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Understanding the Contexts of Adolescent Female Participation in Sport and Physical Activity

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Purpose: Participation in physical activity (PA) is reported to decline in adolescence, particularly for girls. However, we do not know if this decline in PA is consistent across modes and settings or whether there are transfers of participation between modes and settings. Nor do we understand the changes in specific types of PA or the interaction between types of participation and different modes/settings. This study investigated contexts of PA participation for female adolescents at two life transition points. **Method:** A survey of 489 Year 7 and 243 Year 11 adolescent girls was conducted, incorporating a measure of overall PA level and participation rates in seven modes/settings and in specific types of sport and PA. **Results:** Less than half of the respondents met or exceeded the recommended level of moderate or vigorous PA—60 min or more—on the previous day, and there was no significant difference in the proportions in Years 7 and 11 (39.5% vs. 45.9%; $p > .05$). However, older adolescents shifted their participation away from organized, competitive modes and settings toward nonorganized and noncompetitive modes and settings and individual types of PA. **Conclusions:** An understanding of the changes in PA modes and settings identified here can inform the planning of policies and implementation of programs for the promotion of PA by adolescent girls.

Keywords: health, setting, transition

Regular participation in physical activity (PA) throughout the lifespan is imperative for good physical and mental health (U.S. Department of Health & Human Services,

2008). Even so, many people do not participate regularly enough or at levels sufficient for health gain (Australian Bureau of Statistics [ABS], 2010). Significant decreases in participation in PA are reported to occur during adolescence, and this occurs more so for girls than for it does for boys (Lubans, Sylva, & Morgan, 2007; Zick, Smith, Brown, Fan, & Kowaleski-Jones, 2007; Zimmermann-Sloutskis,

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Wanner, Zimmermann, & Martin, 2010). Adolescence is a transitional period of life marked by many biological, environmental, social, and psychological (e.g., self-worth, body image) transformations, which influence changes in PA. In particular, marked decreases in PA have been reported during the transition from primary to secondary school (Years 6–7) when confronted with organizational changes as well as differences in support networks (Garcia, Pender, Antonakos, & Ronis, 1998), and in the transition from junior to senior secondary school (Years 10–11) when experiencing a sharp increase in the pressure of study (Eime, Payne, Casey, & Harvey, 2010).

Maintaining participation throughout adolescence is critical as it has been demonstrated that if adolescents are active during this transitional period, they are more likely to be regular participants in PA as young adults (Scheerder et al., 2006). Conversely, inactive adolescent girls are more likely to be obese as adults (Tammelin, Laitinen, & Nayha, 2004). From a population health perspective, it is critical that the determinants contributing to the decreases in PA during adolescence are identified and acknowledged in PA-related health policy and practice. Most importantly, changes in the context of participation need to be understood. A number of systematic reviews have summarized the determinants of participation in PA for adolescent girls (Allender, Cowburn, & Foster, 2006; Allender, Hutchinson, & Forster, 2008; Biddle, Whitehead, O'Donovan, & Nevill, 2005; Sallis, Prochaska, & Taylor, 2000). However, research to date has not focused on changes in the contexts of PA participation.

The context of leisure-time PA has three aspects, which we term *mode*, *setting*, and *type*. Refining the definitions of Caspersen, Powell, and Christenson (1985), we distinguish four modes of leisure-time PA: team sport, which is organized and usually competitive; individual sport, which is also organized and usually competitive; organized but noncompetitive PA, exercise that is planned, repetitive, and purposive in the sense that improvement or maintenance of one or more components of physical fitness is an objective; and nonorganized PA, which is generally informally arranged and unstructured. The three main settings for PA in adolescents are school, a club or leisure center, and neighborhood settings such as the home, street, or park. By types, we mean the many specific sports and forms of leisure-time PA (e.g., tennis, swimming, walking). It is common for adolescents to participate in a particular type of PA through multiple modes and/or settings.

With regard to assessing PA levels, objective measurement of PA using accelerometers or pedometers does not enable PA modes, settings, or types of participation to be distinguished. Many studies use valid and reliable self-report instruments to assess PA participation in adolescents. These instruments typically provide information on duration and intensity, but only provide limited information about mode, setting, and/or type of participation (Kuo et al., 2009;

Patnode et al., 2010). For example, Findlay, Garner, and Kohen (2009) investigated multiple patterns of organized PA outside of school. Although they reported that participation in organized PA decreased during adolescence, it is unknown whether the children replaced their participation in organized activities with participation in unorganized activities (Findlay et al., 2009). Although a study by Beunen et al. (2004) provided information on structured (private or school sport club) and nonstructured (with friends, family, or alone) participation, it did not provide information on the type of sport or the setting. A number of studies have reported PA types within specific domains but have not provided information on settings (Garcia et al., 1998; Pate, Dowda, O'Neill, & Ward, 2007; Zick et al., 2007).

PA participation is reported to decline during adolescence for girls, and we have an understanding of some key determinants. However, we do not know if this decline in overall levels or amounts of PA is consistent across modes and settings or whether or not there are transfers between modes and settings. Nor do we have an understanding of the changes in specific types of PA or the interaction of participation in different activities in different settings. Such knowledge would enable us to better understand patterns of participation and the determinants and hence to better plan sport and PA opportunities for this cohort.

The aim of the Factors Influencing Transitions in Girls' Active Leisure and Sport study was to investigate changes in PA at two crucial life transition points for female adolescents: elementary to junior secondary school (Years 6–7) and junior secondary to senior secondary (Years 10–11). The particular study described in this article investigated patterns of PA in seven contexts (mode/setting combinations) at baseline (Year 7 and Year 11) and retrospectively 1 year earlier (Year 6 and Year 10). Cross-sectional comparisons between Year 7 and Year 11 were also made. In addition, the specific types of sports and PA undertaken within a school, club or leisure center, and neighborhood settings were investigated for both age groups.

METHODS

Procedure

A cluster randomization process was used to select schools for this study. Schools in metropolitan, regional, and rural areas of Victoria, Australia, were randomly selected and invited to participate. The postcodes of schools were used to assign a value of the ABS Socioeconomic Indexes for Areas Index of Relative Socioeconomic Advantage and Disadvantage (IRSAD; ABS, 2008) to each, and the distribution of schools was checked to ensure they were representative of the broader IRSAD distribution in Victoria. A total of 17 schools in the metropolitan area

(34% of 50 contacted) and 14 schools in rural and regional areas (88% of 16 contacted) participated in the study. Ethical approval was gained from the university human research ethics committees, the Victorian Department of Education, and the Victorian Catholic Education Office.

A pilot test was conducted, involving 71 respondents in a convenience sample of three schools. Minor changes were made to the content of the questionnaire, and the order of questions was revised.

During the Southern hemisphere autumn (April 2008), all female students in Years 7 and 11 of participating schools were invited (by the physical education coordinator or a researcher) to participate, and plain-language information statements and parental and respondent consent forms were distributed. Informed consent was obtained from all human research participants. Students who returned both self- and parent-completed consent forms within the stipulated time completed the baseline questionnaire, usually during school class time. Consent rates were as follows: Metropolitan Year 7, 23.7% (368 of 1,550 distributed); Metropolitan Year 11, 13.0% (155 of 1,189 distributed); Nonmetropolitan Year 7, 25.7% (123 of 479 distributed); and Nonmetropolitan Year 11, 16.8% (88 of 523 distributed).

Measures

Level of PA was estimated using the validated 24-hr recall diary PDPAR (Trost, Marshall, Miller, Hurley, & Hunt, 2007), which was modified to focus exclusively on female activities. The number of 30-min blocks of moderate-to-vigorous physical activity (MVPA) was derived from the “hard” and “very hard” intensity responses to the PDPAR diary.

Respondents were also asked whether or not they participated in PA in seven mode/setting combinations: school physical education classes; competitive team activities and competitive individual activities both in and out of school; organized noncompetitive activities; and nonorganized activities.

Further, respondents were presented with a list of 22 specific types of popular sport and PA (with the option of indicating up to 6 that were not specified) and were asked to indicate in which activities they currently participated within each of the three settings—school, club or leisure center, and neighborhood (home, street, park, etc.).

With regard to the question about participation in seven modes/settings, respondents were also asked to answer with respect to the previous year (i.e., when they were in Year 6 or Year 10) as well as the current year (Year 7 or Year 11).

Statistical Analysis

Data screening was undertaken prior to the data analyses. All analyses were conducted using the Statistical Package for the Social Sciences Version 19 on the cases with

complete data for the particular analysis. Pearson chi-square tests were used to investigate cross-sectional differences between Year 7 and Year 11 cohorts with regard to rates of participation in each mode/setting and type of PA. McNemar chi-square tests were used to investigate changes from the previous year to the current year in the rates of participation in each mode/setting.

RESULTS

Respondents

A total of 732 respondents completed the questionnaire. Of these, 71.2% ($n = 521$) were from metropolitan schools and 28.8% ($n = 211$) were from rural and regional schools. Year 7 respondents accounted for 66.8% ($n = 489$) of the sample and 33.2% ($n = 243$) were from Year 11.

The age range of respondents was 11 to 20 years old ($M = 13.6$, $SD = 1.96$, $n = 701$). Most respondents were aged 11 to 13 years old ($n = 464$, 66.2%). These students were in Year 7; the remaining 33.8% ($n = 237$) were aged 16 to 20 years old; these students were in Year 11.

Level of Physical Activity: Minutes of MVPA Per Day

Because the PDPAR diary is based on discrete time intervals of 30 min, the MVPA measure was similarly quantized. Fifty-six cases with estimated MVPA of more than 256 min per day (i.e., those who reported more than eight 30-min blocks), which corresponds to the 99th percentile of responses in the 2007 Australian National Children’s Nutrition and Physical Activity Survey (Tim Olds, personal communication), were also excluded, as were 57 cases reporting “hard” or “very hard” intensities for activities other than sport, PA, or active transport. These respondents generally reported levels of intensity that were inconsistent with the activities reported, presumably due to misinterpretation of the question.

Table 1 shows that less than half of the respondents met or exceeded the recommended level of MVPA—60 min or more (Department of Health & Aging, 2004)—on the previous day, and there was no significant difference between the proportions in Years 7 and 11 (39.4% vs. 45.8%), $\chi^2(1) = 1.68$, $p > .05$. Around half the respondents at each year level (Year 7, 51.6%; Year 11, 47.6%), $\chi^2(1) = 0.64$, $p > .05$, reported no MVPA on the previous day.

Contexts: Modes and Settings

Table 2 summarizes the changes from Year 6 to Year 7 and from Year 10 to Year 11 in participation in each of seven contexts (combinations of modes and settings), as well as cross-sectional comparisons between Year 7 and Year 11. There were significant increases in Year 7 students’

TABLE 1
MVPA on Previous Day: By Cohort (Years 7 and 11)

<i>Number of 30-Min Blocks</i>	<i>Estimated Minutes of MVPA</i>	<i>Year 7 %</i>	<i>Cohort Year 11 %</i>	<i>Combined %</i>
0	0	51.6	47.6	50.0
1	30	8.9	6.5	8.0
2	60	13.8	13.1	13.5
3	90	8.1	12.5	9.9
4 or more	≥ 120	17.5	20.2	18.6
<i>n</i>		246	168	414

participation in PA in school physical education and nonorganized PA. Significant decreases were evident, however, in school competitive team activities and individual activities. For the Year 11 students, there were significant decreases across all modes and settings except for nonorganized PA, which significantly increased.

Cross-sectionally, in the current year (i.e., the year of the study), the Year 7 students were significantly more likely than the older adolescents to participate in PE classes and in all competitive contexts except school team sports, whereas Year 11 students had significantly higher participation rates in organized noncompetitive PA and nonorganized PA.

TABLE 2
Participation in Each Mode/Setting of PA: By Cohort (Years 7 and 11) and Epoch (Previous Year, Current Year)

	<i>Year 7 (n = 485) %</i>	<i>Year 11 (n = 242) %</i>	<i>Difference % Points</i>	<i>p Value</i>
Previous year^a				
PE classes	83.4	89.7	6.3	.014
Competitive team sports at school	80.2	67.5	-12.7	<.001
Competitive team sports outside school	66.1	63.8	-2.3	.299
Competitive individual sports at school	48.9	44.4	-4.5	.146
Competitive individual sports outside school	41.5	36.6	-4.9	.117
Organized but noncompetitive physical activity (e.g., aerobics, weights classes, circuit training)	34.8	51.0	16.2	<.001
Nonorganized physical activity (e.g., walking, jogging, rollerblading [alone or with friends])	69.5	79.6	10.1	.004
Current year				
PE classes	96.3	44.4	-51.9	<.001
Competitive team sports at school	63.4	58.4	-5.0	.112
Competitive team sports outside school	62.2	53.5	-8.7	.015
Competitive individual sports at school	41.1	28.8	-12.3	.001
Competitive individual sports outside school	37.0	22.6	-14.4	<.001
Organized but noncompetitive physical activity (e.g., aerobics, weights classes, circuit training)	30.9	42.4	11.5	.002
Nonorganized physical activity (e.g., walking, jogging, rollerblading [alone or with friends])	79.6	86.8	7.2	.009
<i>Change^b</i>		<i>p Value</i>		<i>p Value</i>
Physical education classes	12.9	<.001	-45.3	<.001
Competitive team sports at school	-16.8	<.001	-9.1	.010
Competitive team sports outside school	-3.9	.121	-10.3	.003
Competitive individual sports at school	-7.8	.003	-15.6	<.001
Competitive individual sports outside school	-4.5	.061	-14.0	<.001
Organized but noncompetitive physical activity (e.g., aerobics, weights classes, circuit training)	-3.9	.121	-8.6	.040
Nonorganized physical activity (e.g., walking, jogging, rollerblading [alone or with friends])	10.1	<.001	7.8	.011

^a Year 6 and Year 10.

^b Change = current year - previous year.

Regarding the previous year, Year 7 students reported significantly higher participation rates (in Year 6) than did Year 11 students (in Year 10) in competitive school team sports, whereas participation in physical education classes, organized noncompetitive PA, and nonorganized PA were reportedly significantly higher in Year 10 than in Year 6.

Contexts: Types of PA

Table 3 provides a summary of specific types of PA undertaken by respondents, broken down by settings, modes, and year levels. The cross-sectional differences between the Year 7 and Year 11 participation rates are also shown. In each group, activities are listed in order from the largest decrease in the rate (from Year 7 to Year 11) to the largest increase.

In comparison to Year 7, Year 11 respondents reported consistent trends across all settings away from club- and team-based competitive sports, including gymnastics, swimming, netball, hockey, and softball, and toward more individual activities including walking, jogging, running, dancing, aerobics, stationary exercises (cycle, treadmill), and weights/circuit training.

DISCUSSION

Aaron and colleagues point out that little research has focused on factors associated with discontinued or changing patterns of participation in specific activities (Aaron, Storti, Robertson, Kriska, & LaPorte, 2002). This is the first study to comprehensively examine the context of changes in PA participation in different modes, settings, and types in two transitional periods for adolescent girls. This study adds knowledge by showing that changes in PA are not uniform across all modes, settings, and types and that PA participation actually increases in some modes/settings and specific types. This information is of critical importance to those planning and implementing programs and policies to promote PA by adolescent girls.

Investigation of the modes and settings provides a greater understanding of the changes that occur in PA participation. The Year 7 students were more likely to participate in school physical education (and nonorganized PA than they had in the previous year. Given the context of Australian school physical education, this is not an unexpected finding. There is a shortage of specialized physical education teachers in primary schools, which is a major inhibitor to individuals' skill development and participation in PA in general (Independent Sport Panel, 2009). Students' exposure to more physical education in early secondary school compared with primary school has also been previously reported (Garcia et al., 1998). The physical education policy for the state of Victoria mandates 100 min per week in physical education for students in Years 7

through 10 (Department of Education and Early Childhood Development); however, this is often not met within individual schools (Jenkinson & Benson, 2009). It seems that by Year 10, the PA levels decrease to the levels seen at Year 6. Although the Year 7 students' overall PA did increase, there were significant decreases from the previous year for competitive team sports both at school and outside school. For the Year 11 students, there were significant decreases from the previous year for all modes except nonorganized PA.

Aaron et al. (2002) report that the decline in PA during adolescence is primarily due to a decrease in the number of reported activities rather than decreased time spent on a specific activity. However, cross-sectionally in the current study, Year 11 students were less likely to participate than were Year 7 students in all modes/settings except organized but noncompetitive PA and nonorganized PA. Both cohorts reported high levels of participation in nonorganized PA, and of all modes/settings, this was the most commonly reported among the Year 11 cohort. Year 7 students were more likely than Year 11 students to engage in competitive activities.

Year 7 students were significantly more active within the school setting than were their older counterparts. The school is a setting that is increasingly the focus of PA interventions and efforts to increase PA (De Meij et al., 2010; Saunders, Ward, Felton, Dowda, & Pate, 2006). Given the contribution to PA participation of compulsory physical education in Year 7, it is tempting to advocate an extension of compulsory secondary school physical education beyond current levels. However, even leaving aside broader issues of a crowded curriculum and educational priorities, this might be counterproductive. Firstly, there is strong evidence that school PE can have a negative impact on attitudes to PA participation for female adolescents for a variety of reasons including gender issues with coeducational classes and dissatisfaction with physical education uniforms (Allender et al., 2006; Casey, Eime, Payne, & Harvey, 2009; Eime et al., 2010). Secondly, as Kuo et al. (2009) point out, there are limited opportunities for PA during school hours, and as a PA setting, schools are often not accessible out of hours (Scott et al., 2007). Further, evidence from the United States shows that there is no association between meeting the states' physical education requirements and children's PA levels (Kim, 2012).

Notwithstanding the importance of school as a setting for PA, because school is a PA setting only for a limited period of one's life, it is important to understand the context of PA and trends in participation in all settings and how we can foster transitions out of school and into the community (Eime & Payne, 2009). A common community setting for organized PA is the sports club (Eime & Payne, 2009; Eime, Payne, & Harvey, 2009; Eíðsdóttir, Kristjánsson, Sigfúsdóttir, & Allengrante, 2008). Compared with the previous year, participation in PA through this setting had not

TABLE 3
Participation in Specific Types of PA: Participation Rates by Context and Year Level

<i>Type of PA: By Setting and Mode^a</i>	<i>Year 7% (n = 488)</i>	<i>Year 11% (n = 243)</i>	<i>Difference % Points</i>	<i>p Value</i>
School				
<i>Team Sport</i>				
Hockey	14.3	9.5	-4.8	>.10
Softball	19.5	15.2	-4.3	>.10
Netball	34.6	34.2	-0.4	>.10
Australian Rules Football	12.5	14.4	+1.9	>.10
Football (Soccer)	3.9	7.4	+3.5	.041
Volleyball	21.3	25.5	+4.2	>.10
<i>Individual Sport</i>				
Athletics	52.9	45.7	-7.2	.067
Swimming	21.3	22.2	+0.9	>.10
Tennis	11.5	13.6	+2.1	>.10
Basketball	21.1	24.7	+3.6	>.10
<i>Organized Noncompetitive</i>				
Gymnastics	12.5	4.5	-8.0	.001
Jogging/running	26.0	19.8	-6.2	.061
Rollerblading/skateboarding	0.8	0.8	0.0	>.10
Horse riding	1.2	2.5	+1.2	>.10
Swimming (recreation)	14.3	15.6	+1.3	>.10
Aerobics	4.9	6.6	+1.7	>.10
Cycling (recreational)	2.5	4.5	+2.1	>.10
Dancing	7.6	10.3	+2.7	>.10
Stationary (cycle, treadmill)	3.3	6.2	+2.9	.067
Walking	18.2	21.4	+3.2	>.10
Surfing/boogie boarding	1.2	4.9	+3.7	.002
Karate/martial arts	1.2	6.2	+5.0	<.001
Weights/circuit training	3.3	12.3	+9.0	<.001
Club or Leisure Center				
<i>Team Sport</i>				
Netball	33.0	30.9	-2.1	>.10
Australian Rules Football	1.6	1.2	-0.4	>.10
Volleyball	1.0	0.8	-0.2	>.10
Hockey	2.7	2.9	+0.2	>.10
Softball	0.8	2.1	+1.2	>.10
Football (Soccer)	3.7	4.9	+1.3	>.10
Basketball	17.4	19.8	+2.3	>.10
<i>Individual Sport</i>				
Swimming (sport)	16.4	7.0	-9.4	<.001
Gymnastics	7.4	2.5	-4.9	.007
Tennis	17.4	14.0	-3.4	>.10
Athletics	7.4	4.1	-3.3	.087
Cycling	1.8	4.9	+3.1	.018
Jogging/running	7.4	11.9	+4.5	.041
<i>Organized Noncompetitive</i>				
Dancing	20.9	14.4	-6.5	.034
Swimming (recreation)	19.9	14.0	-5.9	.051
Karate/martial arts	4.3	2.5	-1.8	>.10
Horse riding	5.1	3.3	-1.8	>.10
Rollerblading/skateboarding	2.9	1.2	-1.6	>.10
Surfing/boogie boarding	1.2	0.0	-1.2	>.10
Walking	6.4	9.1	2.7	>.10
Stationary (cycle, treadmill)	4.1	12.8	+8.7	<.001
Aerobics	1.2	14.0	+12.8	<.001
Weights/circuit training	3.7	18.9	+15.2	<.001
Neighborhood				
<i>Nonorganized</i>				
Rollerblading/skateboarding	33.2	18.5	-14.7	<.001
Basketball	14.8	11.5	-3.3	>.10

TABLE 3 – (Continued)

Type of PA: By Setting and Mode ^a	Year 7% (n = 488)	Year 11% (n = 243)	Difference % Points	p Value
Volleyball	7.6	4.5	-3.1	>.10
Karate/martial arts	4.5	1.6	-2.9	.049
Softball	3.7	1.3	-2.5	.061
Athletics	10.2	7.8	-2.4	>.10
Swimming (sport)	10.7	8.2	-2.4	>.10
Gymnastics	4.7	2.9	-1.8	>.10
Cycling	42.6	41.2	-1.5	>.10
Netball	10.5	9.5	-1.0	>.10
Football (Soccer)	5.1	4.9	-0.2	>.10
Hockey	2.0	2.1	0.1	>.10
Horse riding	12.1	13.2	+1.1	>.10
Swimming (recreation)	38.7	39.9	+1.2	>.10
Australian Rules Football	16.6	18.9	+2.3	>.10
Tennis	16.6	19.3	+2.7	>.10
Surfing/boogie boarding	10.1	33.7	+3.6	>.10
Aerobics	3.9	9.1	+5.2	.004
Weights/circuit training	11.7	21.0	+9.3	.001
Stationary (cycle, treadmill)	27.0	38.3	+11.2	.002
Dancing	19.5	34.2	+14.7	<.001
Jogging/running	56.1	72.0	+15.9	<.001
Walking	77.5	93.4	+15.9	<.001
All Settings and Modes				
Rollerblading/skateboarding	36.3	20.6	-15.7	<.001
Gymnastics	24.0	8.6	-15.3	<.001
Netball	60.9	52.3	-8.6	.027
Swimming (sport)	41.4	32.9	-8.5	.027
Athletics	60.9	53.5	-7.4	.057
Hockey	18.0	11.5	-6.5	.023
Softball	23.0	16.5	-6.5	.042
Swimming (recreation)	62.1	56.4	-5.7	>.10
Basketball	45.9	42.0	-3.9	>.10
Tennis	40.0	37.4	-2.5	>.10
Karate/martial arts	9.4	9.1	-0.4	>.10
Horse riding	16.2	16.0	-0.1	>.10
Football (Soccer)	10.4	10.7	+0.3	>.10
Volleyball	27.9	28.4	+0.5	>.10
Cycling	45.3	47.7	+2.4	>.10
Australian Rules Football	28.1	31.3	+3.2	>.10
Surfing/boogie boarding	32.2	35.8	+3.6	>.10
Jogging/running	69.5	78.6	+9.1	.009
Dancing	41.6	51.4	+9.8	.012
Walking	81.6	96.7	+15.2	<.001
Aerobics	9.8	27.2	+17.3	<.001
Stationary (cycle, treadmill)	32.0	51.9	+19.9	<.001
Weights/circuit training	17.4	44.0	+26.6	<.001

^aIn each group, activities are listed in order from the largest decrease in the rate (from Year 7 to Year 11) to the largest increase.

changed significantly for the Year 7 students, but it had decreased, for both individual and team sports, for the Year 11 students. This is consistent with elements of the previously published data. In a longitudinal study by Telama & Yang (2000), it was reported that for adolescents aged 9 to 18 years old, participation in all types of PA declined, with particularly steep declines for participation in sport. Participation in organized sport was highest at age 12 and the decline was steepest for girls between 15 and 18 years of age. Similarly, Australian statistics for 6- to 14-

year-olds show that participation in sport peaks for both boys and girls at 9 to 11 years of age before decreasing (Kumar, Rossiter, & Olczyk, 2009). In contrast, longer-term national and international data regarding overall adolescent club sport participation reinforce the importance of this setting for adolescents but present no clear recent trend in rates of participation. The ABS investigated adolescent participation in organized sport for those aged 12 to 14 years old, and they reported an increase from 66.1% in 2000 to 68.1% in 2003 and a slight decrease to 67.8% in 2006

(Kumar et al., 2009). A cross-sectional survey of sports club participation for Icelandic adolescents found that the percentage of regular participants in club sports rose steadily from 17.2% in 1992 to 31.7% in 2006 (Eiðsdóttir et al., 2008). For these adolescents, organized club sport was the main source of PA. Other Australian data for girls and women aged 15 to 24 years indicated that 57% participated in organized PA, the majority of this participation being at a sports club; one third (33%) of total organized PA participation was at a sports club, followed by 25% in a fitness or leisure center and 21% in a school (Standing Committee on Recreation & Sport, 2009, State and Territory tables for Victoria, pp. 1–11).

When investigating the specific types of PA participation within a club or center, Year 11 students were more likely than Year 7 students to participate in individual activities such as weights, aerobics, stationary exercise, jogging, running, and cycling. It is difficult to draw conclusions about changes in within-school participation, as the types of PA are generally determined by the school and are not necessarily chosen by the students. In the neighborhood setting, Year 11 students were less likely than Year 7 students to participate in rollerblading, swimming, basketball, volleyball, and karate, and they were more likely to walk, jog, run, dance, or do stationary exercises and weights.

It is important to understand the changes within each setting, but also to investigate whether there are common changes. Across settings, decreases were common in gymnastics and swimming, and overall, there were decreases in the team sports of netball, hockey, and softball. Increases across different settings were evident for jogging/running, stationary exercises, aerobics, weights/circuit training, and walking. These activities do not have as many restrictions on time and place for participants and can be performed individually. The transition from team to individual activities during adolescence has been previously reported (Pate et al., 2007). A number of individual activities are also preferred because they rely less on perceptions of competence (Eime et al., 2010). Similar findings have been reported in the literature (Aaron et al., 2002; Zimmermann-Sloutskis et al., 2010).

This study had a number of limitations. First, notwithstanding the use of incentives and explicit encouragement of both active and inactive students to participate, recruitment rates were low and students with more interest in PA were more likely to have volunteered to participate in this study. Such self-selection bias would inflate the reported rates of participation in particular types of sport/PA, but it would only threaten the validity of the comparisons between year levels if the extent of self-selection differed in the two cohorts, and it would only threaten the validity of the longitudinal comparisons within year levels if the pattern/magnitude of longitudinal changes were dependent on the level of sport/PA. Second,

measurement of PA levels was based on a self-report tool. Assessing PA participation among any age group is problematic, and this is particularly so for adolescents who are likely to engage in a variety of sport/PA throughout the day (e.g., organized sport, exercise, lifestyle activities, and active transport). Thus, there is a significant potential for recall error when reporting their PA. It is noted that the cross-sectional comparisons are between groups (year levels) determined by an inherent characteristic (age), rather than between self-determined categories (such as sports club membership), and so the usual caveat regarding caution in inferring causality does not apply. Finally, it is acknowledged that when making a large number of comparisons (such as those in Table 2 or Table 3), although the overall number of significant results was much higher than the Type 1 error rate of 1 in 20, and although the significant results occurred in a consistent pattern, some of the individual results may well be due to chance.

CONCLUSION

This study uniquely identified patterns and trends in PA participation in a range of specific contexts across year levels, modes, settings, and types of PA. In summary, adolescents significantly increased their participation as they transitioned into secondary school; however, for the older adolescents, participation significantly decreased from Year 10 to Year 11 and was significantly less than that of their younger counterparts. This article uniquely identified that at both transition points, changes in the level of participation were accompanied by changes in modes, settings, and types of PA. At Year 7, this predominantly related to increased participation in school-based settings. At Year 11, the shifts were toward nonorganized activities and away from all other modes/settings, and toward individual types of PA in place of team-based sports.

There are a number of implications for further research and for sports industry and community practice. First, we need to recognize and have a better understanding of these changes. In doing so, we recognize that PA is complex and move forward from general statements that adolescents simply need to be more physically active. In addition, multiple modes and types of PA need to be available, and we need to promote flexibility of delivery throughout adolescence. For female adolescents, there are clearly reasons for the changes in overall PA levels, and more specifically in changes in participation mode, setting, and types. Such knowledge enables us to better understand the determinants and hence to better plan sport and PA opportunities for this cohort. Second, we need a stronger focus on integrating and linking school-community settings (Eime & Payne, 2009), and in doing so adapting to changes across the adolescent transitional period, so that adolescents can be better prepared for when they leave the school

environment and develop lifelong PA habits. Finally, the effects on health of the move away from school PA and physical education as older adolescents and the overall trend away from organized to nonorganized PA need to be further explored. The move away from team- and club-based activities to individual pursuits provides great flexibility in time, but we need to investigate the implications for health, including mental and physical health, as social engagement through sport diminishes.

WHAT DOES THIS ARTICLE ADD?

This article has uniquely demonstrated that PA participation for adolescent girls is not consistent across all modes and settings of participation, and that in some cases, increases were evident throughout this transitional period of life. At both adolescent transition points, changes in the level of participation were accompanied by changes in modes, settings, and types of PA. The school was a factor contributing to increases in PA for those transitioning into secondary school. Older adolescents shifted their participation away from organized, competitive modes and settings toward nonorganized and noncompetitive modes and settings and individual types of PA. We need to understand the specific determinants of these changes and foster the development of policies and programs linking these adolescents into community activities for sustainability of participation across the lifespan. In addition we need to understand the impact of the changes of activities from team- and club-based group activities to individual pursuits on health.

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