPA was defined as any activity at greater than or equal to three METs.

The final outcomes of interest derived from the MARCA were:

- The extent of participation in sport (number of participants reporting engagement)
- Total daily time spent in sport (minutes/day)
- Total daily time spent in MVPA (minutes/day)
- Daily PAL (METs)
- The contribution of sport to meeting physical activity guidelines
- Number of participants reporting engagement in a team sport
- Number of participants reporting engagement in an individual sport
- Number of participants reporting engagement in each sport (e.g., rugby, netball, tennis)
- School days and non-school days were weighted equally as children spend approximately one in two days in school.⁵

Statistical analysis

Statistical analyses were performed using IBM SPSS statistics version 19 (IBM corporation, New York, United States of America). Descriptives (mean, standard deviation [SD]) were calculated for time spent in sport and MVPA, and percentages were calculated for engagement in different sport types.

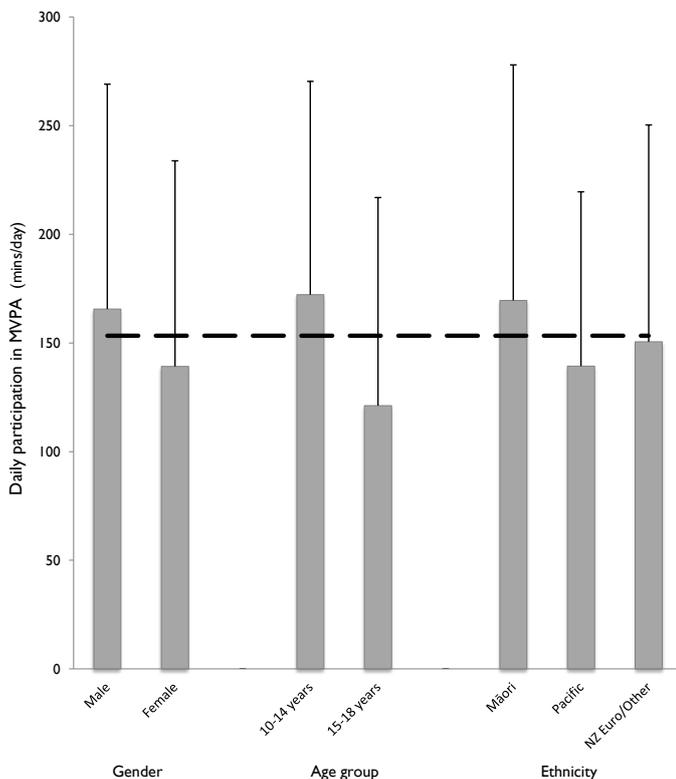


Figure 1. Self-reported daily participation in MVPA in subgroups of interest (MARCA)

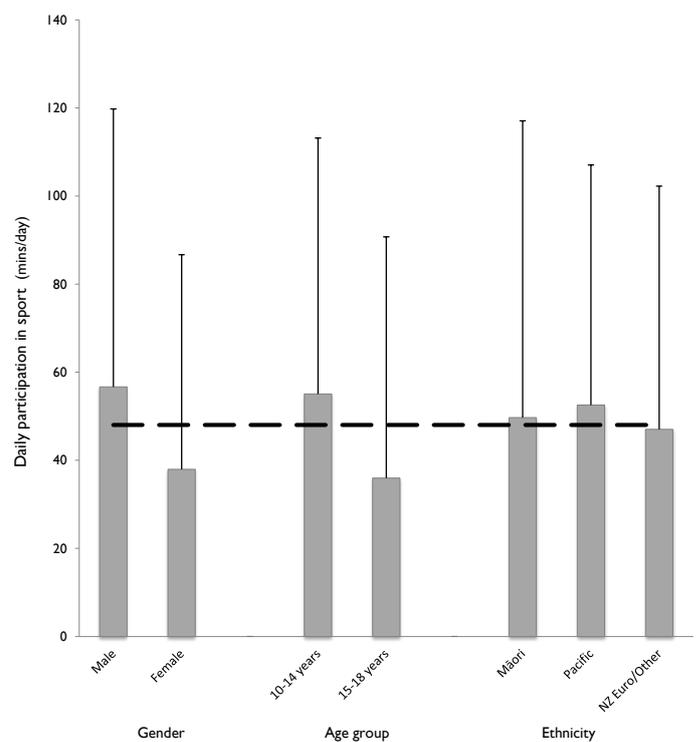


Figure 2. Self-reported daily participation in sport in subgroups of interest (MARCA)

Rank	All participants	Males	Females	10–14 years	15–18 years	Māori	Pacific	NZ Euro/other
1	Soccer	Soccer	Dancing (general)	Soccer	Soccer	Trampoline	Rugby union	Soccer
2	Trampoline	Rugby union	Trampoline	Trampoline	Dancing (general)	Basketball	Rugby league	Trampoline
3	Basketball	Basketball	Swimming laps	Basketball	Basketball	Rugby union	Touch football	Basketball
4	Rugby union	Cricket	Soccer	Rugby union	Rugby union	Soccer	Basketball	Cricket
5	Cricket	Trampoline	Netball	Cricket	Touch football	Touch football	Soccer	Dancing (general)
6	Dancing (general)	Touch football	Basketball	Swimming laps	Cricket	Hand tennis	Hand tennis	Swimming laps
7	Swimming laps	Hand tennis	Cricket	Dancing (general)	Lifting weights	Swimming laps	Volleyball (court)	Rugby union
8	Touch football	Rugby league	Dodgeball	Touch football	Rugby league	Dancing (general)	Dancing (general)	Touch football
9	Hand tennis	Swimming laps	Touch football	Hand tennis	Pool/billiards/snooker	Rugby league	Cricket	Hand tennis
10	Rugby league	Dodgeball	Hand tennis	Dodgeball	Swimming laps	Netball	Trampoline	Netball
11	Tennis	Softball	Softball	Netball	Volleyball (court)	Dodgeball	Netball	Dodgeball

MARCA – Multimedia Activity Recall for Children and Adolescents

Table 2: Self-reported 11 most popular sport activities by frequency (MARCA)

Demographic sub-groups were defined including gender, age, deprivation, area (rural vs. urban), ethnicity and weight status. Deprivation level was defined according to the 2006 NZ Deprivation Index (I=least deprived, V=most deprived).³⁰ Ethnicity was evaluated using prioritised ethnicity. International Obesity Task Force criteria were used to define weight status from BMI.²⁵ Statistical comparisons of sports participation among the demographic sub-groups were performed using analysis of variance. The response variable was minutes per day of sport, which was log transformed due to a non-normal distribution. The comparisons for deprivation, area (urban vs. rural), ethnicity and weight status were adjusted for age and gender. The alpha was set at 0.05.

RESULTS

In the total survey population aged 5–24 years, 2,493 (99.6%) participants provided valid MARCA data, among whom 1,308 (52.5%) were aged 10–18 years and included in this analysis. Average daily time spent in sport and MVPA, and average daily PAL, are shown in Table 1. Overall, 894 (68%) participants reported engaging in sport, for an average of 48 (SD 57) minutes per day. Reported engagement in MVPA was 153 (SD 100) minutes per day, therefore sport participation accounted for 31% of total daily MVPA by time. The time spent in MVPA and sport in subgroups of interest is shown in Figure 1 and Figure 2.

For sport, MVPA and PAL males had higher reported levels than females. Males performed 19 minutes more sport and 26 minutes more MVPA per day than females. Therefore, the bulk of the difference in daily MVPA between genders (71%) was attributable to differential engagement in sport. The gender difference in sport participation was statistically significant ($F(1, 1306)=26.70, p=0.00$).

Younger participants (10–14 years) reported greater engagement in sport and MVPA, and had higher PALs than older participants (15–18 years), though the difference between groups for sport participation was not statistically significant ($F(1, 1306)=0.340, p=0.560$). The difference between the age groups for sport participation and MVPA was 19 minutes per day and 51 minutes per day, respectively.

Of all ethnic groups, Pacific young people reported the highest engagement in sport (53 minutes per day), but the lowest MVPA (139 minutes per day). The contribution of sport participation to total daily MVPA for Pacific young people was 38%, compared to 29% in Māori and 31% in NZ European/Other. However, the differences between ethnic groups for sport participation were not statistically significant ($F(1, 1306)=0.845, p=0.469$).

There was no clear gradient in sport, MVPA or PAL across deprivation status, area (urban vs. rural) and weight status. There were no statistically significant differences in sport participation in any of these demographic groups.

Participation in both team and individual sports was higher in males compared to females and younger participants (10–14 years) compared to older participants (15–18 years), consistent with the pattern of engagement in sport overall. Of all ethnic groups, Pacific young people had the highest engagement in team sports (72%) but the lowest engagement in individual sports (29%). There were no other clear differences across different demographic groups.

In all participants aged 10–18 years, the 11 most commonly reported sports in order were: soccer, trampoline, basketball, rugby union, cricket, dancing, swimming laps, touch football, hand tennis, rugby league and netball. Gender, age and ethnic differences in the most popular sports were found (Table 2). Rugby union and rugby league were more popular in males, whereas dancing and netball were more popular in females. Trampoline, dodgeball and netball were more popular in younger participants (10–14 years), whereas lifting weights, rugby league, pool/billiards/snooker, swimming laps and volleyball were more popular in older participants (15–18 years). Rugby union and rugby league were popular in Pacific young people.

DISCUSSION

Sport participation and physical activity is critical for the physical, mental and social well-being of young people.^{5, 10, 13} This study indicates that most (68%) NZ young people aged 10–18 years report engaging in sport, though participation varied by gender, age and ethnicity. Sport was a key component of total MVPA, and participants reported meeting and exceeding recommended guidelines for physical activity.⁶

Females were identified as an 'at-risk' group for lower MVPA and sport participation, with a similar trend found for older (15–18 years) participants. These 'at-risk' groups are consistent with previous research.^{5, 19, 20, 31} Participants reported engaging in 48 (SD 57) minutes of sport each day, similar to the 43 (SD 45) minutes per day found in an Australian survey that also used the MARCA.⁵ However in the current study, sport participation accounted for 31% of total daily MVPA by time, which was markedly lower than the 45% reported in the Australian study.⁵ In contrast to previous studies, there was no association in this study between sport involvement and deprivation level, area and weight status.^{5, 19, 32} However, these findings have not been consistent, with other studies reporting no differences in sport participation by deprivation and area.³³ Also, the most popular sports were very similar to those found in Australia.⁵

The strengths of this study include the use of a large, representative sample of NZ young people. In addition, the MARCA allows for the collection high resolution information, and allows sport to be placed in the context of overall MVPA and use of time. Several limitations were also identified. Firstly, the cross-sectional nature of the study did not allow for causal effects and change over time to be examined. There was a 45% non-participation rate, thus there is the possibility that participants

differed from non-participants even though the study population was representative of NZ by ethnicity, age and geography.

Data from a subgroup of participants aged 10–18 years were analysed rather than the total sample. We chose to exclude those aged 5–9 years as their recall was done differently to older participants. For this age group, parents gave a proxy report of activities the child carried out whilst under direct parental supervision only. Many opportunities for sport participation arise at school and after school. Therefore, a significant amount of sport participation may be missing from these proxy recalls, and they were not comparable to the recalls of older participants. Furthermore, those aged 19–24 years were excluded as it was felt the life context of these participants, particularly in regard to sport participation, was different to 10–18 year olds who were mostly still at school with access to school sport opportunities.

Further, issues relating to methodology of the MARCA warrant comment. Due to its self-report nature, the MARCA is susceptible to over-reporting of length and intensity of physical activity. The estimate for MVPA was 153 minutes per day in the population, which far exceeds recommendations, and suggests this type of bias did occur. Despite these limitations, the MARCA psychometric properties have been shown to be sound.^{26, 29}

In the analysis, assumptions were made from MARCA data which may have influenced the results. The MARCA is unable to differentiate between a casual game of soccer and a formal, organised game (both are reported as “soccer”). Thus, sports which are easy to play in a park or backyard are likely to be reported more, even though the context of these games may often be informal. Even though sports such as trampolining and lifting weights are likely to be hobbies rather than rule-governed sports, they were included in the sport list as it was possible to do them competitively. Similarly, sports that could be played as both an individual and as a team, such as tennis and swimming laps, were coded as individual sports rather than team sports. This may have led to an over-representation of individual sports. A number of sports are season-specific, and as the survey was carried out in spring, summer and autumn, it is likely that winter sports were under-represented. Also, young people are generally more active in summer compared to winter months.³³

The results of this study highlight opportunities for interventions to increase sport participation in young people. In particular, females indicated lower daily MVPA and sport participation. In addition, the average MET value for the 11 most popular female sports (7.1 METs) was lower than in males (7.5 METs), indicating that females engage in less vigorous forms of sport as well as less sport overall. In this survey, most of the difference in MVPA participation between males and females (71%) could be attributed to a differential engagement in sport. Encouragement of sport should be targeted specifically to females to prevent insufficient physical activity and consequential health issues.

The most popular sports differed among gender, age and ethnic groups, thus it is important to ensure a wide range of sports are accessible to young people. For example, four of the top five sports in boys were team sports, whereas only two of the top five sports in girls were team sports (Table 2). In addition, Pacific young people had the highest participation in team sports but the lowest MVPA and participation in individual sports. This indicates that team sports may be more appropriate for this group, and agrees with Pacific cultural values, such as a group (rather than individual) societal orientation and collective involvement. Group sports, such as small-sided games, have been shown to be a promising intervention for improving the health and cardiovascular fitness of Pacific adults.³⁴

In conclusion, a national survey of NZ young people indicated that sport participation is an important contributor to daily physical activity. Females were particularly ‘at-risk’ for lower sport participation, and may benefit from targeted intervention. The popularity of sports differed among demographic groups, suggesting it is important to ensure a range of sports are accessible to young people.

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