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Computer Usage and Academic Performance Across Four waves of Growing Up in Ireland

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Introduction

- Presence of computers and other internet enabled devices approaching saturation Europe wide
  - (EU – Kids online, 2004 to 2014)
- Many homes now have multiple devices making supervision and monitoring difficult
- Children using computers at earlier ages and for longer than ever before
  - Habit formation and skill development (Livingstone et al. 2011)
- Evidence for low overall digital literacy
  - (European commission 2013)

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Introduction

- Computer use has varied effects on academic performance. Mixed effects reported varying by **usage** intensity and **application** types (Casey et al. 2012)
- Consequences/Adaptations; potential changes in attentional patterns and behaviours as a result of technology use
  -Johnson (2016)
- Academic advantages have been seen in several large scale studies:
  - Programme for International Student Assessment (PISA) (OECD,2005)
  - Longitudinal Study of Australian Children (Fiorini, 2010)

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Aims

Summary of Casey et al (2012)

- Importance of controlling for social gradient in test outcomes
  - (Williams et al 2009)
- Better test outcomes at 9 years
  - Moderate computer use
  - Informational computer use
- Worse test outcomes at 9 years
  - Social media use

Aims of current study

- Move from cross sectional to a longitudinal view
  - Classes of behaviour (Latent classes)
  - Change over time (Latent growth)

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Sample

- GUI Cohort '98 Anonymised Microdata File (AMF) Waves 1-4

Longitudinal fixed panel design

- **Sample size**
- Wave 1 9yrs N = 8,568
- Wave 2 13yrs N = 7,525
- Wave 3 17yrs N = 6,210
- Wave 4 20yrs N = 5,190

- Evidence of differential attrition across waves (Williams et al, 2009). Re-weighted using 20yr weight

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Academic performance variables

- **9 Year Data**
  - Drumcondra Primary Maths Test
    - British Ability Scales (matrices)
- **13 Year Data**
  - Drumcondra Numerical Ability Test
- **17 Year Data**
  - Junior Certificate Mathematics
- **20 Year Data**
  - Leaving Certificate Mathematics

- **Scoring of Junior Certificate**
  - Junior Certificate (Grade A-E)
  - Junior Certificate level (Higher, Ordinary, Foundation)
  - Scale constructed following a coding scheme producing a Leaving Certificate points total equivalent range 10-100
- **Academic scores parameterised as Z-scores Mean of zero, SD of one.**

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Computer applications at 9 and 13

- **Computer use at 9**
- How often?
  - None, a little, a lot
- Playing games
- **Chatrooms**
- Media Consumption
- **E-mailing**
- **Instant messaging**
- Surf for fun
- Homework
- School projects

- **Computer use at 13**
- How often?
  - None, a little, a lot
- Playing games
- **Social Media**
- Media Consumption
- Surf for fun
- Homework
- School Projects

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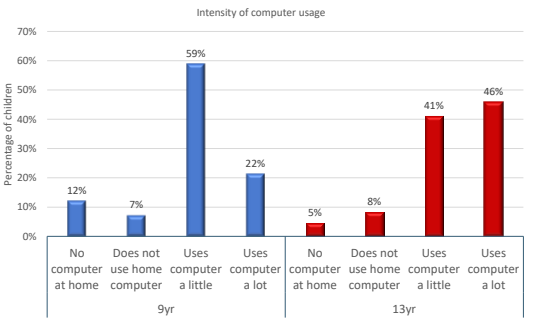
Computer usage intensity at 9 and 13



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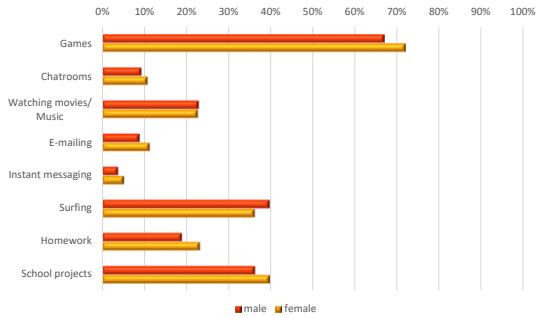
Applications used at 9 by gender



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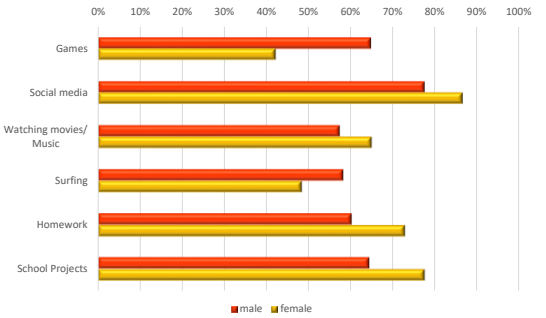
Applications used at 13 by gender



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Latent class model example

- O'Neill and Dinh (2018)
- Datasets
  - EU kids online (2011)
  - Net Children Go Mobile
- 4 broad clusters outlined
  - Entertainment oriented
  - Learning & handheld device oriented
  - Social networking & communication oriented
  - Active 'savvy' user

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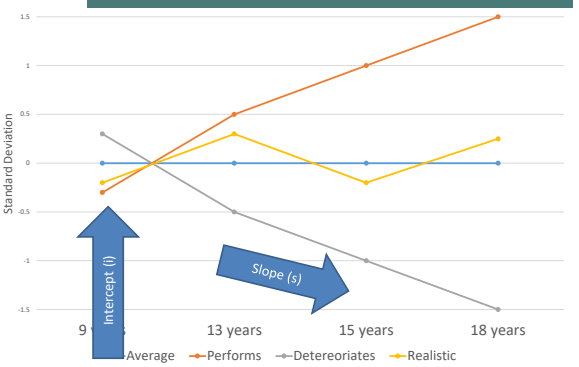
Latent growth model example



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Statistical models developed

Latent Class Models

- Begin with baseline model (1 class) and increase number of latent classes to balance model fit statistics with a parsimonious number of classes of behaviour

Latent growth models

- Model 1: Baseline model
- Model 2: Household Level covariates
- Model 3: Child level covariates
- Model 4: Latent Class variables

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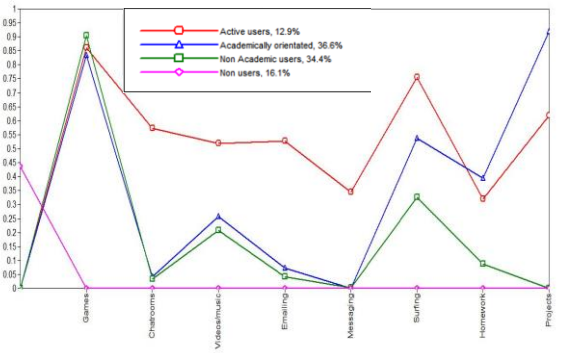
9yr model classifications



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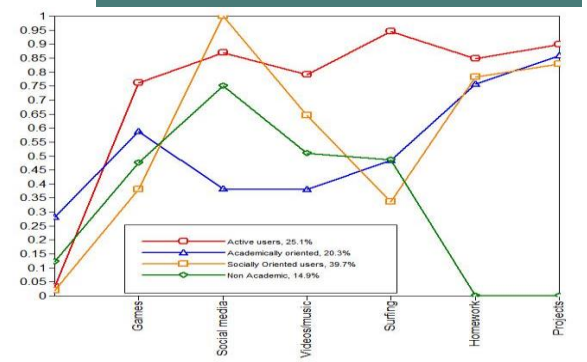
13yr model classifications



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Summary of model fit statistics

Baseline models 1-3

Covariates (Williams et al 2009)

- PCG/SCG Education
- HSD Structure
- HSD Social class
- Equivalised Income
- Child gender
- Child ability (British ability scales-Matrices)

Model Fit Statistics support all models

- Chi-sq to df ratio ✓
- CFI values above 0.9 ✓
- RMSEA values below 0.10 ✓
- SRMR values below 0.10 ✓

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Model 4 summary
Growth model with latent class variables

	Starting point (Intercept)	Mathematics (Standardised) β
9 years	Active users	0.20**
	Academically oriented users	0.32***
	Non-computer users	0.23***
	Non academic users[1]	Ref
	Change over time (Slope)	**Mathematics (Standardised) β**
13 years	Active users	0.48***
	Academically oriented user	0.23**
	Socially oriented user	0.21**
	Non academic user[1]	Ref

* P < .05, ** p < .01, *** p < .001

Reference categories:
- [1]non academic computer users at 9 and 13

- None to moderate use related to better intercept outcomes
- Longitudinally, relative to 'Non-academic' computer users, 'Active', 'Academically oriented' and 'Socially oriented' users showed significantly better developmental trajectories

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Implications

- Findings are supported both **cross-sectionally** and **longitudinally**
- Evidence that informational computer use supports better educational outcomes
- Evidence that not engaging in productive use of computers is associated with poorer outcomes
- Support for "Ladder of opportunities" concept
  - (Livingstone et al. 2011)

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Future research

- Challenges of parameterisation of educational outcomes
- Expand longitudinal modelling of computer use
- Flexible control variables
- Develop guidelines based around both time and age appropriate activities

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Thank you

Thanks to all GUI team members and especially to study participants

Questions, comments and suggestions are very welcome

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