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)

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)
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

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.

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

Computer usage intensity at 9 and 13

- 9yr
- 13yr
- 7%
- 10%
- 12%
- 22%
- 22%
- 58%
- 46%
- 46%
- 12%
- 0%
- 12%

Intensity of computer usage

Percentage of children

No computer at home
Does not use home computer
Uses computer a little
Uses computer a lot
No computer at home
Uses computer a little
Uses computer a lot

02/12/2021
Applications used at 9 by gender

Applications used at 13 by gender

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

Latent growth model example
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

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
Model 4 summary
Growth model with latent class variables

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<tr>
<th>Starting point (Intercept)</th>
<th>Mathematics  (Standardised) β</th>
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<tr>
<td>Active users</td>
<td>0.20**</td>
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<tr>
<td>Academically oriented users</td>
<td>0.32***</td>
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<tr>
<td>Non-computer users</td>
<td>0.23***</td>
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<tr>
<td>Non academic user$^1$</td>
<td>Ref</td>
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</table>

<table>
<thead>
<tr>
<th>Change over time (Slope)</th>
<th>Mathematics (Standardised) β</th>
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<tbody>
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<td>Academically oriented user</td>
<td>0.23**</td>
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<tr>
<td>Socially oriented user</td>
<td>0.21**</td>
</tr>
<tr>
<td>Non academic user$^2$</td>
<td>Ref</td>
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</tbody>
</table>

Reference categories:
• Non academic computer users at 9 and 13

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

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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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