

The use of the NPD and PLASC in examinations research



CAMBRIDGE ASSESSMENT

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UNIVERSITY of CAMBRIDGE
Local Examinations Syndicate

Cambridge Assessment



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Assessment Research & Development

- Largest examinations research capacity of its kind in Europe
- Research aims to enhance knowledge and understanding of educational assessment
- 20 researchers
- 4 teams
- Educational Measurement (and Statistics) team

Key examinations data sources



1. Internal Cambridge Assessment data

CA examination results datasets for all candidates

✓ Strength: Highly detailed, candidate level data

✗ Limitation: Only available for CA candidates

2. JCQ Inter-Awarding Body Statistics

General qualification examination results tables for all UK candidates, by gender and school type

✓ Strength: Accessible data for all UK awarding bodies

✗ Limitation: Composite data, at the qualification level

Key examinations data sources:

3. NPD and PLASC



 Detailed candidate level examination results data, across all UK awarding bodies

- First use: 16+/18+ databases from 1996
- Yearly data request:
 - Basic KS4 and KS5 NPD extracts
 - Matched to prior attainment and PLASC
 - Plus extra UPN variable
- Manipulation and analysis: Base SAS

NPD and PLASC:

Areas of examinations research



Aptitude
Coursework Marking
Fairness Comparability
Gender Difficulty Achievement
Uptake Progression
Design Standards
Provision

1. Routine
analysis

2. Reactive
analysis

Routine NPD/PLASC analysis

- Candidate uptake and centre provision of GCSE and A-level subjects in England
- Broken down by: gender, attainment, deprivation, centre size, centre type



- Key NPD variables:
 - KS4_SUBLEVNO / KS5_SUBLEVNO = qualification
 - KS4_MAPPING / KS5_MAPPING = subject
 - KS4_ANCN / KS5_ANCN = centre
- Automated SAS programs

Uptake of A-level subjects 2010



Five most popular subjects:
uptake overall and by gender

Subject	Uptake (% of Year 13 A-level candidates)		
	All (N = 264,131)	Male (N = 142,231)	Female (N = 121,900)
Mathematics	24.4	31.5	18.4
Psychology	19.2	11.2	26.1
Biology	19.0	18.0	19.8
General Studies	16.9	17.0	16.8
History	16.3	17.4	15.4

Uptake of A-level subjects 2010

Five most popular subjects: uptake by centre type

Subject	Uptake (% of Year 13 A-level candidates)						
	Academy (N=4473)	Compre. (N=114694)	FE / Tert. College (N=25417)	Grammar (N=21873)	Indepen. (N=34688)	Secondary Modern (N=3974)	Sixth Form College (N=56632)
Mathematics	19.3	22.2	15.8	37.6	37.3	13.3	21.1
Psychology	17.0	20.3	22.7	18.5	8.7	20.7	22.3
Biology	16.2	18.5	12.6	30.9	23.5	11.1	16.3
Gen. Studies	13.6	16.3	3.1	36.7	6.5	6.2	24.9
History	13.8	17.5	11.5	20.3	20.7	14.7	12.4

Provision of A-level subjects 2010



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Five most popular subjects: provision by centre type

Subject	Provision (% of A-level <u>centres</u>)						
	Academy (N=115)	Compre. (N=1420)	FE / Tert. College (N=207)	Grammar (N=164)	Indepen. (N=564)	Secondary Modern (N=101)	Sixth Form College (N=135)
Mathematics	79.1	94.4	73.4	99.4	90.4	73.3	97.8
Psychology	68.7	87.0	79.2	80.5	52.3	66.3	94.8
Biology	73.0	92.0	72.9	99.4	87.1	56.4	94.8
Gen. Studies	16.5	37.0	8.7	59.8	15.8	14.9	42.2
History	67.8	90.6	65.7	99.4	83.5	64.4	94.1

Routine NPD/PLASC analysis: CA Statistical Reports



The screenshot shows the Cambridge Assessment website's 'Statistical Reports' page. The header includes the Cambridge Assessment logo and navigation links: Home, About Us, Our Services, Viewpoints, Spotlights, Events, News Room, Assessment, Qualifications, Research, Professional Development, and Consultancy. The main content area features a large image of a paperclip and the title 'Statistical Reports' with a subtitle: 'Series of reports containing statistical analysis of the examination system.' Below this, there are sections for 'In Research' (with links to Published Articles and Journal Papers, Conference Papers, Statistical Reports, Research Matters, and Factsheets), 'Related' (with links to Events, Viewpoints, Information for Researchers, Research Department, and Cambridge ESOL Research), and a 'Research RSS Feed' section with options to 'Stay up to date' and 'Follow us on Twitter'.

Audiences

Internal and external:

- Examinations practitioners
- Assessment researchers

Purposes:

- Make examinations statistics easily and widely accessible
- Fill a gap in alternative examinations data sources
- Inform research and practice

Reactive NPD/PLASC analysis



Response to current key issues and events:

**Policy
changes**

**Public
consultation**

**External
request**

**Media / public
concern**

Reactive NPD/PLASC analysis

Response to current key issues and events:

Policy changes

Public consultation

External request

Media / public concern

Policy change: 2004 - Modern Foreign Languages no longer compulsory at GCSE

Response: Extended analyses of the uptake of Modern Foreign Languages

- By key centre and candidate characteristics

Mean GCSE	GCSE French uptake (% of Year 11 candidates)	
	2000	2006
Low	40.1	14.9
Medium	56.9	31.8
High	68.5	52.7

Reactive NPD/PLASC analysis

Response to current key issues and events:

Policy changes

Public consultation

External request

Media / public concern

Public consultation: 2011 UCAS higher Education admissions process review

Response: An analysis of how accurately AS-level grades predicted 2010 A level grades

- '09 AS-level results matched to '10 A-level results
- A-level grade equal to, higher than or lower than matched AS-level grade?
- Comparison with BIS analysis of 2009 UCAS predicted grade accuracy:

A-level grade:	Predictor (column %)	
	AS-level grade	Predicted grade
Equal	54.5	51.7
Higher	22.9	6.6
Lower	22.7	41.7

Reactive NPD/PLASC analysis

Response to current key issues and events:

Policy changes

Public consultation

External request

Media / public concern

External request: Cambridge University – what are the numbers and demographics of students attaining the highest A-level results?

Response: A series of Statistical Reports investigating high A-level attainment:

- Attainment of 3 A grades over time
- Attainment of the new A* grade

Centre type	% of 2010 Year 13 A-level candidates attaining at least	
	A*AA	A*A*A*
Comp. / Sec mod	5.7	1.1
Grammar	19.3	5.0
Independent	23.2	6.0

Reactive NPD/PLASC analysis

Response to current key issues and events:

Policy changes

Public consultation

External request

Media / public concern

Media / public concern: Decline in the uptake of Physics qualifications

Response: An analysis of the factors that determine uptake of A-level Physics

What factors determine the uptake of A-level Physics?

Background (1)



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Concern about decline in Physics uptake

- “Concern over decline in physics ” (*BBC, 11th Aug 2006*)
- “Next generation of scientists could be lost” (*Royal Society, 26th Sept 2006*)
- “Government 'failing' to get teenagers to take science“ (*Guardian, 10th March 2006*)
- “Schools letting down UK science” (*CBI, 13th Aug 2006*)
- “Shortage of physics teachers worse than ever” (*IOP, 21st Nov 2005*)
- “Reading closes physics department” (*BBC, 2nd Oct 2006*)

What factors determine the uptake of A-level Physics?

Background(2)



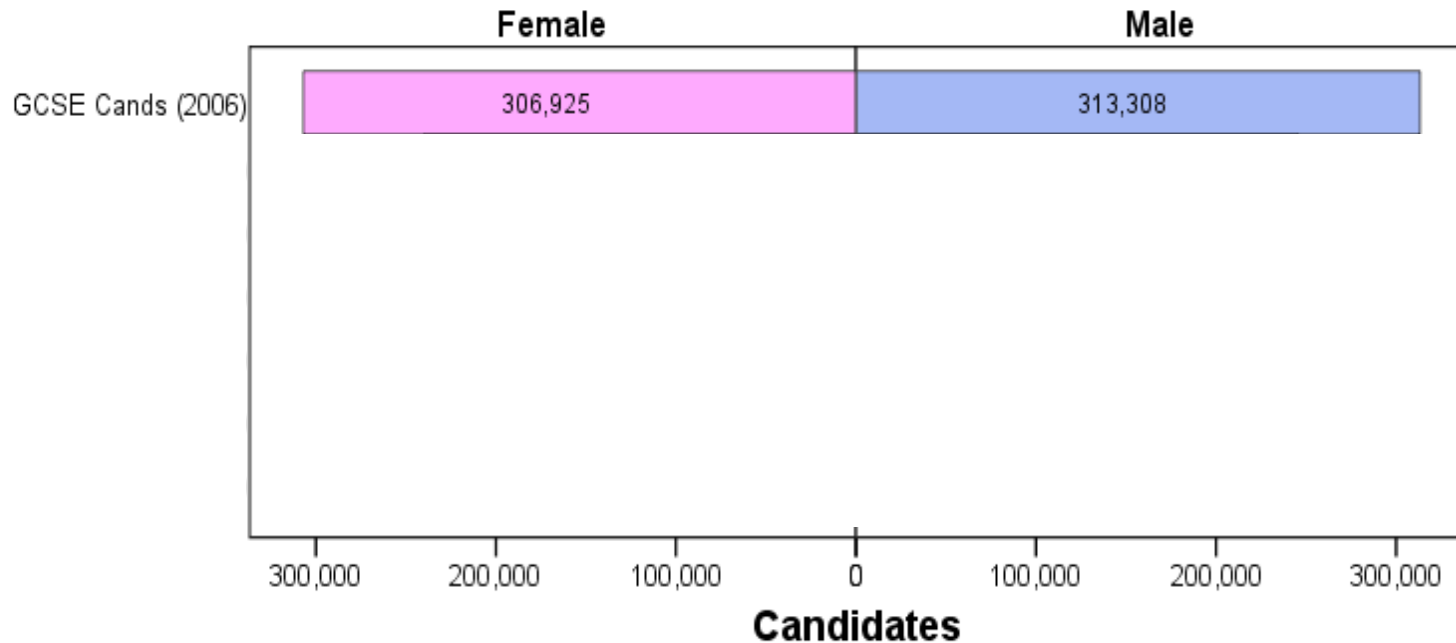
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Possible reasons

- Combined Science GCSE
- Lack of specialist teachers (Smithers & Robinson, 2006)
- Difficulty of subject (Vidal Rodeiro, 2007)
- Spiral of decline

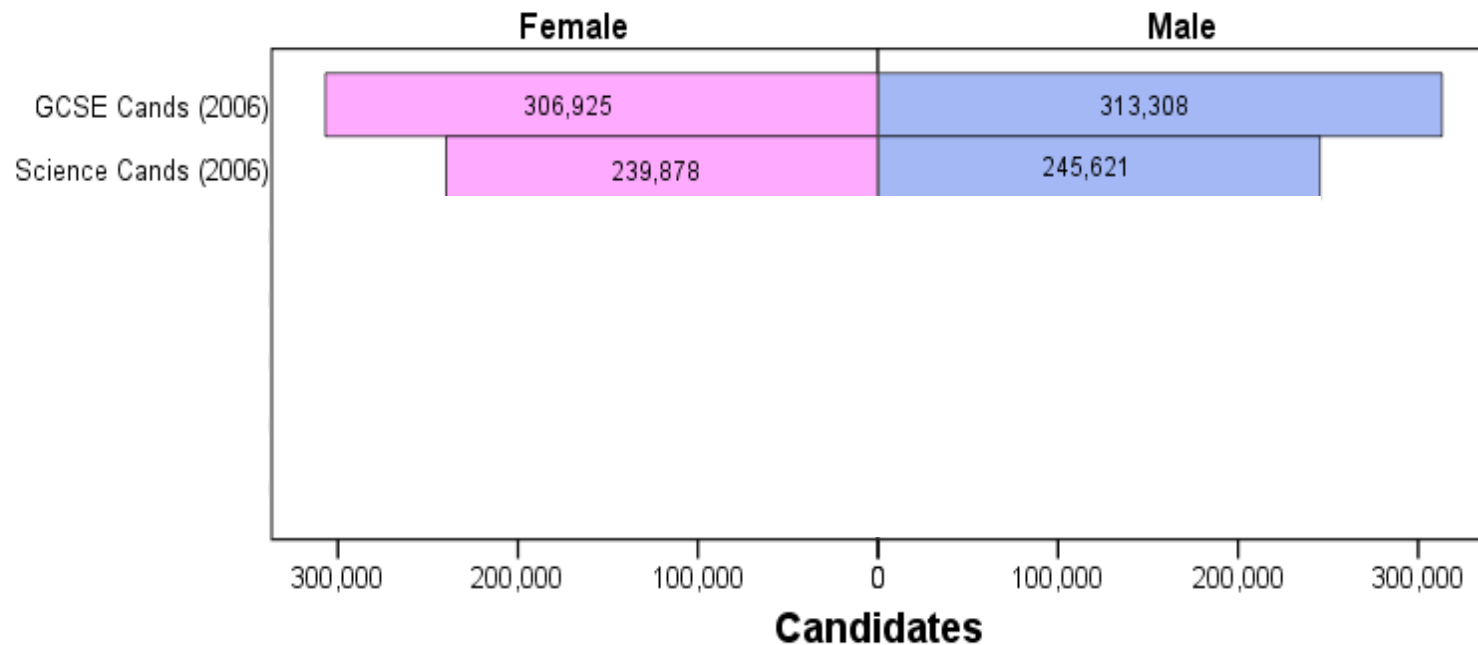
What factors determine the uptake of A-level Physics?

The gender gap



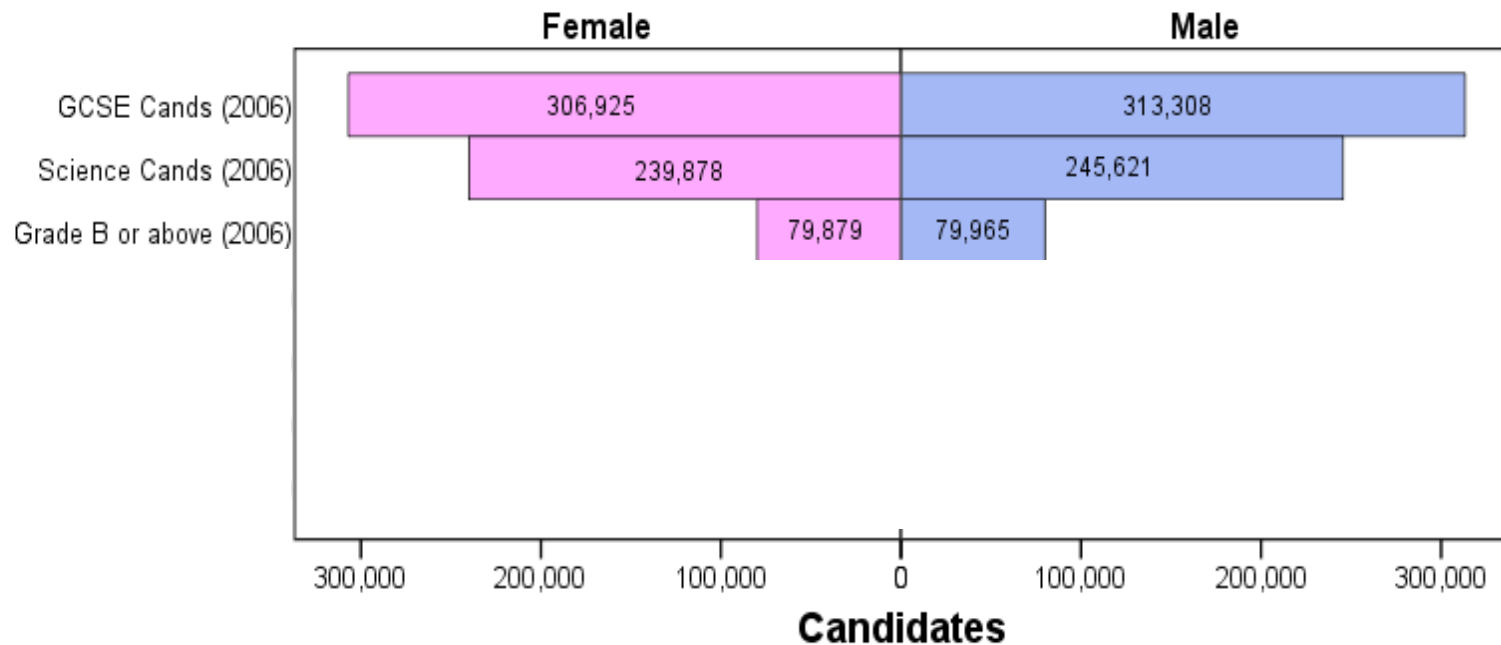
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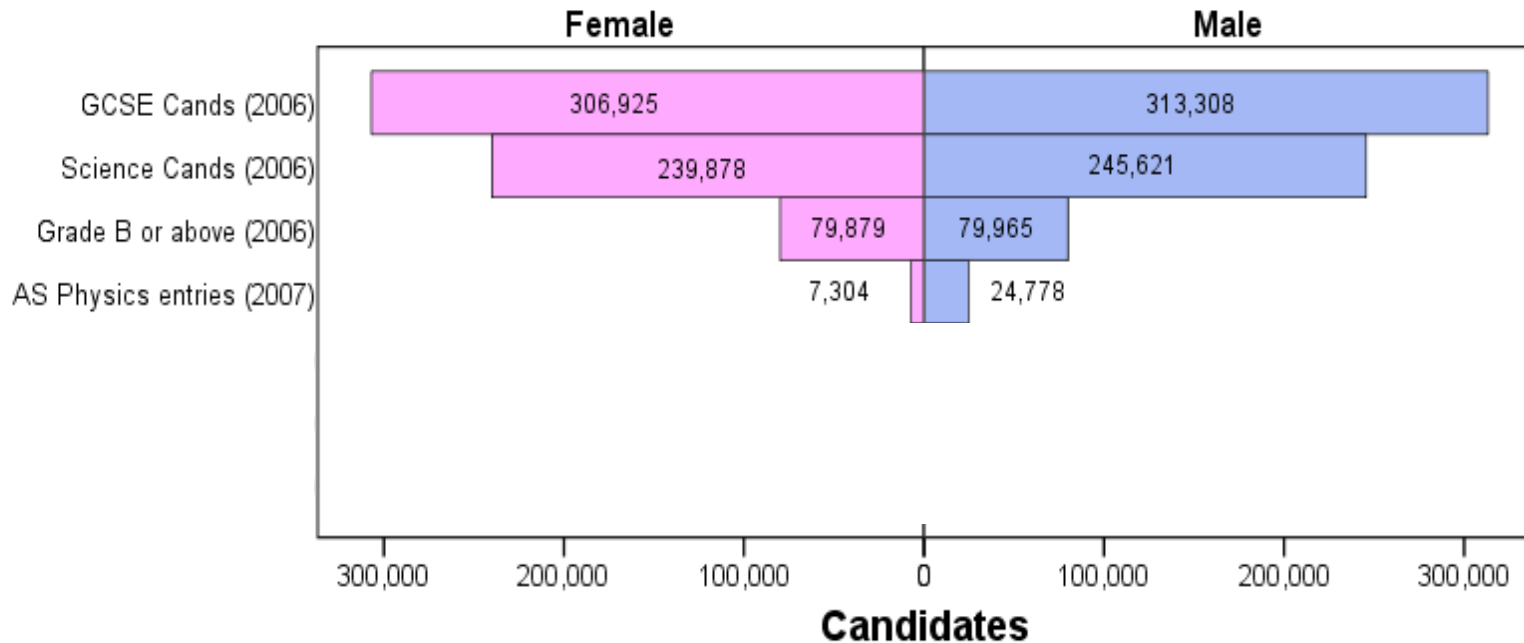
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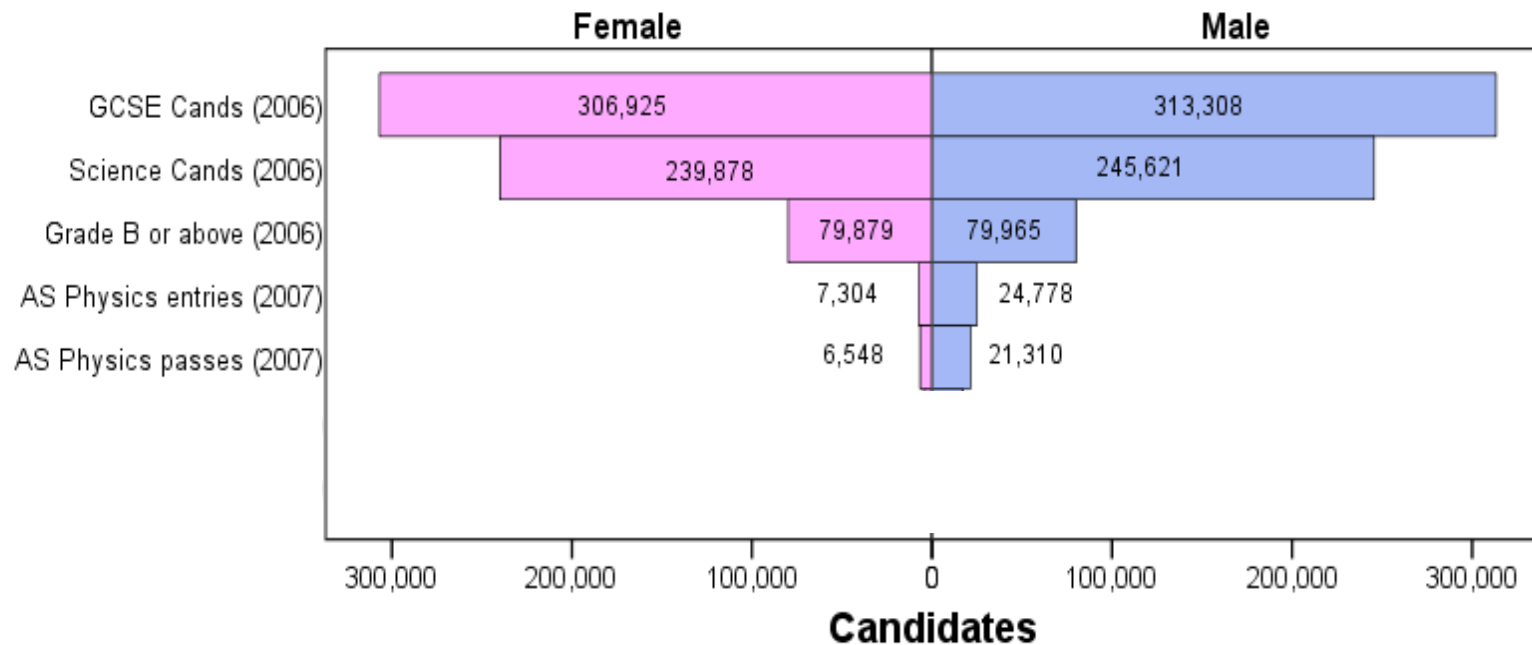
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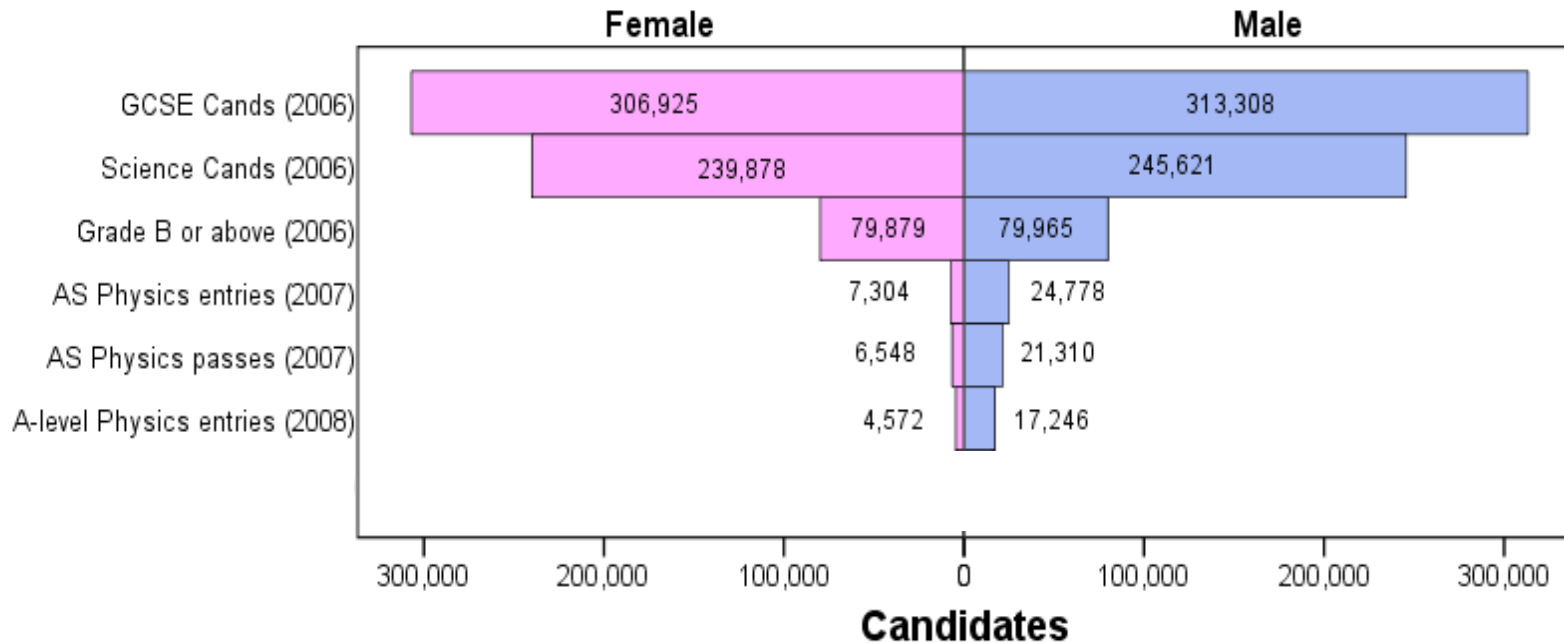
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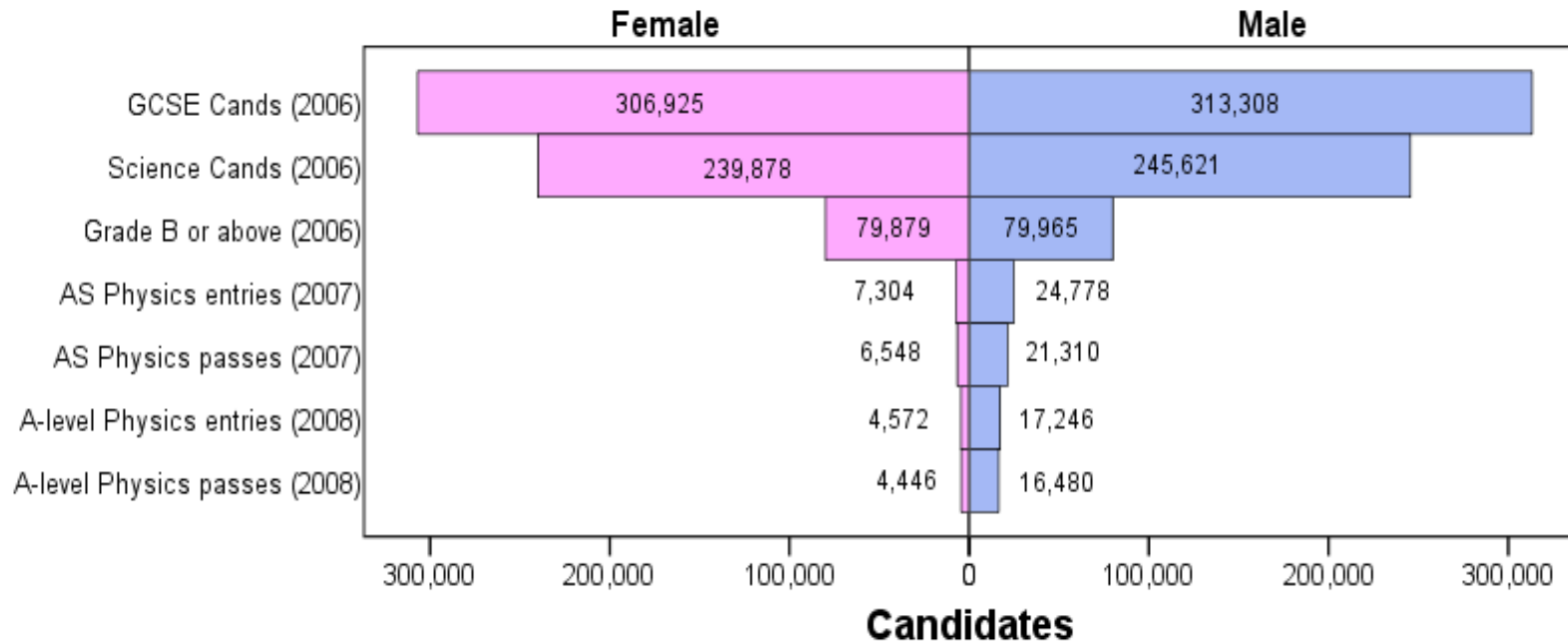
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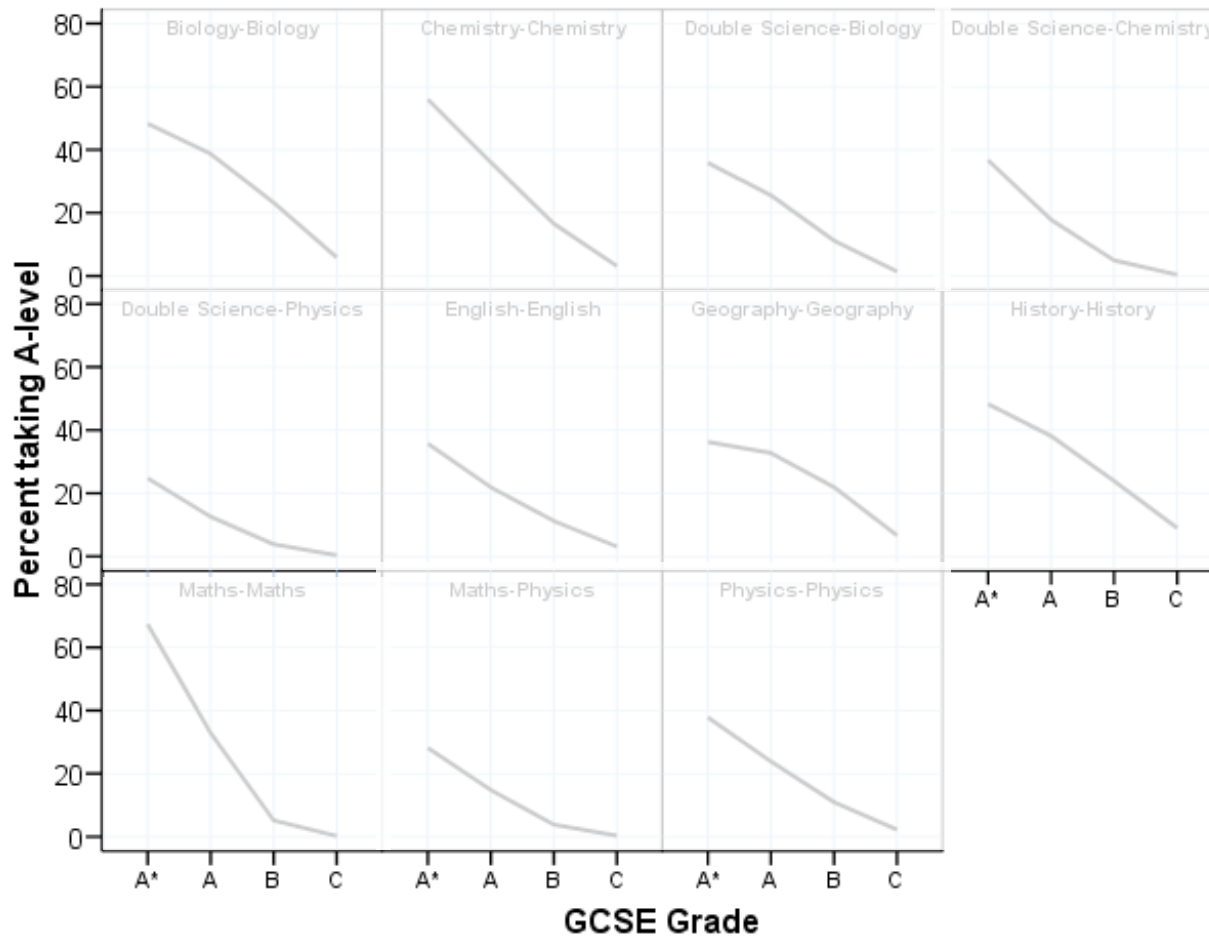
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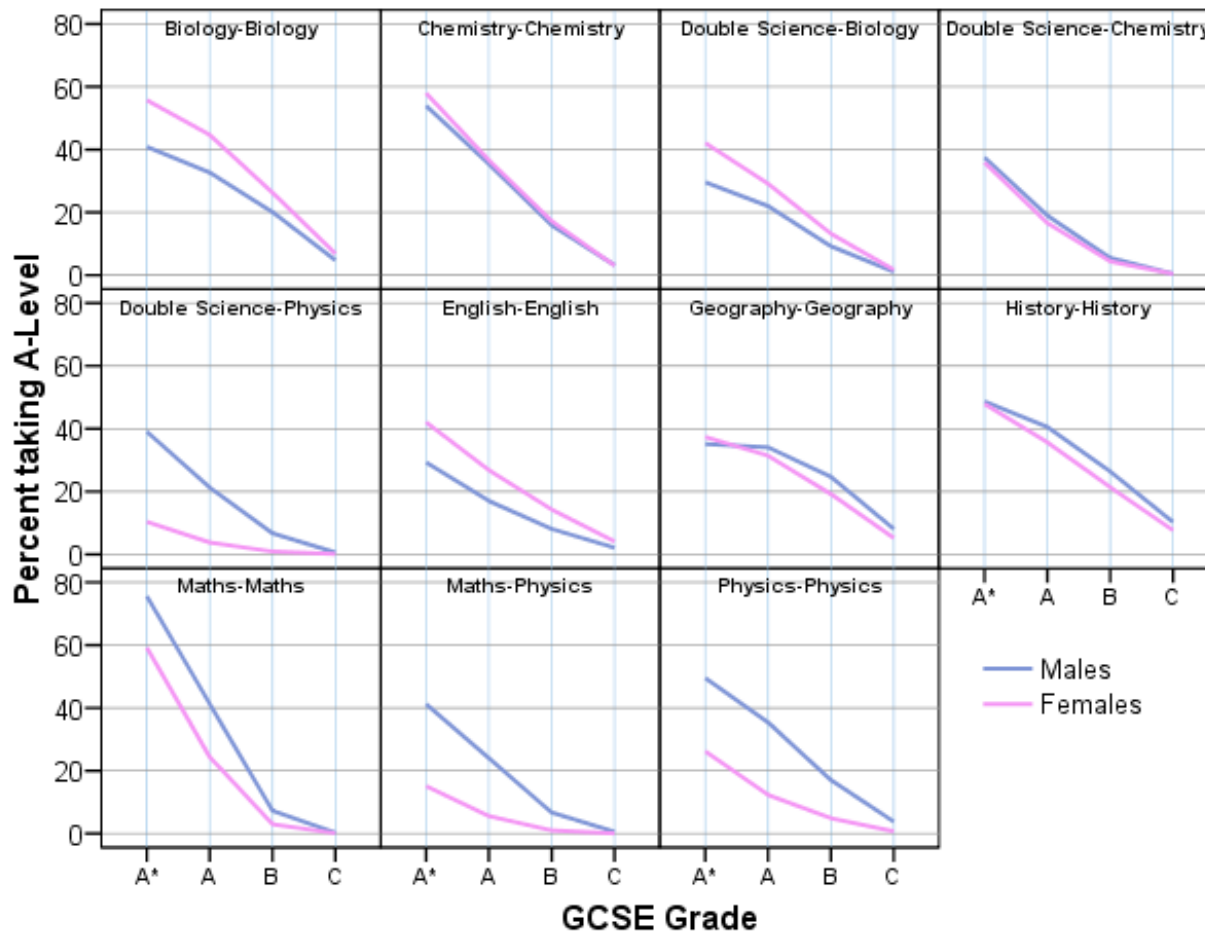
What factors determine the uptake of A-level Physics?

Progression to A-level



What factors determine the uptake of A-level Physics?

Progression to A-level



What factors determine the uptake of A-level Physics?



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Multi-level model

Data: National Pupil Database 2008 KS5 extract
NCN database

Outcome measure: Taking A-level Physics or not

Independent variables:

Gender

Prior attainment

School type

Mixed/single sex schools

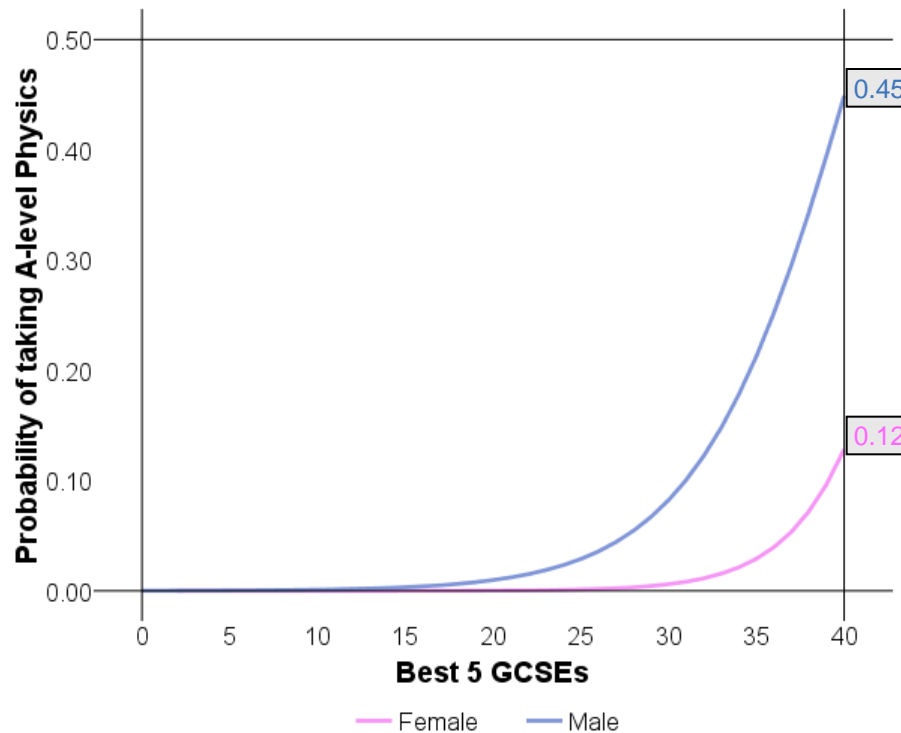
Type of science at GCSE

GCSE Science/Maths grade

What factors determine the uptake of A-level Physics?

Results

Model I – gender & prior attainment



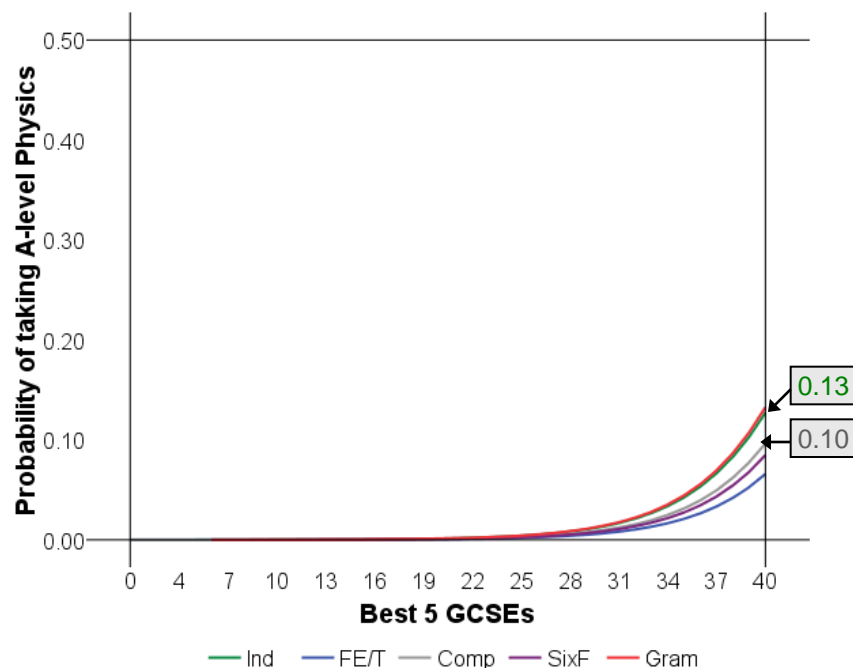
What factors determine the uptake of A-level Physics?

Results

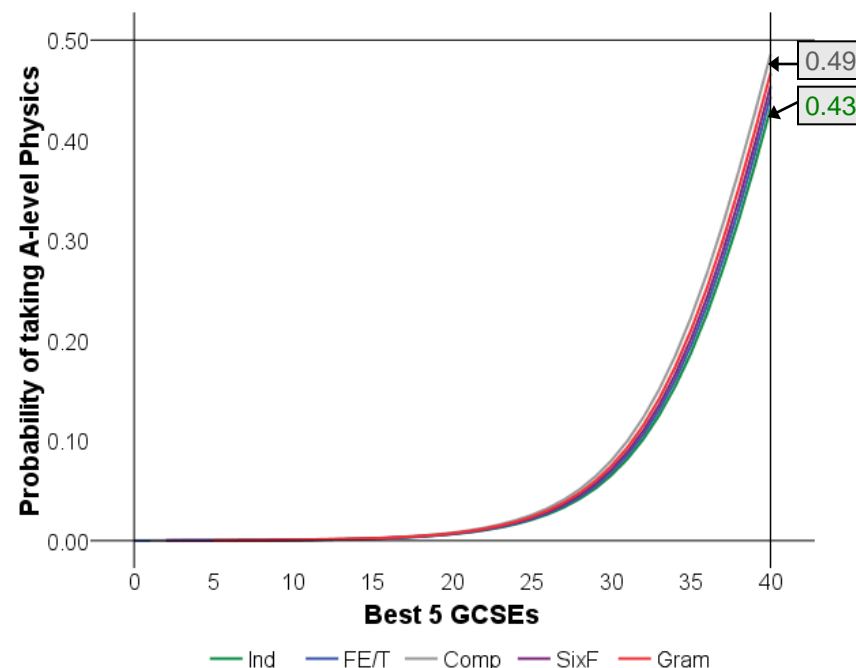


Model II – Model I + school type

Females



Males



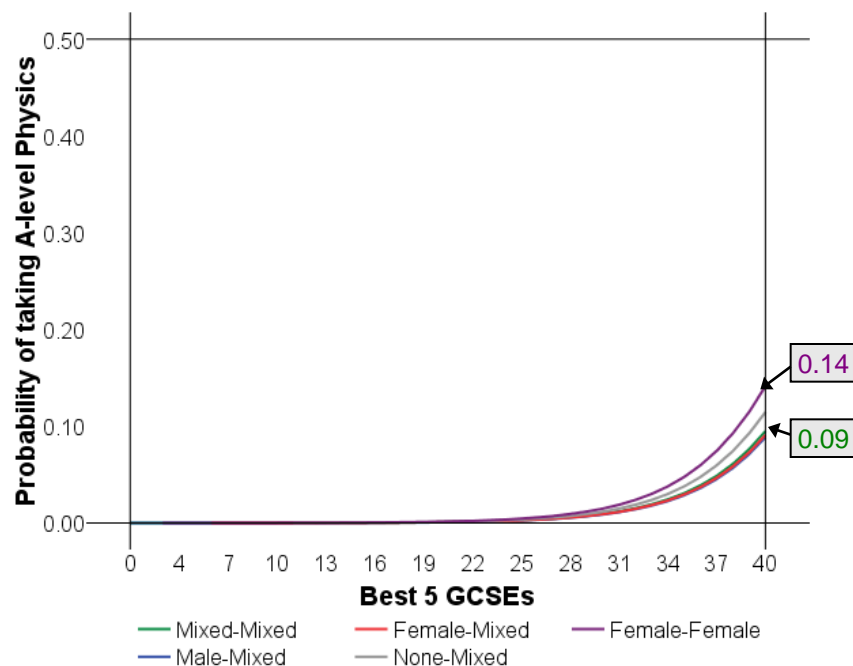
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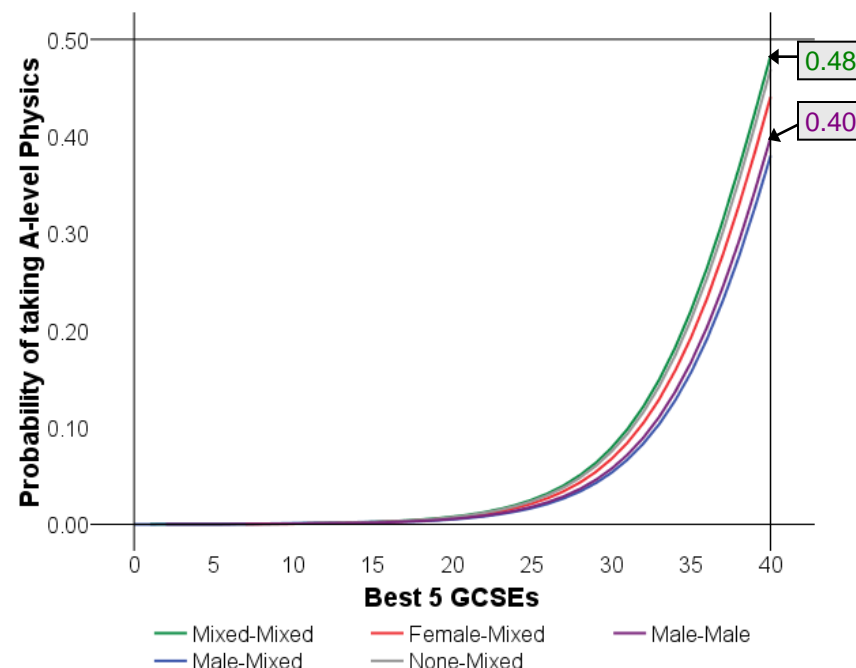


Model III – Model I + school gender

Females



Males

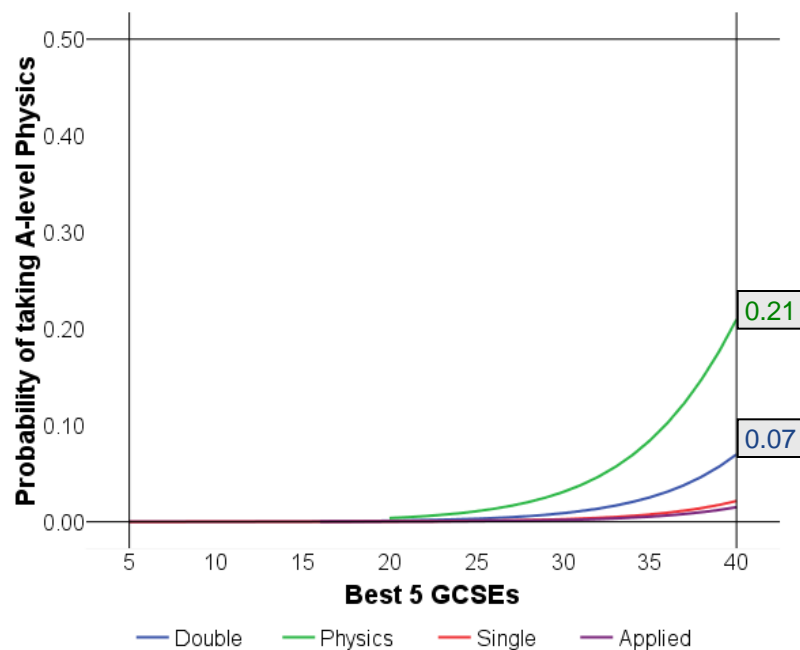


What factors determine the uptake of A-level Physics?

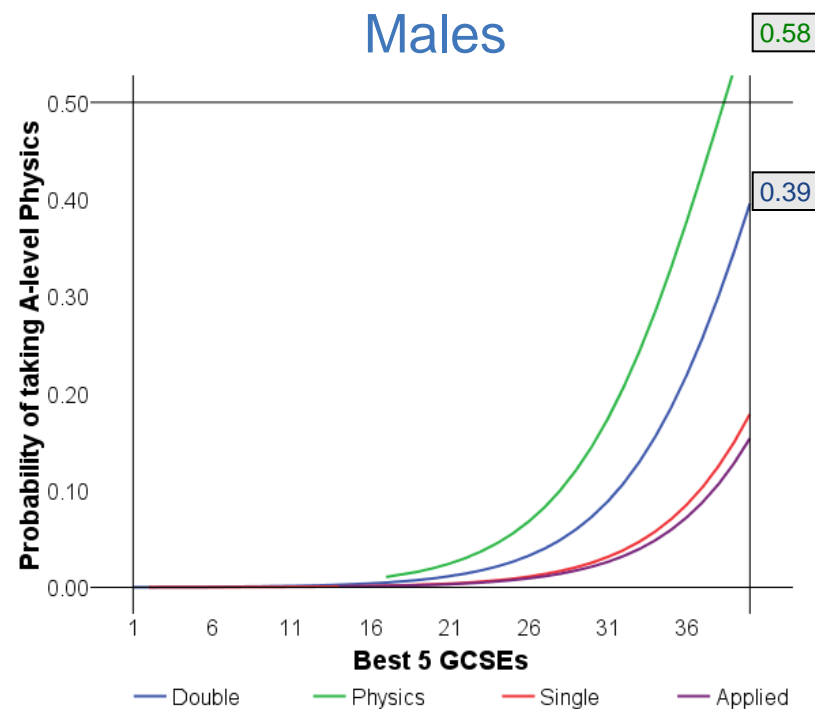
Results

Model IV – Model I + GCSE science

Females



Males



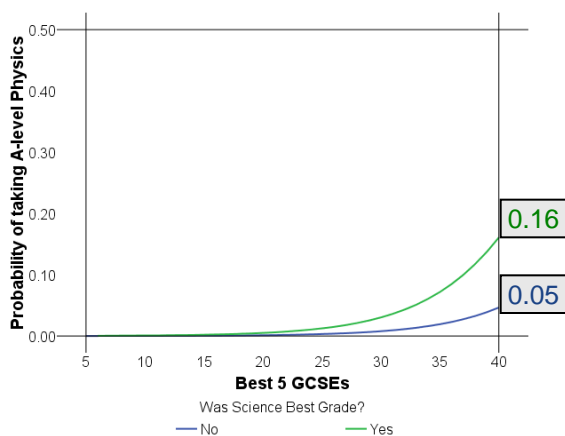
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Results

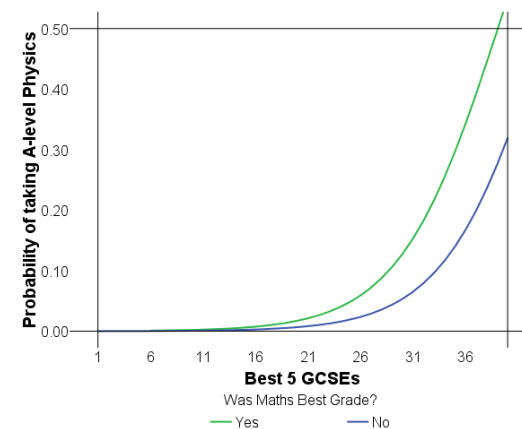
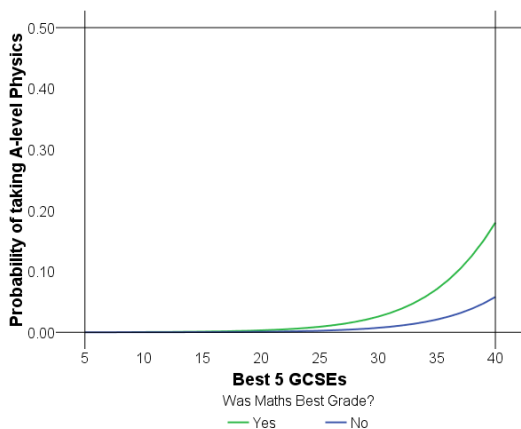
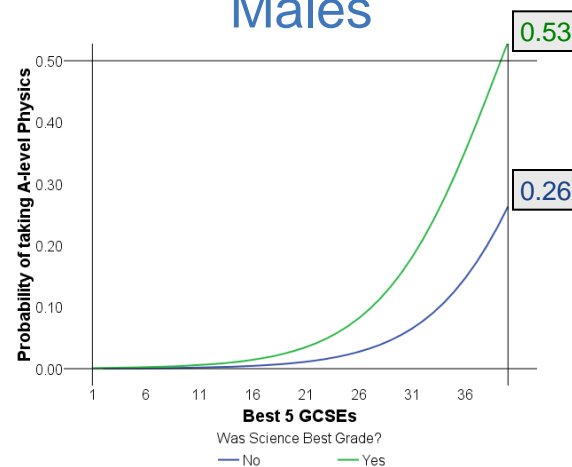


Model V – Model I + GCSE science/maths grade

Females



Males



What factors determine the uptake of A-level Physics?



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Conclusions

Predictors of uptake

Male

Physics GCSE

Best result in Science/Maths GCSE

Grammar/Independent school (females only)

Solutions?

Increase uptake/provision of Physics GCSE

Increase uptake amongst girls

More specialist physics teachers

References

- Cambridge Assessment Statistical Reports:
http://www.cambridgeassessment.org.uk/ca/Our_Services/Research/Statistical_Reports
- JCQ Inter-Awarding Body Statistics:
http://www.jcq.org.uk/national_results/index.cfm
- UCAS 2011 Admissions Process Review Consultation:
<http://www.ucas.com/reviews/admissionsprocessreview/>
- Gill, T. & Bell, J.F. (2011): What Factors Determine the Uptake of A-level Physics?, International Journal of Science Education:
<http://www.tandfonline.com/doi/abs/10.1080/09500693.2011.577843>

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Any questions?

Disclaimer: not all of the work referred to in the presentation was undertaken by us so we might not be able to answer detailed or technical questions about specific projects