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Trajectories of technology usage in younger children

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Screen Time

- Screen time - a useful shortcut to describe a wide set of behaviours
- Early screen time research – largely based around television consumption
- Expanded to include desktops, laptops, tablets, phones etc
(Strasburger et al., 2013)

Screen Time

- Inherent assumption of screen time being a sedentary behaviour leading to weight gain

(Peck et al., 2015)

- Further assumption often made that high screen time may displace other beneficial learning activities

(Murray and Morgan 2015)

- Mixed attitudes and evidence for any screen time effects particularly for younger children

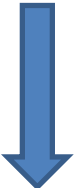
(Screen time, red wine, coffee, chocolate)

Hypotheses

- Screen time data can be explained by one or more latent classes
- Latent classes capture meaningful behavioural differences between groups
- These differences in behaviour remain statistically significant when controlling for child and demographic characteristics

Data Source for the Current Study

- GUI Infant Cohort Anonymised Microdata Files (AMF)

• Wave 1	9mths	Unweighted sample of – 11,134	2008
• Wave 2	3yrs	Unweighted sample of – 9,793	
• Wave 3	5yrs	Unweighted sample of – 9,001	
• Wave 4	7yrs	Unweighted sample of – 5,344	
• Wave 5	9yrs	Unweighted sample of – 8,032	

- Pure fixed panel design

- Evidence of differential attrition across waves (Williams, 2009). Re-weighted using census information

Screen time variables

- 3yrs – TV time

- None
- < 2 hours
- 2-3 hours
- 3 hours +

- Variable naming

- 3Y

- 5yrs – Screen time

- 5Y

- 7yrs – Screen time

- Week days, Weekends

- 7YWD, 7YWE

- 9yrs

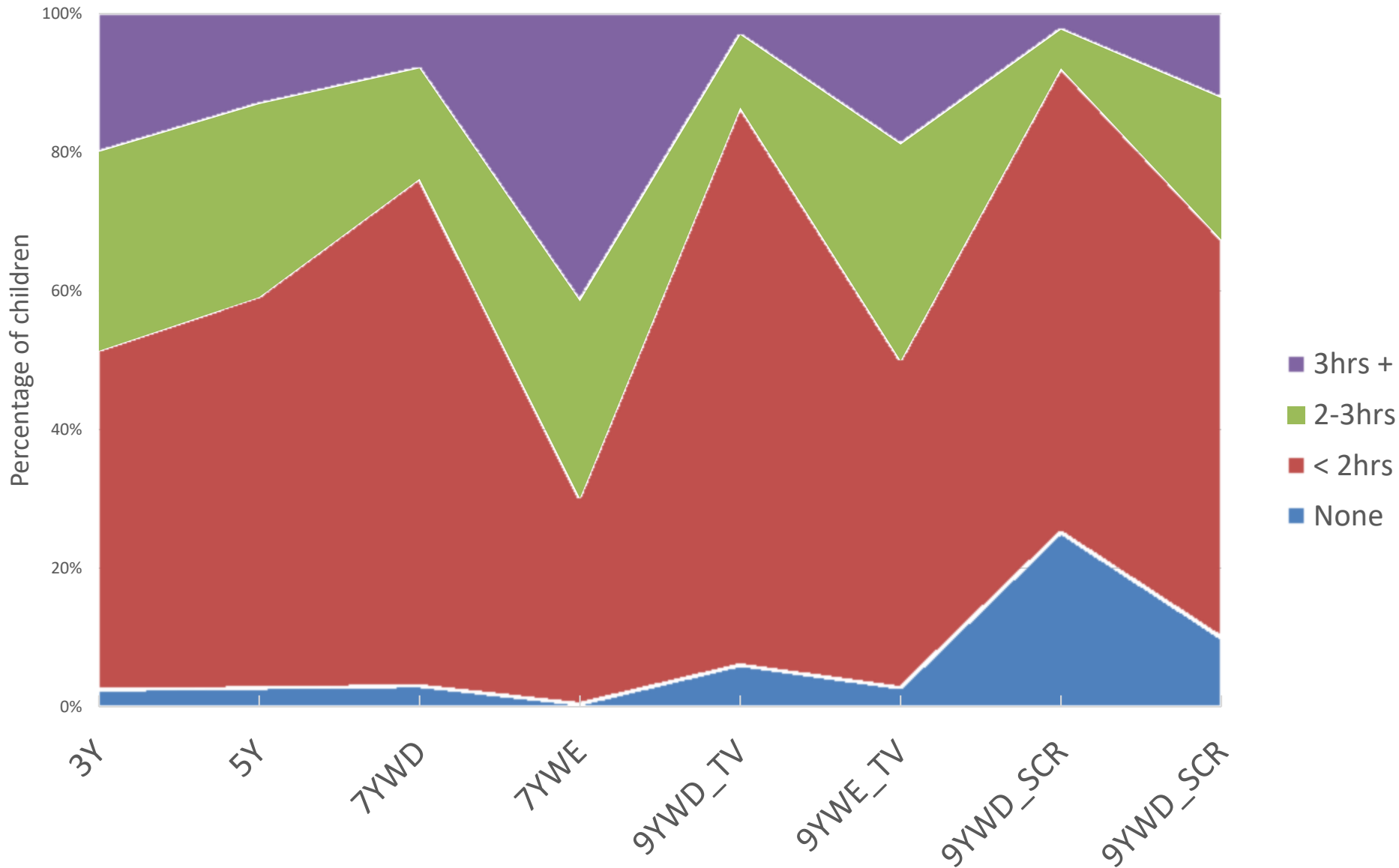
- TV time weekdays, weekends

- 9YWD_TV, 9YWE_TV

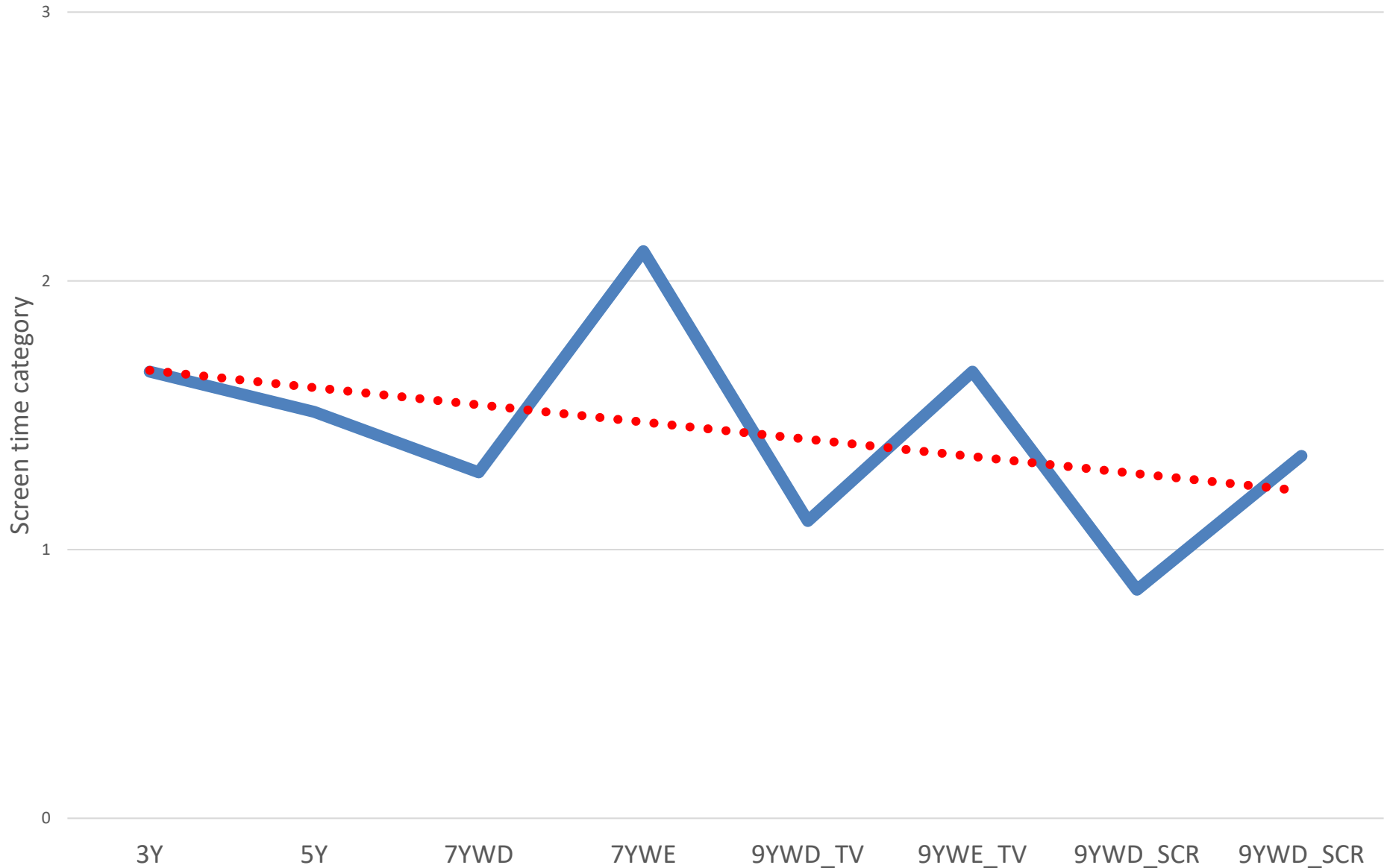
- Other Screen time Weekdays, weekends

- 9YWD_SCR, 9YWE_SCR

Screen time from 3-9 years across multiple domains



Group average of screen time across all categories

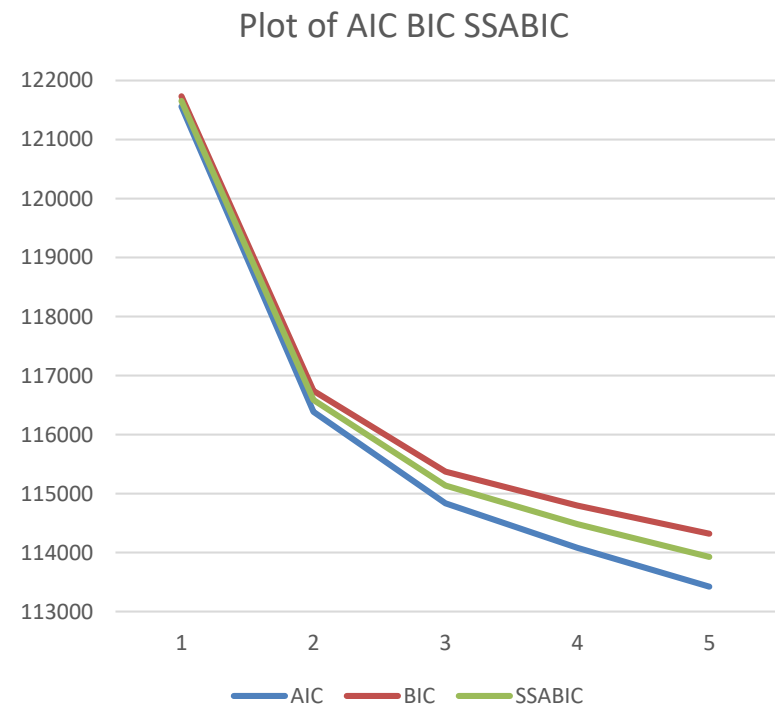


Statistical model developed

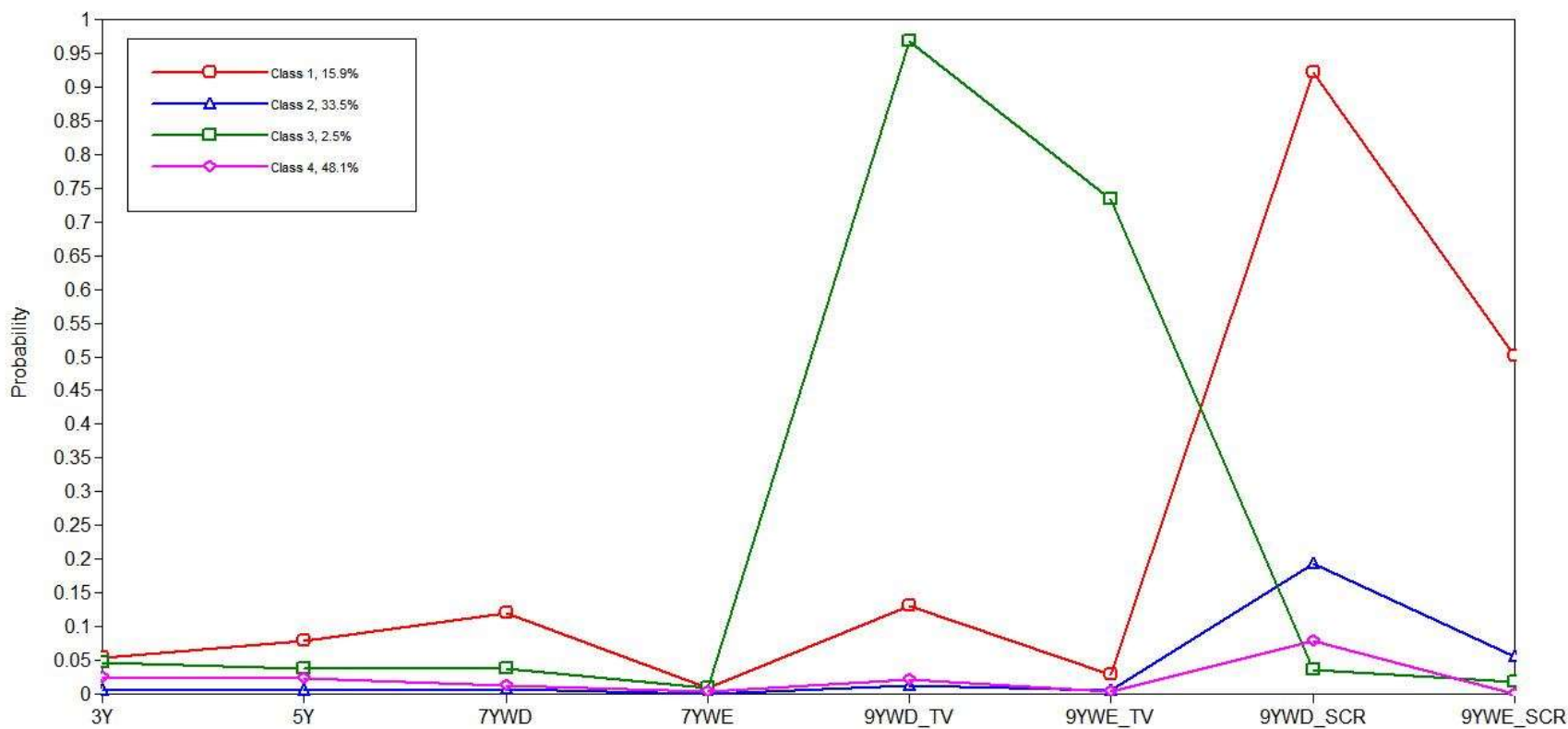
- Latent Class Analysis (LCA)
- Group individuals into categories
- Each category contains individuals who are similar to each other and different from individuals in other categories
- Classes developed using Mplus (Muthén & Muthén, 2000)
- Classes exported and used as categorical variable in further models
- Allows participants with partial data to contribute to development of latent class models

LCA fit statistics

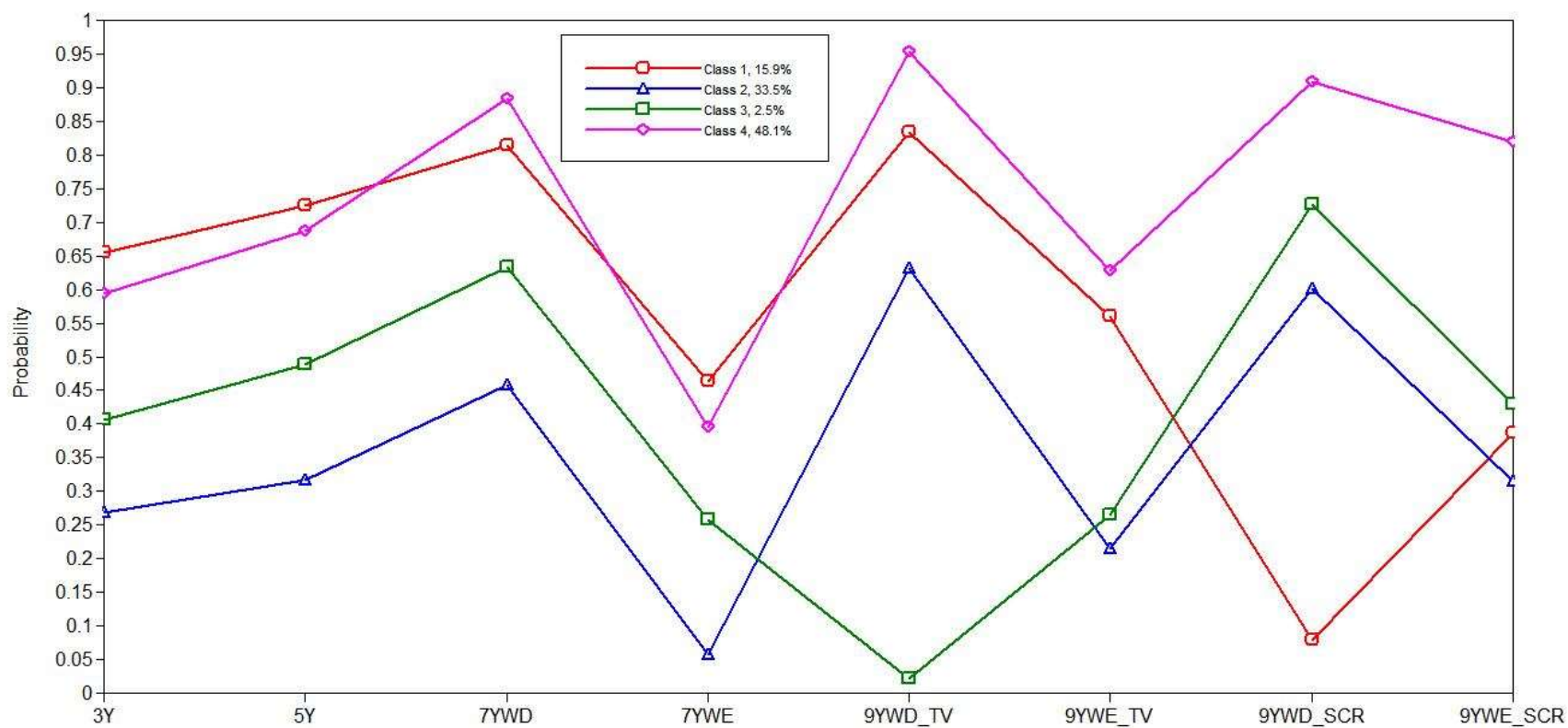
(Number of latent classes)	Log Likelihood	Best LL replicated	# parameters	Lo-Mendel test LMR-LRT (p)	Entropy (information explained)
1	-60755.037	N/A	24	N/A	N/A
2	-58144.391	y	49	p < .001	0.572
3	-57343.787	y	74	p < .001	0.609
4	-56941.436	y	99	p < .001	0.676
5	-56587.552	y	124	p > .05	0.614



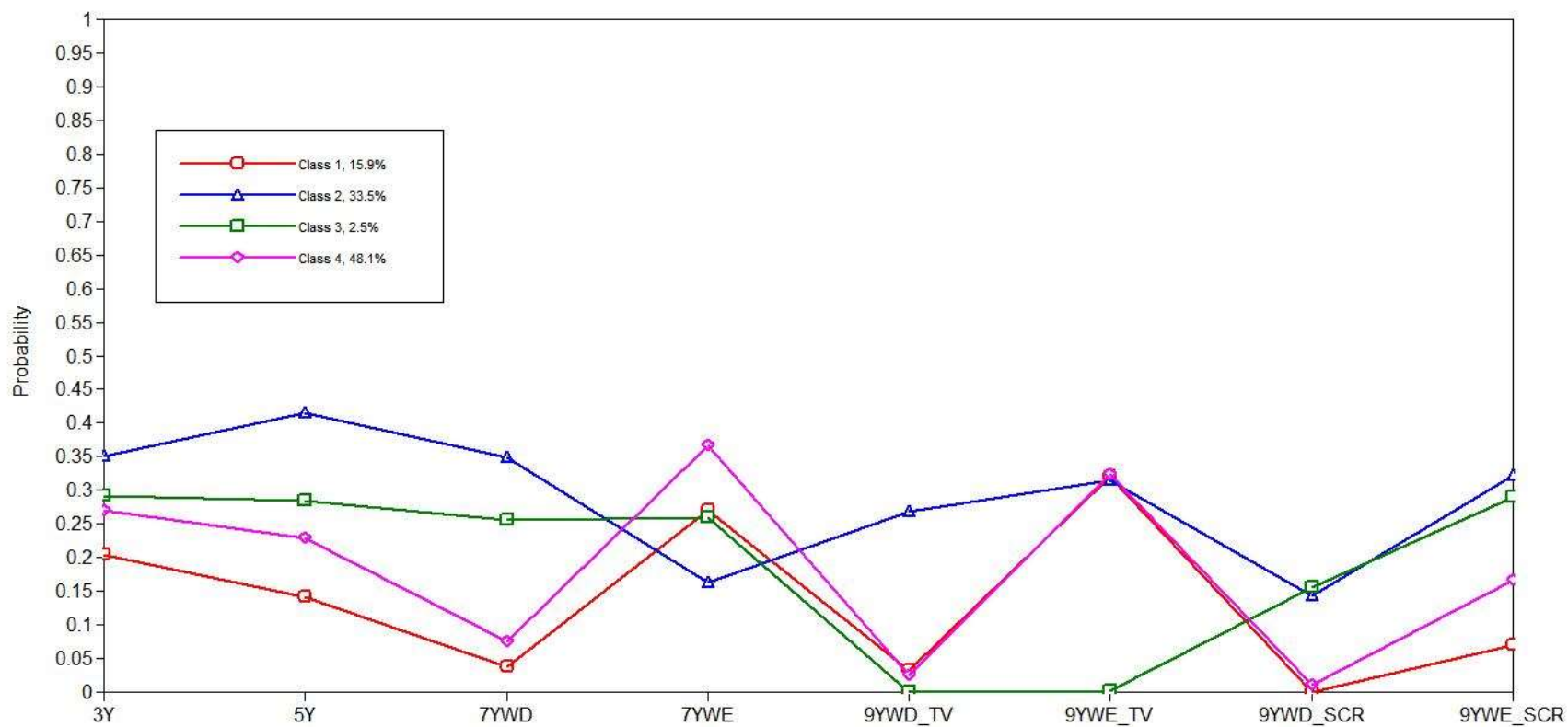
Category: No use



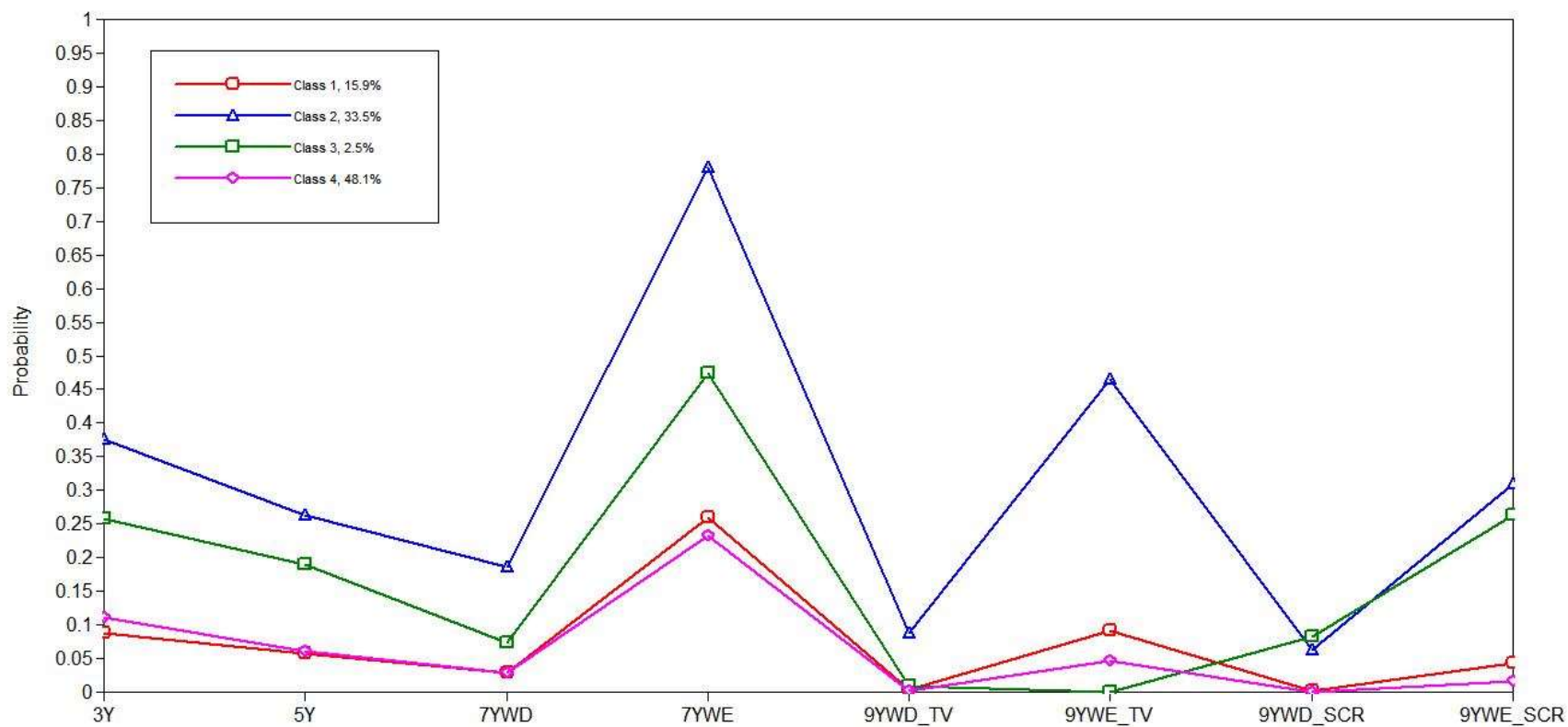
Category: < 2hrs



Category: 2-3hrs



Category: 3hrs +



Description of classes and hypotheses

- **Class 1** 15.9% N = 1,441
 - Moderate TV, Low Screens
 - **Class 2** 33.5% N = 3,290
 - High TV, High Screens
 - **Class 3** 2.5% N = 196
 - Low TV, High screens
 - **Class 4** 48.1% N = 5,242
 - Moderate TV, Moderate Screens
- Screen time data can be explained by one or more latent classes.
 - Latent classes capture meaningful behavioural differences between groups
 - These differences in behaviour remain statistically significant when controlling for child and demographic characteristics

Educational performance variable

- **9 Year Data**

- Drumcondra Primary Reading Test
- Curriculum linked
- Age and class appropriate
- Parameterised as a percentage and logit score
- Allows comparison for all children on the same scale

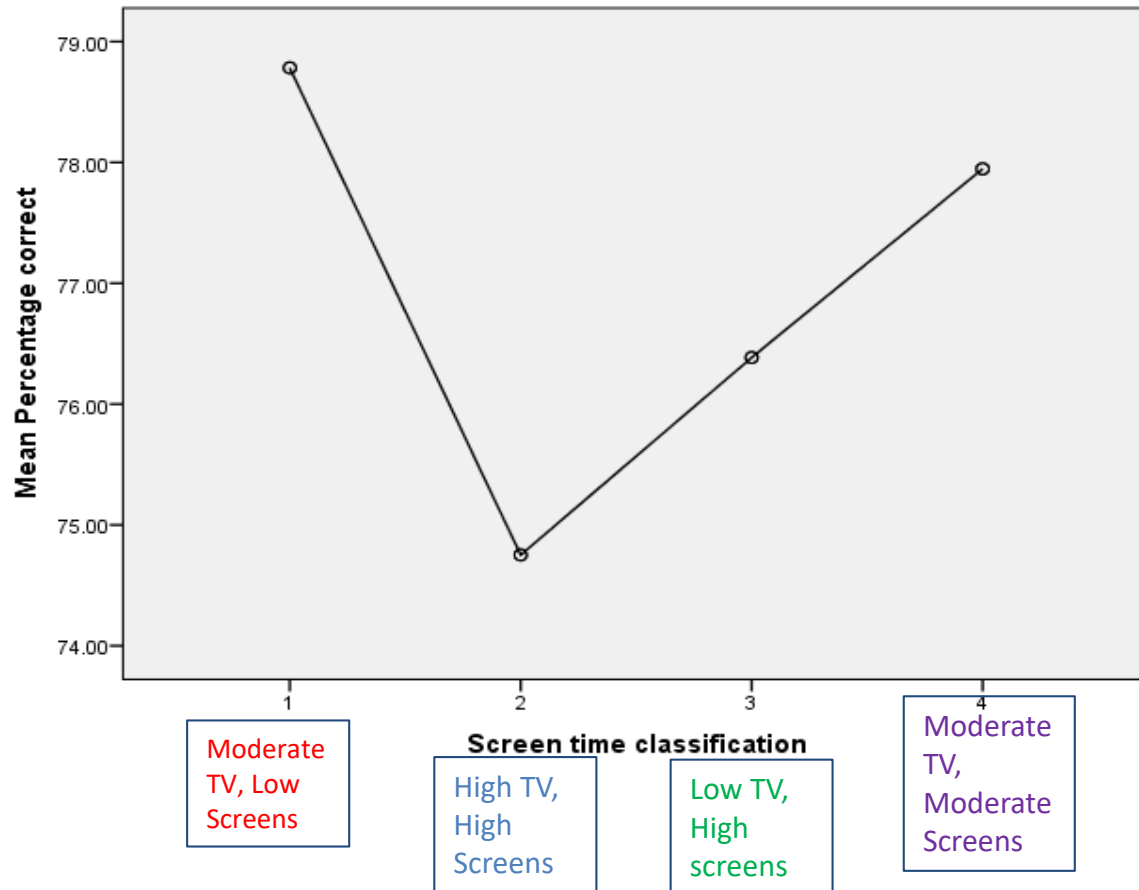
One-way Analysis of Variance

Overall model
 $F(3, 7746) = 20.816, p < .001$

$\text{Eta}^2 = .008$

		Mean difference
High TV, High Screens	Moderate TV, Low Screens	4.1%*
	Low TV, High screens	1.6%
	Moderate TV, Moderate Screens	3.2%*
* $p < .001$		

Means of Drumcondra Reading test - percentage correct - Wave 5



Hypotheses revisited

- Screen time data can be explained by one or more latent classes.
- Latent classes capture meaningful behavioural differences between groups
- These differences in behaviour remain statistically significant when controlling for child and demographic characteristics

Control variables

- Child covariates
 - Gender
 - British Abilities Scale (Picture similarities score)
 - Urban/rural
- Parent level
 - PCG education (Ref: Degree+ level)
 - Presence of SCG
- Family level
 - Equivalised Income (Ref: highest income)
 - Social class (Ref: professional workers)

Regression model 1

		Model 1			
Ref: High TV and Screen use	Moderate TV, Low Screens	0.064***			
	Low TV, High screens	0.005			
	Moderate TV, Moderate Screens	0.079***			
Child level covariates	Female Gender				
	Picture similarities -5yrs				
	Rural				
Education Ref: Degree level	PCG up to primary				
	PCG Secondary				
	PCG Post Secondary				
	SCG present				
Income Ref: Highest income quintile	Lowest quintile				
	2nd quintile				
	3rd quintile				
	4th quintile				
Social class Ref: Professional workers	Managerial and technical				
	Non manual				
	Skilled manual				
	Semi-skilled				
	Unskilled				
	Validly no class				

Regression model 2

		Model 1	Model 2		
Ref: High TV and Screen use	Moderate TV, Low Screens	0.064***	0.054***		
	Low TV, High screens	0.005	0.003		
	Moderate TV, Moderate Screens	0.079***	0.068***		
Child level covariates	Female Gender		0.018		
	Picture similarities -5yrs		0.212***		
	Rural		-0.001		
Education Ref: Degree level	PCG up to primary				
	PCG Secondary				
	PCG Post Secondary				
	SCG present				
Income Ref: Highest income quintile	Lowest quintile				
	2nd quintile				
	3rd quintile				
	4th quintile				
Social class Ref: Professional workers	Managerial and technical				
	Non manual				
	Skilled manual				
	Semi-skilled				
	Unskilled				
	Validly no class				

Regression model 3

		Model 1	Model 2	Model 3	
Ref: High TV and Screen use	Moderate TV, Low Screens	0.064***	0.054***	0.017	
	Low TV, High screens	0.005	0.003	0.001	
	Moderate TV, Moderate Screens	0.079***	0.068***	0.036***	
Child level covariates	Female Gender		0.018	0.026	
	Picture similarities -5yrs		0.212***	0.187***	
	Rural		-0.001	0.006	
Education Ref: Degree level	PCG up to primary			-0.186***	
	PCG Secondary			-0.147***	
	PCG Post Secondary			-0.154***	
	SCG present			0.055***	
Income Ref: Highest income quintile	Lowest quintile				
	2nd quintile				
	3rd quintile				
	4th quintile				
Social class Ref: Professional workers	Managerial and technical				
	Non manual				
	Skilled manual				
	Semi-skilled				
	Unskilled				
	Validly no class				

Regression model 4

		Model 1	Model 2	Model 3	Model 4
Ref: High TV and Screen use	Moderate TV, Low Screens	0.064***	0.054***	0.017	0.01
	Low TV, High screens	0.005	0.003	0.001	0.005
	Moderate TV, Moderate Screens	0.079***	0.068***	0.036***	0.027*
Child level covariates	Female Gender		0.018	0.026	0.031**
	Picture similarities -5yrs		0.212***	0.187***	0.174***
	Rural		-0.001	0.006	0.02
Education Ref: Degree level	PCG up to primary			-0.186***	-0.107***
	PCG Secondary			-0.147***	-0.08***
	PCG Post Secondary			-0.154***	-0.077***
	SCG present			0.055***	0.002
Income Ref: Highest income quintile	Lowest quintile				-0.11***
	2nd quintile				-0.091***
	3rd quintile				-0.076***
	4th quintile				-0.05**
Social class Ref: Professional workers	Managerial and technical				-0.044**
	Non manual				-0.067***
	Skilled manual				-0.097***
	Semi-skilled				-0.088***
	Unskilled				-0.052***
	Validly no class				-0.113***

Hypotheses revisited

- Screen time data can be explained by one or more latent classes.
- Latent classes capture meaningful behavioural differences between groups
- These differences in behaviour remain statistically significant for **class 1** and **class 4** when controlling for child characteristics, but only for **class 4** when controlling for parent and family characteristics

Ref: High TV and Screen use	Moderate TV, Low Screens
	Low TV, High screens
	Moderate TV, Moderate Screens

Conclusions

- Parent characteristics around education, income and class of employment have much greater contribution to child reading performance than screen time alone
- Family Social class, Education and Income are all linked, e.g. parents with higher education more likely to promote rule governed behaviours in the home (Murray and Egan 2014)
- Small initial differences in performances may represent different developmental trajectories
- Encouraging signs of rule based behaviour in children's access to television and other devices

Future research

- Test mediation models for rules around technology use as a mediator of the relationship between social class, economic advantage and educational performance of children
- Develop longitudinal models using cognitive test scores with time varying covariate of screen time

Acknowledgements

I'd like to thank the GUI research team for their helpful comments in developing this presentation

But the biggest thank you should go to the GUI participants, without your efforts none of this work would be possible

Questions, Comments and Suggestions