



Tracking the Physical Activity Levels of the *Growing Up in Ireland* Child Cohort Over Eight Years

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Economic and Social Research Institute

10th Annual
Research
Conference
2018



**An Roinn Leanaí
agus Gnóthaí Óige**
Department of Children
and Youth Affairs



INTRODUCTION

HEALTH BENEFITS OF PHYSICAL ACTIVITY WELL ESTABLISHED

- Physical activity (PA) is essential to a healthy lifestyle
 - Early evidence from London Transport Workers Study (Morris *et al.*, 1953)
 - Being 'active' has a protective effect against chronic disease such as CVD, type II diabetes and some cancers (Lee *et al.*, 2012)
 - Inactivity is the 4th leading cause of death worldwide (Kohl *et al.*, 2012)
- Key role in combatting overweight/obesity and associated disease, particularly given it is a modifiable behaviour
 - E.g. Daily recommended calorie intake for a man is ~2500 calories
 - Daily energy expenditure for an average man is 2500 calories = energy balance
 - If he's particularly sedentary, his EE might drop to 2000 calories = **energy surplus**
 - But if he ran a marathon, his EE would increase to 5000+ calories = **energy deficit**

Solution to obesity epidemic? Daily marathon!



INTRODUCTION

EVIDENCE OF REDUCTION IN PA THROUGH ADOLESCENCE

- Recent meta-analyses highlight PA decline from childhood to adulthood
 - Dumith *et al.*, 2011:
 - 25/26 studies showed yearly reduction in PA – 7% decrease per year
 - Greater decline for girls than boys
 - Corder *et al.*, 2017:
 - Majority of studies displayed a significant decline in PA into early adulthood
 - Greater decline observed via accelerometry vs. questionnaire
- Evidence of reduction in PA levels in Irish research
 - Children's Sport Participation and Physical Activity survey
 - 'Active' in Primary = 19% Post-primary = 12%
 - Health Behaviours in School Children survey
 - 'Active' 11yrs = 38-51% (f/m) 15yrs = 13-27%
 - 2016 Healthy Ireland Survey:
 - 'Active' 15-24yr = 34-56% (f/m) 35-44yr = 23-39%



AIMS OF THE STUDY

PA Behaviour Influenced by Many Factors:

- Biological (BMI, sex, ethnicity)
- Environmental (access, facilities, season)
- Behavioural (screen time, diet, risky behaviour)
- Demographic (SES, parental obesity)
- Psychological (self-esteem, attitudes)
- Social (friends, parent PA)

Ref: Sallis et al., 2000, Bauman et al., 2012

- Determinants of behaviour not necessarily the same as determinants of behaviour *change*

Research Questions:

Q1. Do we observe a decline in physical activity levels for the *GUI* Child Cohort from ages 9 to 17/18 years?

Q2. If so, what causes young people to become less active?
- What are the **barriers** to being active / **predictors** of activity decline?

METHODS

- Two specific questions about PA levels asked BUT same question asked at ages 9, 13 and 17/18 years:
 1. No. of times / fortnight they did 20mins+ of **light exercise**?
 - Examples include walking or slow cycling (including in PE)
 2. No. of times / fortnight they did 20mins+ of **hard exercise**?
 - Examples include playing football, jogging or fast cycling (including in PE)
- How do we interpret & analyse this PA data? **MET-minutes/week**
 - METs are a unit of measurement of the energy expenditure (EE) associated with a given activity
 - 1MET = 1kcal/kg/hour = equivalent to sitting at rest
 - Any activity can be expressed as a multiple of this 1MET reference*
 - Walking is 2-5METs (requiring 2-5 times as much energy as rest)
 - Cycling leisurely = 6-8METs - Jogging at 10km/hr = 9-10METs
 - Hoovering = 3-4METs - Mowing the lawn = 4-5METs



METHODS: Applying METs to GUI Data

- 1. “Hard” Exercise / Vigorous Physical Activity (VPA):

Playing football

8METs

Jogging

9-10METs

Fast cycling

10METs

VPA = 8METs (same values as WHO GPAQ)

- 2. “Light” Exercise / Moderate Physical Activity (MPA):

Walking

3.5METs

Slow cycling

4.5METs

MPA = 4METs (same values as WHO GPAQ)

- **MET-mins/wk** = (MPA-mins/wk * 4METs) + (VPA-mins/wk * 8METs)

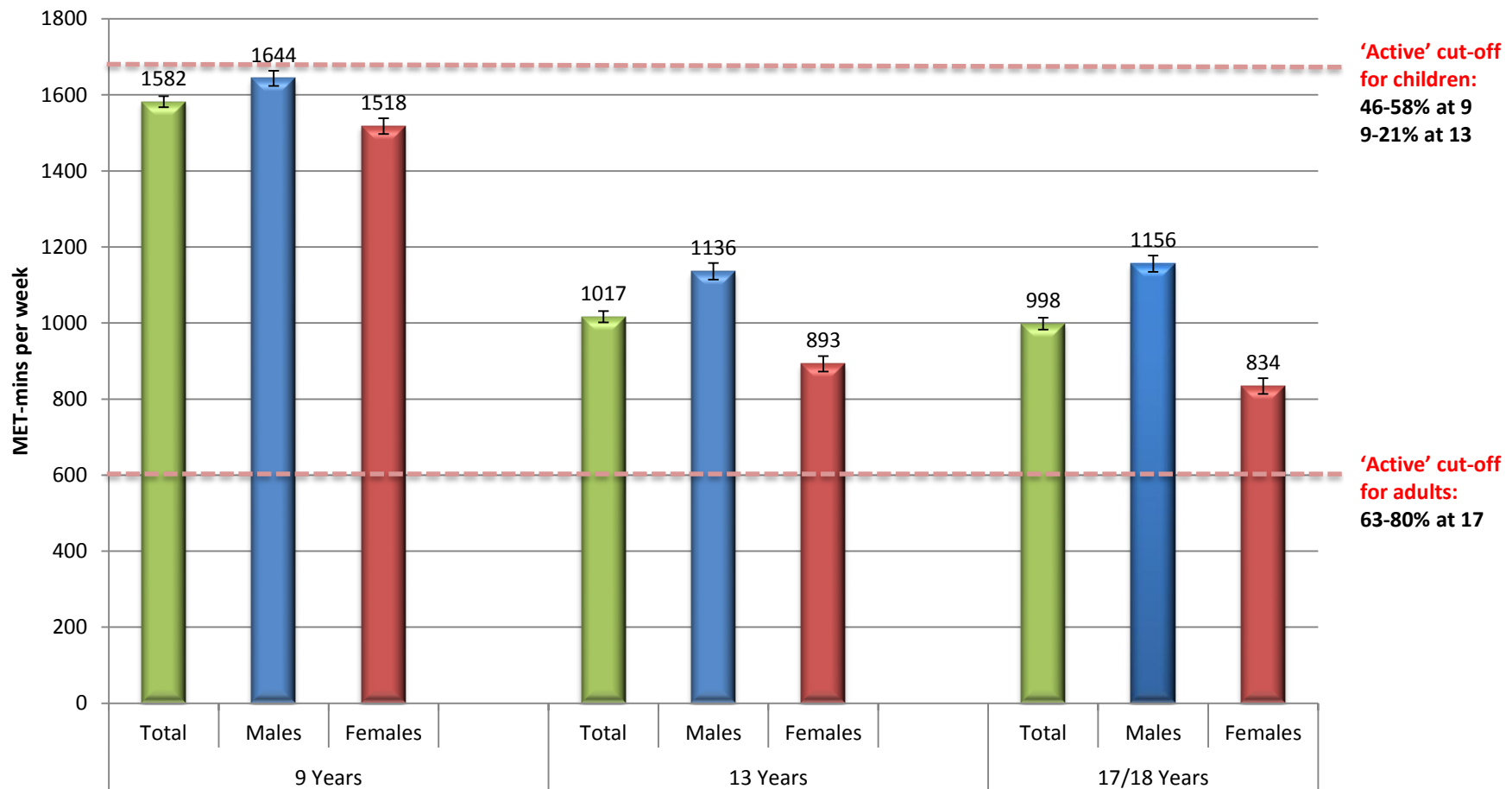
*assuming one bout of activity is 30mins

- **“Active” child guidelines:** 60mins MVPA per day = **1680 MET-mins/week**

- **“Active” adult guidelines:** 30mins MPA on 5 days = **600 MET-mins/week**

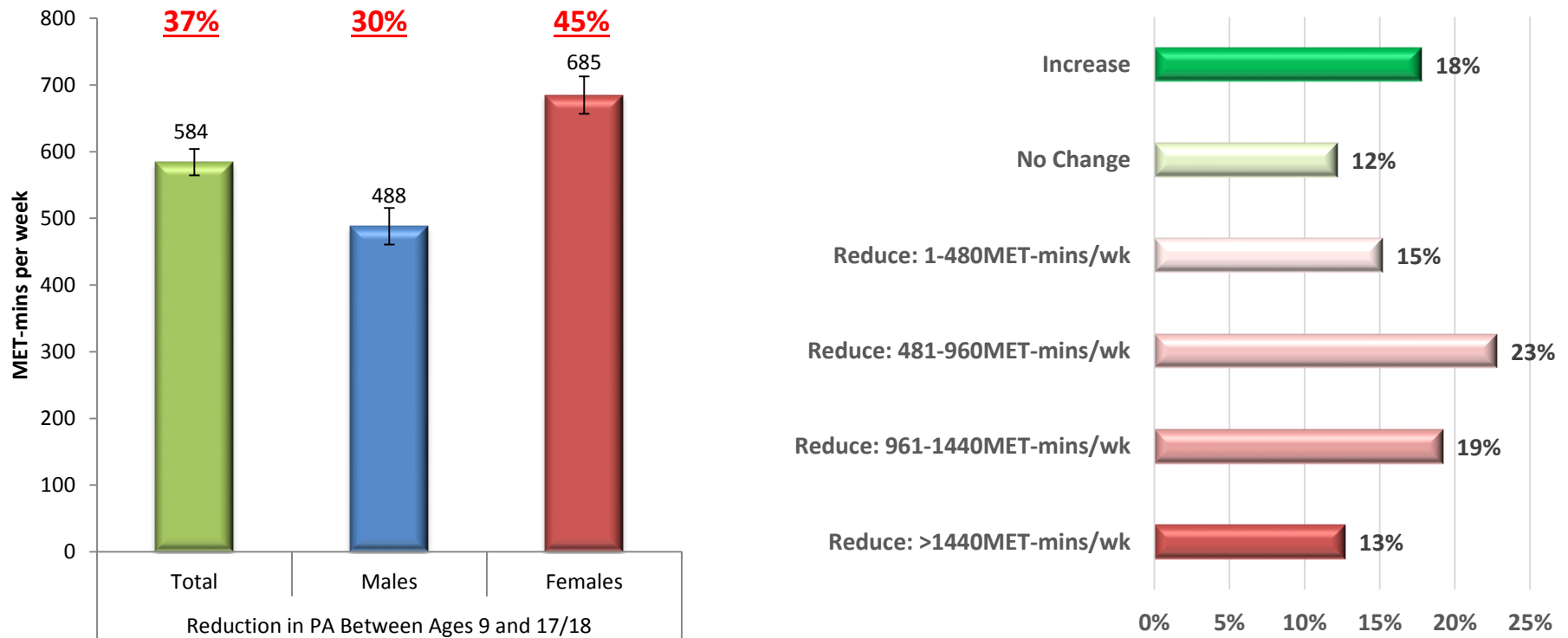
RESULTS: Descriptives

Fig 1: PA Levels across all three waves of the study (n=6,039)



RESULTS: Reduction in Physical Activity

Fig 2: Reduction in PA from 9 to 17Yrs ($\Delta PA = PA \text{ at } 9\text{yrs} - PA \text{ at } 17/18\text{yrs}$)



* 10min daily reduction (280MET-mins/week) in MVPA associated with increased waist circumference, higher BP and higher fasting insulin (Ekelund *et al.*, 2012)

RESULTS: Bivariate Analysis

Table 1: Activity Reduction from 9-17/18yrs according to Key Factors

| | | N | Mean | Sig. |
|-------------------------------|---------------------------------------|----------|-------------|-------------|
| YP Gender | Male | 2983 | 465.7 | <0.001 |
| | Female | 2810 | 649.1 | |
| Family Income Quintile | 1.00 Lowest | 961 | 604.4 | 0.001 |
| | 2.00 2nd | 1128 | 566.5 | |
| | 3.00 3rd | 1095 | 469.0 | |
| | 4.00 4th | 1097 | 561.4 | |
| | 5.00 Highest | 1108 | 570.0 | |
| Family Type | 1.00 Single Parent 1 or 2 children | 619 | 470.8 | <0.001 |
| | 2.00 Single Parent 3 or more children | 374 | 623.4 | |
| | 3.00 Couple 1 or 2 children | 2026 | 524.5 | |
| | 4.00 Couple 3 or more children | 2775 | 586.1 | |
| Family Class | 1.00 profess | 2468 | 555.0 | 0.001 |
| | 2.00 skilled man | 2090 | 519.8 | |
| | 3.00 unskilled | 616 | 613.7 | |
| | 4.00 No valid class | 520 | 649.9 | |

RESULTS: Bivariate Analysis

Table 1: Activity Reduction from 9-17/18yrs according to Key Factors

| | | N | Mean | Sig. |
|--------------------------|-----------------------------|------|-------|--------|
| YP BMI at 9 | Healthy weight | 4007 | 569.1 | 0.008 |
| | Overweight | 1097 | 548.0 | |
| | Obese | 364 | 440.0 | |
| YP Chronic Illness at 9 | Yes | 637 | 615.1 | 0.035 |
| | No | 5156 | 547.2 | |
| YP Chronic Illness at 17 | Yes | 758 | 642.2 | 0.001 |
| | No | 5009 | 542.9 | |
| YP TV Viewing | Less than an hour | 1360 | 559.0 | 0.013 |
| | 1 hour to less than 3 hours | 3852 | 567.6 | |
| | 3 hours or more | 581 | 460.0 | |
| No. of Friends | None | 111 | 257.7 | <0.001 |
| | 1 | 357 | 541.7 | |
| | 2 or 3 | 2369 | 547.1 | |
| | 4 or 5 | 1933 | 561.9 | |
| | 6 or more | 1014 | 604.6 | |
| Piers-Harris | | | | <0.001 |



RESULTS: Bivariate Analysis

Non-significant variables excluded from further analysis

- **Environmental factors:** access to play areas, green space locally, membership of sports club
- **Demographic/biological:** parental education, general health
- **Psychosocial:** efforts to lose weight, dieting
- **Social:** video games use*, TV/computer in room



RESULTS: Regression Analysis

Hierarchical Regression Predicting Reduction in Physical Activity

| | Model 1 – BMI (controlling for baseline PA & gender) | | Model 2 – Model 1 + demographic variables | | Model 3 – Model 2 + all other variables | |
|---------------------------------|--|--------|---|--------|---|--------|
| | B | Sig. | B | Sig. | B | Sig. |
| YP Physical Activity at 9 Years | 0.9 | <0.001 | 0.9 | <0.001 | 0.9 | <0.001 |
| YP Gender (female) | 298.2 | <0.001 | 316.3 | <0.001 | 326.7 | <0.001 |
| YP BMI at 9 Years | 7.3 | 0.004 | 4.2 | 0.132 | 3.1 | 0.279 |
| PCG Overweight/obese at 9 Years | | | 38.7 | 0.023 | 44.2 | 0.011 |
| 2 nd Income Quintile | | | 60.6 | 0.034 | 52.4 | 0.074 |
| 1 Parent Family, 1-2 Children | | | -91.7 | 0.005 | -84.5 | 0.011 |
| PCG Never worked | | | 118.9 | 0.005 | 55.5 | 0.203 |
| YP Chronic illness at 9 Years | | | | | 64.2 | 0.028 |
| TV viewing (less than 1 hr/day) | | | | | -48.1 | 0.018 |
| Number of Close friends | | | | | -21.1 | 0.025 |
| Piers-Harris Score | | | | | -3.7 | <0.001 |
| R ² | 0.447 | | 0.457 | | 0.458 | |



CONCLUSION

SUMMARY

- Significant decline in physical activity levels (30-45%) for the *GUI* cohort (**Q.1**)
- Findings here and elsewhere suggest a natural tendency towards decline
- Social (friends), behavioural (TV viewing), demographic (family type, SES, parental weight status) and psychosocial (self-concept) all predictors of decline (**Q.2**)
- Confirms complexity of physical activity behaviour
 - Range of barriers across many domains = multi-dimensional interventions at an early age
 - Interventions should aim to increase baseline PA and temper tendency towards decline
- Limitations:
 - Ideally use more robust measure of PA e.g. long questionnaire or objective tool (normal data)
 - However, must consider increased burden on YP / increased resource constraints
- Future research:
 - Look at 9-13yr vs. 13-17yr transitions separately, along with entry into adulthood
 - Has *intensity* or *frequency* of physical activity changed?
 - Explore parental PA as a predictor of decline



THANK YOU

Many thanks to the following parties:

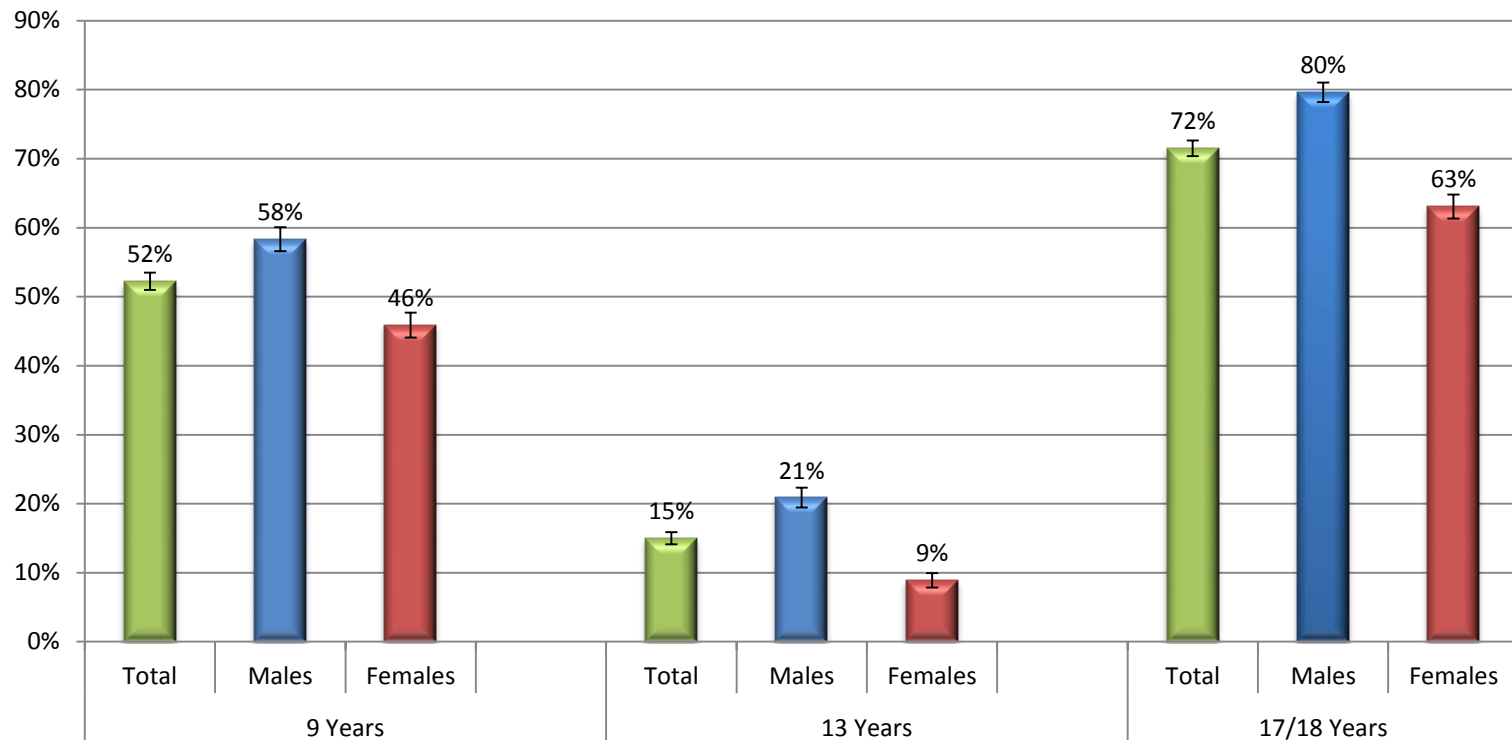
- My GUI and ESRI colleagues
- Our colleagues at the DCYA, TCD and CSO
- Huge thanks to all the GUI study children and their families

Questions, comments or feedback welcome.

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RESULTS: Percentage 'Active'

Fig 3: Percentage of Study Children Achieving PA Guidelines



- Irish HBSC survey @ 11yrs: 38% (girls), 51% (boys)
- Healthy Ireland survey @ 15-24yr: 34% (women), 56% (men)

RESULTS: Being 'Active' Over Time

Fig 4: Percentage 'Active' across all 3 waves of the study

| 'ACTIVE' AT EACH WAVE? | | | % |
|------------------------|-----------------|--------------------|------|
| <u>9 years</u> | <u>13 years</u> | <u>17/18 years</u> | |
| no | no | no | 15% |
| no | no | yes | 28% |
| no | yes | no | 0.8% |
| no | yes | yes | 4% |
| yes | no | no | 12% |
| yes | no | yes | 30% |
| yes | yes | no | 1.1% |
| yes | yes | yes | 9% |