Sports participation in youth as a predictor of physical activity: A 5-year longitudinal study.

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Figure 1. Deaths attributed to the six leading risk factors, by country income level, in 2004.

**Guidelines for children and young people (aged 2 –18)**

All children and young people should be active, at a moderate to vigorous level, for at least 60 minutes every day.
A clear decline in physical activity (PA) with increasing age in adolescence.

PA reductions are consistently larger in females than males (3).

Monitoring and surveillance of population prevalence are of paramount importance (4) and vital for the progression of PA and public health (5).

Adolescence is a critical time for PA participation where habits developed may persist into adulthood (6, 7).

Public health objectives of promoting PA in youth are based on the assumption that PA is habitual and can become habitual, resultantly tracking into adulthood.

In adolescence, sports participation (SP) is positively correlated with overall PA levels.

SP in childhood and adolescence has been found to be a significant predictor of participation in young adulthood (9).

Current evidence on the contribution of variety and frequency of SP in youth to predicting future PA is unclear (10).

There is a dearth of research investigating the potential role of the highest standard achieved (e.g. elite level) in sports, in predicting PA in later years.

As SP tends to decline in adolescent years, longitudinal research is needed to understand the impact of sport over time.

Best Investments for PA:
Sports systems and programs that promote ‘sport for all’ and encourage participation across the life span (8).

(8) GAPA & ISPAH, 2011, (9) Perkins et al., 2004
(10) Dumith et al., 2011
The purpose of this study is;

(1) To assess tracking of PA in three cohorts of Irish youth;
(2) To assess secular PA trends;
(3) To examine predictors (sports participation at baseline) of PA (follow-up).
Methods

CSPPA Sample (T1)
N = 5,397
Aged 10 - 18 years, 46.6% male
Follow-up permission: n = 4,200

School Respondents (T2)
n = 382
Response rate: 85.8%

Postal Respondents (T2)
n = 491
Response rate: 14.2%

CSPPA Plus Sample (T2)
*Response rate of included sample: 22.3%
n = 873

Excluded (n = 292)
1) Incomplete contact details: n = 129
2) Post returned: n = 160
3) Deceased: n = 3

Primary School Cohort
n = 217
Baseline age: 11.2 ± 0.5 years
30.4% male

Secondary School Cohort
n = 408
Baseline age: 12.8 ± 0.5 years
26.7% male

School Leaver Cohort
n = 248
Baseline age: 14.9 ± 1.4 years
36.3% male

Opt out: n = 58
Absent on day of testing: n = 5

Figure 1 Flow chart of CSPPA Study participants
**Physical activity is any body movement.**

It can be done at different levels of effort:

- **Vigorous Effort** makes your heart rate much faster and you have to breathe deeper and faster than normal. You will probably sweat. E.g. playing football, squash, heavy lifting, digging or fast bicycling.

- **Moderate Effort** makes your heart rate and breathing rate faster than normal. You may also sweat a little. E.g. brisk walking, jogging or vacuuming.

Physical activity includes:
- **Exercise** Weight training, aerobics, jogging, dancing, etc.
- **Sports** Hurling, football, athletics, swimming, etc.
- **General** Brisk walking, washing the car, walking or cycling to school, etc.

Please try to think carefully and be as accurate as possible with your answers. For these next two questions, add up all the time you spend in physical activity each day. **Only include activities of either moderate or vigorous effort.**

**Q1** During the last 7 days, on how many days were you physically active for a total of at least 60 minutes per day? Please circle one number.

0 days 1 2 3 4 5 6 7 days

**Q2** Over a typical or usual week, on how many days are you physically active for a total of at least 60 minutes per day? Please circle one number.

0 days 1 2 3 4 5 6 7 days

Sports participation

- Frequency: 7 response options, recoded to 4 categories.
- Number of sports: modified SAPAC (21 items) (13)
- Sports type: individual, team-based, combination.
- *Standard achieved: basic, competitive, elite.

(13) Sallis et al., 1996
Statistical Analysis

Secular trends
›  Mann-Whitney U

Tracking analyses
›  Spearman rho correlations

Examination of predictors of PA
›  ANCOVA analyses: adjusting for (a) age and sex, (b) age, sex and baseline PA, (c) in the number of sports analysis, sport type was also adjusted for.

›  Fisher LSD for post hoc comparisons.

›  Cohen’s $d$ for effect size.
Results

Sample
Longitudinal sample N = 873 (30.4% male).

› Social class:
  › High (44.6%)
  › Medium (36.8%)
  › Low (12.5%)
  › Unknown (6.1%)

› The secular trend for days meeting MVPA guidelines in 15 - 18 year olds between T1 and T2 was not significant.
Table 1  Physical activity levels and tracking split by cohort groups.

<table>
<thead>
<tr>
<th></th>
<th>T1 mean days (± SD)</th>
<th>T2 mean days (± SD)</th>
<th>PA tracking (ρ)</th>
<th>T1 meeting PAGL (%)</th>
<th>T2 meeting PAGL (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total sample</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total (n= 873)</td>
<td>4.4 ± 1.7</td>
<td>3.5 ± 1.8</td>
<td>.28 ††</td>
<td>9.3</td>
<td>5.3 b</td>
</tr>
<tr>
<td>Male (n = 265)</td>
<td>4.8 ± 1.6</td>
<td>4.2 ± 1.8</td>
<td>.26 ††</td>
<td>13.3</td>
<td>7.6 b</td>
</tr>
<tr>
<td>Female (n = 608)</td>
<td>4.3 ± 1.6</td>
<td>3.2 ± 1.7</td>
<td>.26 ††</td>
<td>7.5</td>
<td>4.3 b</td>
</tr>
<tr>
<td><strong>Primary school</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male (n = 66)</td>
<td>4.8 ± 1.8</td>
<td>4.5 ± 1.8</td>
<td>.23</td>
<td>15.2</td>
<td>10.6</td>
</tr>
<tr>
<td>Female (n = 151)</td>
<td>4.5 ± 1.6</td>
<td>3.7 ± 1.7</td>
<td>.16 †</td>
<td>10.6</td>
<td>7.3</td>
</tr>
<tr>
<td><strong>Secondary school</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male (n = 109)</td>
<td>5.0 ± 1.6</td>
<td>4.1 ± 1.5</td>
<td>.47 ††</td>
<td>17.4</td>
<td>5.6 bb</td>
</tr>
<tr>
<td>Female (n = 299)</td>
<td>4.4 ± 1.6</td>
<td>2.9 ± 1.6</td>
<td>.26 ††</td>
<td>7.2</td>
<td>3.1 b</td>
</tr>
<tr>
<td><strong>School leaver</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male (n = 90)</td>
<td>4.5 ± 1.5</td>
<td>4.0 ± 2.0</td>
<td>.30</td>
<td>6.8</td>
<td>7.8</td>
</tr>
<tr>
<td>Female (n = 158)</td>
<td>3.8 ± 1.7</td>
<td>3.3 ± 1.7</td>
<td>.36 ††</td>
<td>5.1</td>
<td>3.8</td>
</tr>
</tbody>
</table>

T1 = time point 1 (2009); T2 = time point 2 (2014); PAGL = physical activity guidelines

a Time difference (T1 and T2) based on Wilcoxon sign rank test: $P < .01$

b Time difference (T1 and T2) based on McNemar chi-square: $P < .05$; bb $P < .01$

† Significance level of Spearman rho correlation $P < .05$; †† $P < .01$
Table 2  Descriptive statistics of factors related to sports participation.

<table>
<thead>
<tr>
<th></th>
<th>T1</th>
<th>T2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td><strong>Sports participation frequency (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4+ days a week</td>
<td>38.1</td>
<td>23.4</td>
</tr>
<tr>
<td>2-3 days a week</td>
<td>30.6</td>
<td>35.9</td>
</tr>
<tr>
<td>1 day a week</td>
<td>10.6</td>
<td>15.5</td>
</tr>
<tr>
<td>Less than once a week</td>
<td>20.8</td>
<td>25.2</td>
</tr>
<tr>
<td><strong>Number of sports (mean ± SD)</strong></td>
<td>2.1 ± 1.8</td>
<td>2.0 ± 1.8</td>
</tr>
<tr>
<td><strong>Sport type (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Combination</td>
<td>11.7</td>
<td>18.0</td>
</tr>
<tr>
<td>Team</td>
<td>54.3</td>
<td>29.4</td>
</tr>
<tr>
<td>Individual</td>
<td>13.6</td>
<td>30.6</td>
</tr>
<tr>
<td>None</td>
<td>20.4</td>
<td>22.0</td>
</tr>
<tr>
<td>**Standard achieved (%)**a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elite</td>
<td>27.6</td>
<td>22.4</td>
</tr>
<tr>
<td>Competitive</td>
<td>60.9</td>
<td>53.5</td>
</tr>
<tr>
<td>Basic</td>
<td>11.5</td>
<td>24.1</td>
</tr>
</tbody>
</table>

** Sex difference based on chi-square test, P < .01
a Only includes those who participated in club sport at T1 (n = 496; male = 156; female = 340).
Table 3  Associations between PA at follow-up and baseline sports participation factors.

<table>
<thead>
<tr>
<th></th>
<th>df</th>
<th>F</th>
<th>P</th>
<th>$\eta_p^2$</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ANCOVA analyses adjusting for age and sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sports participation frequency</td>
<td>861</td>
<td>20.635</td>
<td>&lt; .001</td>
<td>0.07</td>
<td>.61</td>
</tr>
<tr>
<td>Number of sports</td>
<td>855</td>
<td>1.857</td>
<td>0.09</td>
<td>0.01</td>
<td>.32</td>
</tr>
<tr>
<td>Sport type c</td>
<td>854</td>
<td>2.484</td>
<td>0.06</td>
<td>0.01</td>
<td>.30</td>
</tr>
<tr>
<td>Standard achieved</td>
<td>490</td>
<td>14.756</td>
<td>&lt; .001</td>
<td>0.06</td>
<td>.75</td>
</tr>
<tr>
<td><strong>ANCOVA analyses adjusting for age, sex and baseline PA</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sports participation frequency</td>
<td>849</td>
<td>25.835</td>
<td>&lt; .001</td>
<td>0.03</td>
<td>.40</td>
</tr>
<tr>
<td>Number of sports</td>
<td>844</td>
<td>0.781</td>
<td>0.59</td>
<td>0.01</td>
<td>.05</td>
</tr>
<tr>
<td>Sport type d</td>
<td>843</td>
<td>1.477</td>
<td>0.22</td>
<td>0.01</td>
<td>.17</td>
</tr>
<tr>
<td>Standard achieved</td>
<td>482</td>
<td>9.063</td>
<td>&lt; .001</td>
<td>0.04</td>
<td>.60</td>
</tr>
</tbody>
</table>

Note: ANCOVA analyses using LSD post hoc analysis adjusting for age and sex.

$^a$ $\eta_p^2$ = partial eta squared

$^b$ Cohen's d effect size

$^c$ Adjusted for number of sports, age and sex.

$^d$ Adjusted for number of sports, age and sex and baseline PA.
Longitudinal physical activity

- PA levels reduced from baseline to follow-up.
- Males were more active than females.
- Tracking coefficients ($\rho$) ranged from .16 to .47 and are comparable to those found in systematic reviews. E.g. in a review of European studies, $\rho$ ranged from -.01 to .47 (14).
- In studies with a follow-up of five years or less, moderate tracking was detected (15).
Sports participation predictors of physical activity

- Moderate tracking levels for SP found in both sexes in this study support the concept of SP tracking from childhood and adolescence into adulthood.
- The medium effect size of SP frequency on later PA found here illustrates the importance of promoting regular participation.
- Of concern are the declining levels of SP between T1 and T2 as potential long-term health benefits of SP are most likely attributable to SP maintenance (16).
- Participation at elite or competitive levels at baseline were associated with greater PA at T2 and merits the promotion of competitive sport.
- Gender inequity in sport.

(16) Basterfield et al., 2015
Limitations

› Tracking is represented by Spearman correlations.
› The proportion of females is significantly greater than males.
› PA is a complex behaviour, and future studies should include other PA domains as predictors of later PA.
Conclusion

- PA should be promoted in youth as tracking coefficients suggest it can continue into later life.

- Club sport plays a valuable role in sustaining PA involvement. Individuals who frequently participate in club sports, and who are involved at an elite standard, are more active five years later than those who are not.

- A gender inequality, which is highlighted by the higher proportions of males participating at elite and competitive levels than females, needs to be addressed.

- Sports club participation should be included in wider strategies that promote lifelong PA.
Acknowledgments

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• Many thanks to the school principals, PE teachers and the participants who took part.

References


Questions

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