

BELONGING AND ENGAGING FACTORS FOR SUCCESS IN PHYSICS

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Outline

- Background
- Research Questions
- Methodology
- Preliminary Results
- Further work

“It is the human side of higher education that comes first – finding friends, feeling confident and above all, feeling a part of your course of study and the institution – that is the necessary starting point for academic success”

(What Works ?1, Student Retention and Success, Thomas, 2012)

Background

“Without a successful first step into the world of higher education, a second step may never exist”

(Cook and Leckey, 1999)

“understanding students' sense of belonging may be key to understanding how particular forms of social and academic experiences affect these students” (Hurtado and Carter, 1997).

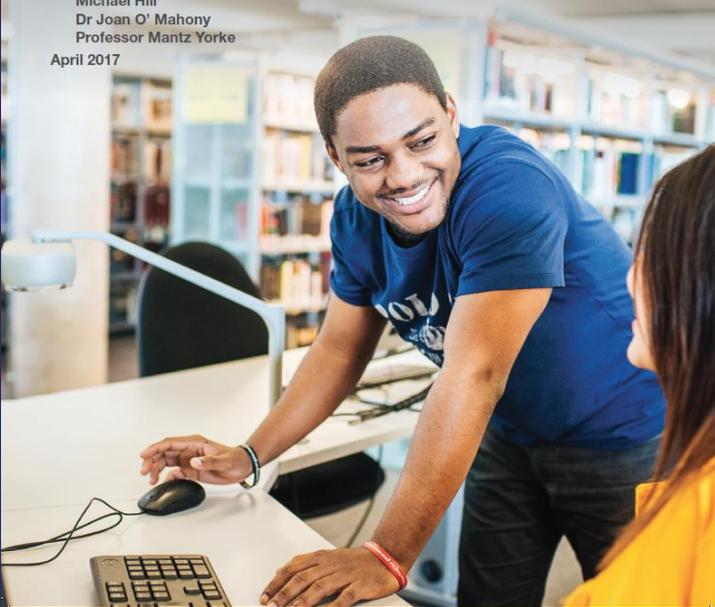
“Every student that drops out of their higher education course is a loss: a loss to their university or college, a loss to the future economy and, above all, a loss to that individual.” (Broadfoot, in Thomas et al., 2017)

What Works? Student Retention & Success

phf Paul Hamlyn Foundation Higher Education Academy Action on Access

**Supporting student success:
strategies for institutional change**
What Works? Student Retention & Success programme

Summary Report
By Professor Liz Thomas
Michael Hill
Dr Joan O' Mahony
Professor Mantz Yorke
April 2017



Physics

Physics has significantly more students with social/communication impairment than other disciplines.

Table 1: Breakdown of responses to the survey of disabled student members of IOP by disability compared to national statistics.

	Respondents to student survey	% of respondents	No. of respondents that declared disability to university	HESA no. and % of disabled physics undergraduates (2014/5)	HESA no. and % of all subjects undergraduates
Social/communication impairment	17	6.8%	16	110 (6.4%)	2,905 (1.7%)
Blind or serious visual impairment	4	1.6%	4	26 (1.2%)	2,500 (1.4%)
Deaf or serious hearing impairment	2	0.8%	2	30 (1.8%)	3,995 (2.3%)
Long-standing illness or health condition	9	3.6%	9	130 (7.6%)	16,395 (9.4%)
Mental-health condition	72	28.8%	55	125 (7.3%)	13,250 (7.6%)
Specific learning difficulty	48	19.2%	45	660 (38.5%)	75,740 (43.2%)
Physical impairment or mobility issue	8	3.2%	8	30 (1.8%)	4,360 (2.5%)
Disability not listed	5	2.0%	5	165 (9.6%)	18,185 (10.4%)
Multiple disabilities/ health condition	81	32.4%	78	125 (7.3%)	12,485 (7.1%)
Prefer not to say/ not known	4	1.6%	1	320 (18.7%)	25,310 (14.5%)
Total	247			1715	175,145

Social impairment:
PHYSICS 6.4%
OTHER 1.7%

Our Project Aims

To focus on:

- 'Russell Group'
- Physics

To investigate:

- How students settle in to university physics
- Compare with academic performance

Aim:

- To understand the issues
- To look for predictors of students needing support
- To 'support and prevent' rather than 'mitigate and lose'.

BEST

PHYSICS

Belonging and **E**ngagement
for **S**uccessful **T**ransition to
higher education (Physics)



UNIVERSITY OF LEEDS

This research tracks the student 'journey' from entry into university, through the degree, to graduation.

Short questionnaires, roughly once a semester.

Participation is voluntary.

All responses to questionnaires are anonymous

Anonymity

What are the first two characters of your postcode?

How many letters are in your first name?

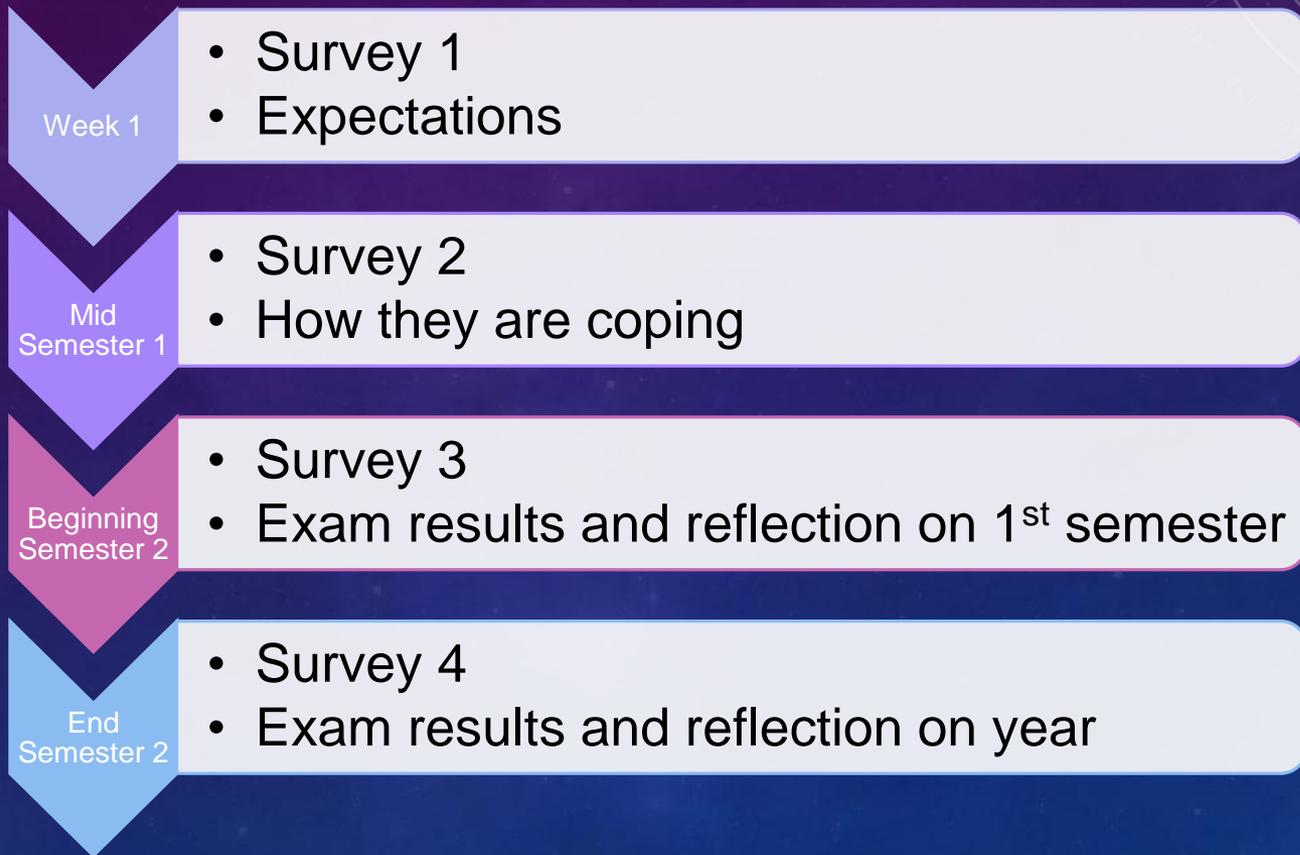
What is your month of birth?

but allowed us to track students

Research Questions

1. How do students' prior expectations of studying Physics at university match up with their lived experience?
2. To what extent do students' demographics affect prior expectations and academic success?
3. What is the nature of the relationship between sense of belonging, engagement and success when studying Physics?

Methodology



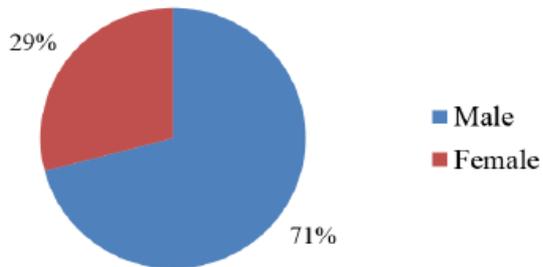
Results

Survey	No. of YEAR 1 student respondents 2017-18	No. of YEAR 1 student respondents 2018-19	No. of YEAR 2 student respondents 2018-19
1	118	144	N/A
2	40	144	N/A
3	26	104	58
4	15	28	15

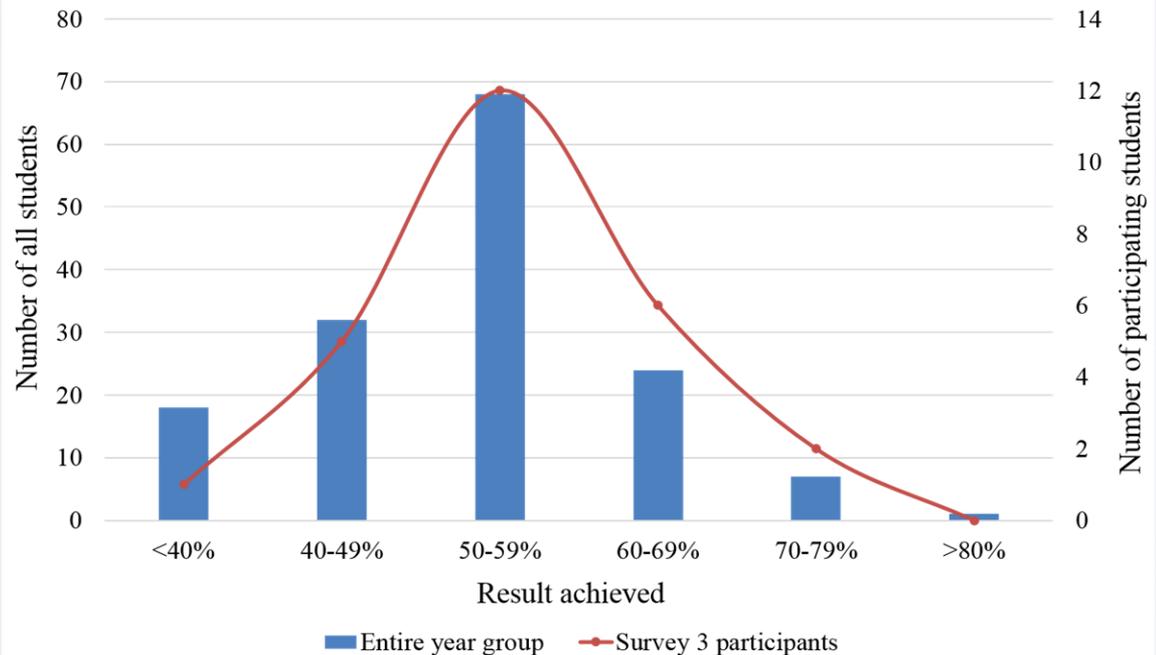
Paper survey in lab gets better response than electronic or paper to 'post in box'.

The cohort

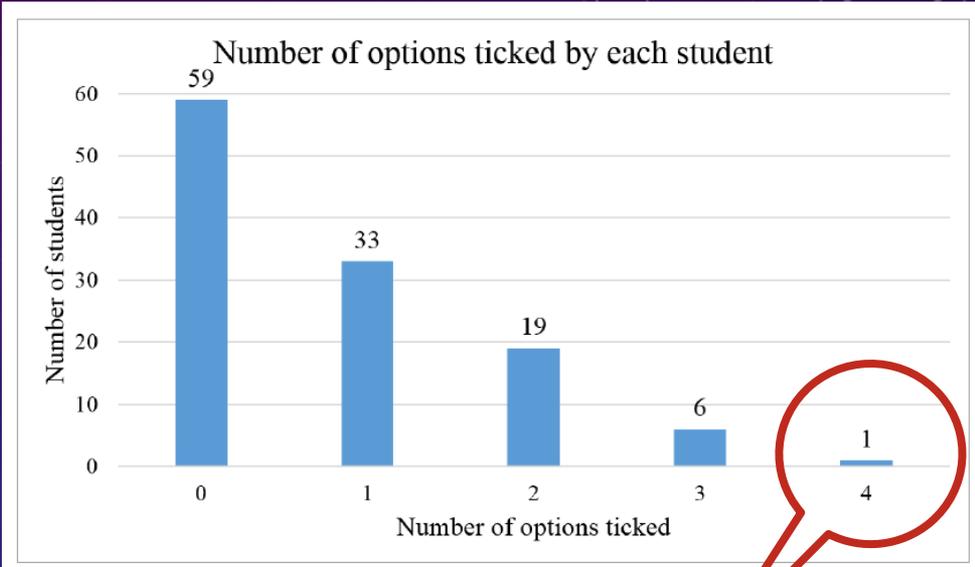
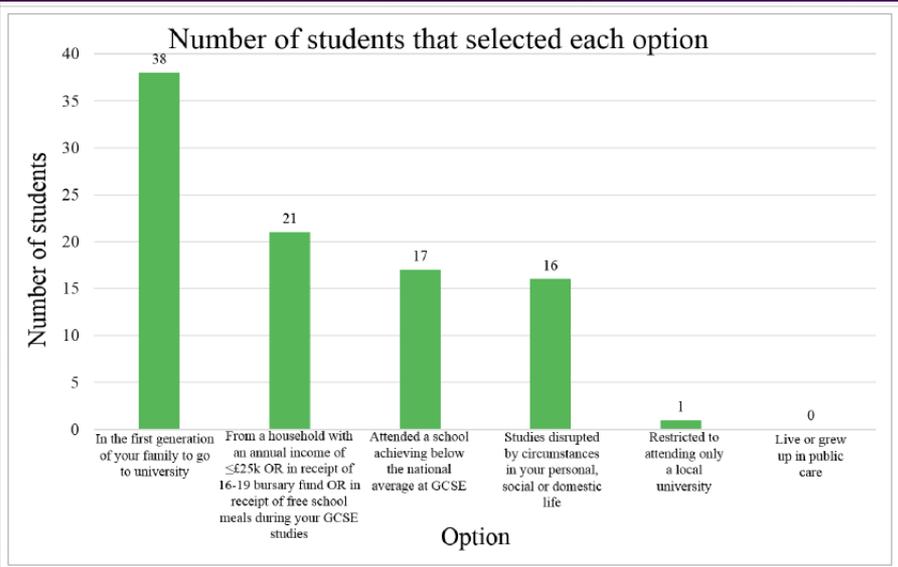
Gender of students that took survey 1



Physics 1 Exam Results



Social background



N=118

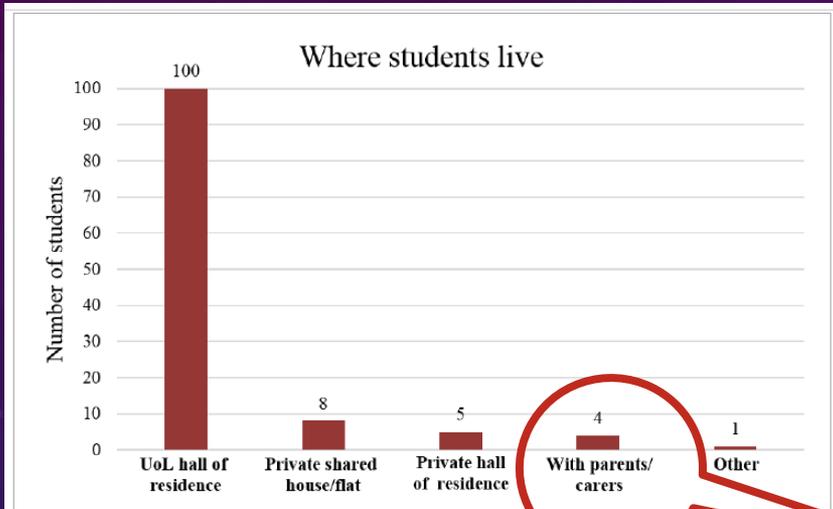
- First generation to uni
- School achieves below national average at GCSE
- Restricted to local uni
- Grew up in public care
- Studies disrupted
- Low income household $<$ £25k

Student A

- Male
- Living in UoL hall of residence
- *First generation to go to university*
- *Attended a school achieving below the national average at GCSE*
- *Restricted to attending only a local university*
- *Studies disrupted by circumstances in personal, social or domestic life*
- Physics at University of Leeds was his insurance choice
- A levels:

Maths	A
Physics	A
Business	A

Accommodation



Literature suggests that living in university accommodation increases students' sense of belonging. (Maestas 2007)

Student B

- *Studies disrupted by circumstances in your personal, social or domestic life*
- Came to Leeds through clearing
- A levels: Maths A*
Physics A*
Business studies A*

Student C

- Male from Leeds
- *First generation to go to university*
- *Attended a school achieving below the national average at GCSE*
- *From a household with an annual income \leq £25k OR in receipt of 16-19 bursary fund OR in receipt of free school meals during GCSE studies*
- Leeds was his first choice
- A levels: Maths A*
Physics A
Chemistry A
EPQ A

Student D

- Female from Leeds
- *First generation to go to university*
- *Attended a school achieving below the national average at GCSE*
- Leeds was her first choice
- Took a foundation year in Interdisciplinary Sciences

Student E

- Male from Bradford
- *First generation to go to university*
- Leeds was his first choice
- A levels: Maths A
Physics C
Chemistry B
Biology A

Perception of preparedness for university

Preparedness week 1

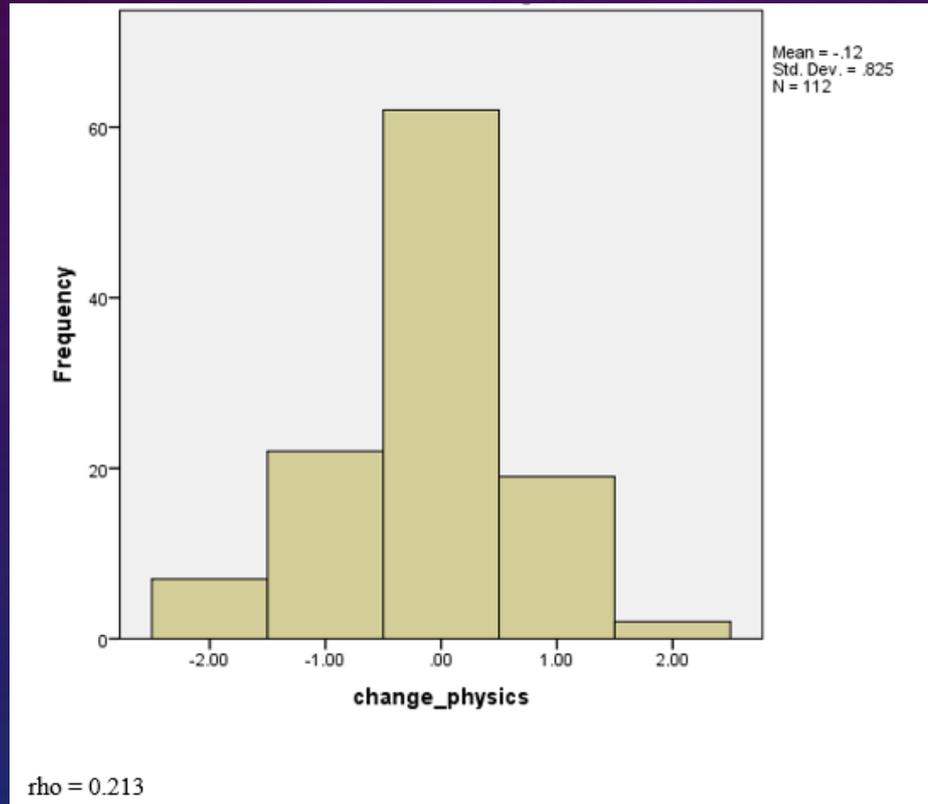
Compared to my peers, I am ..	A lot more	A little more	About the same	A little less	A lot less
prepared in physics knowledge					
prepared in mathematics					
prepared for laboratory work					

Coping mid sem 1

Compared to my peers, I am ..	A lot better	A little better	About the same	A little less	A lot less
coping with the new physics material					
coping with the level of maths					
coping with laboratory work					

Assign scale 5 4 3 2 1

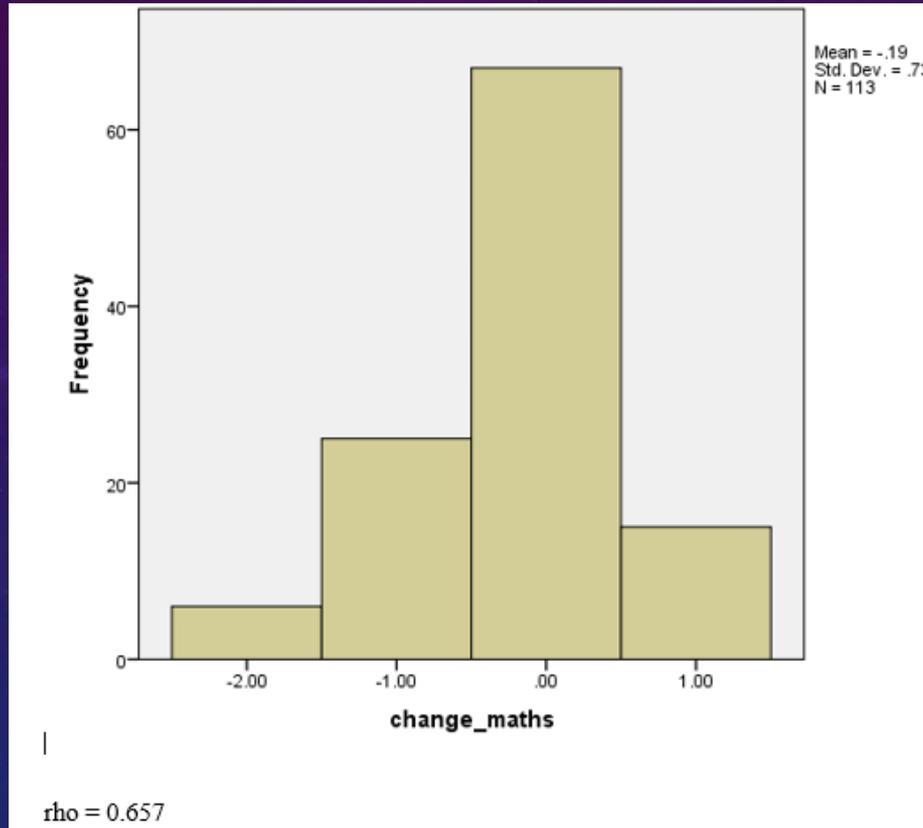
Change in Perception: Physics



Mean = -0.12
SD = 0.825
N=112

Change = coping - prepared

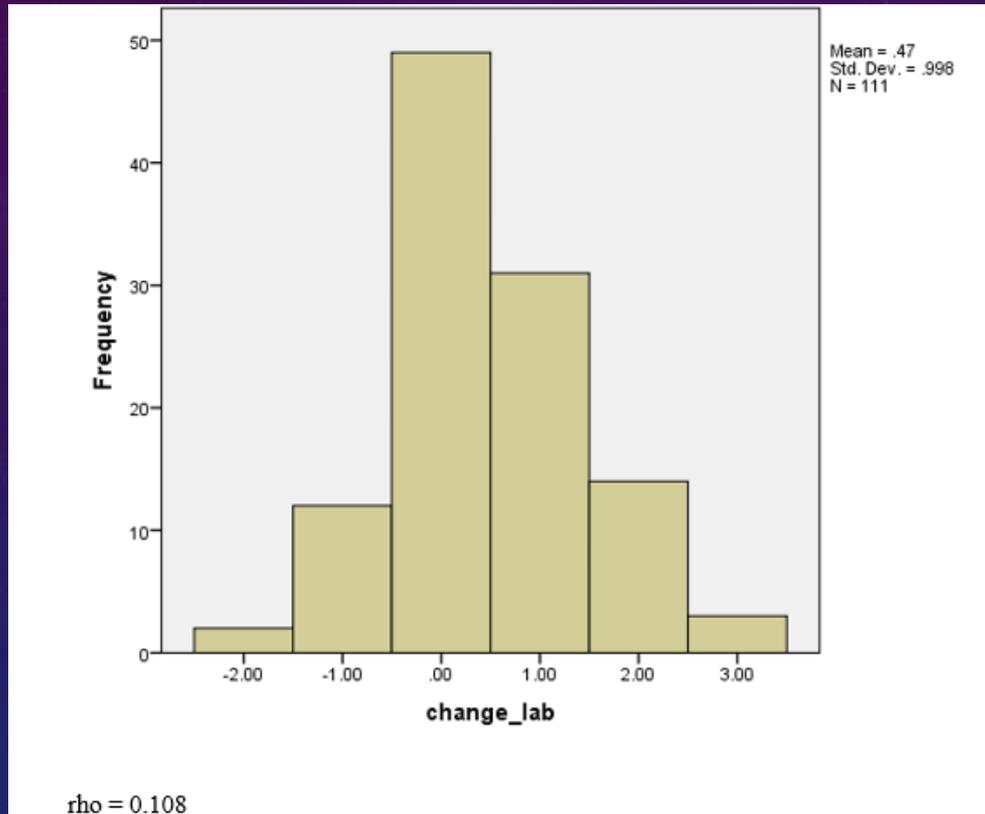
Change in Perception: Maths



Mean = -0.19
SD = 0.73
N=113

Change = coping - prepared

Change in Perception: Lab



Mean = 0.47
SD = 0.998
N=111

Change = coping - prepared

Managing life and study

Compared to my peers I am confident about.....

- being an independent learner
- time management
- independent living

All above variables included in multivariate multiple regression analysis to establish statistically significant relationships. Significant relationships then analysed with spearman's correlation.

Expectation	Lived experience	rho
Prepared in maths	Coping with maths	0.657
Prepared for lab	Managing time and deadlines	0.251
Confident about managing time	Keeping up with work	0.261
Confident about managing time	Managing time and deadlines	0.395
Confident about living independently	Managing time and deadlines	0.383
Confident about living independently	Living independently	0.502

Strangely.....

The more clued up a student believes themselves to be, the less clued up they actually appear to be.



(the bigger the change in their perceptions by survey 2)

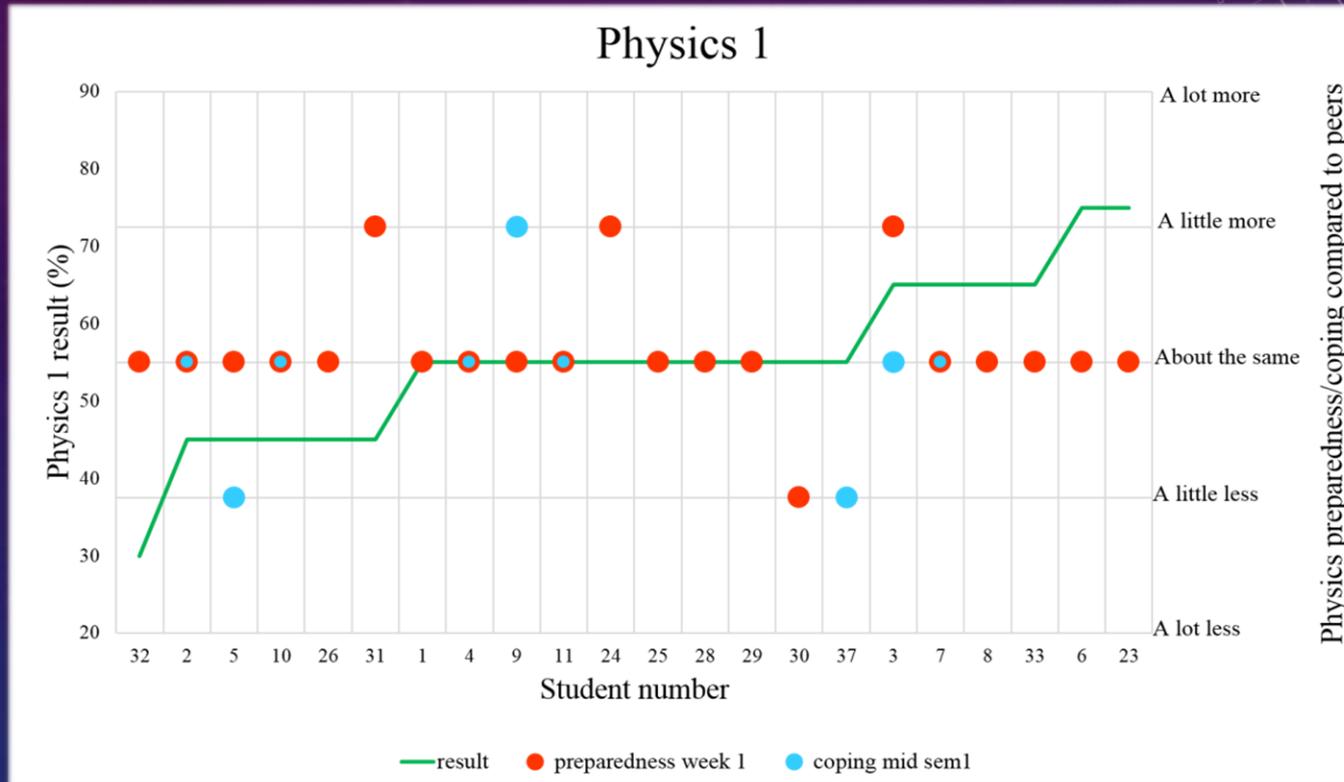
That said, there are no statistically significant relationships between how clued up they feel and their semester 1 results.

Preparedness, coping and results

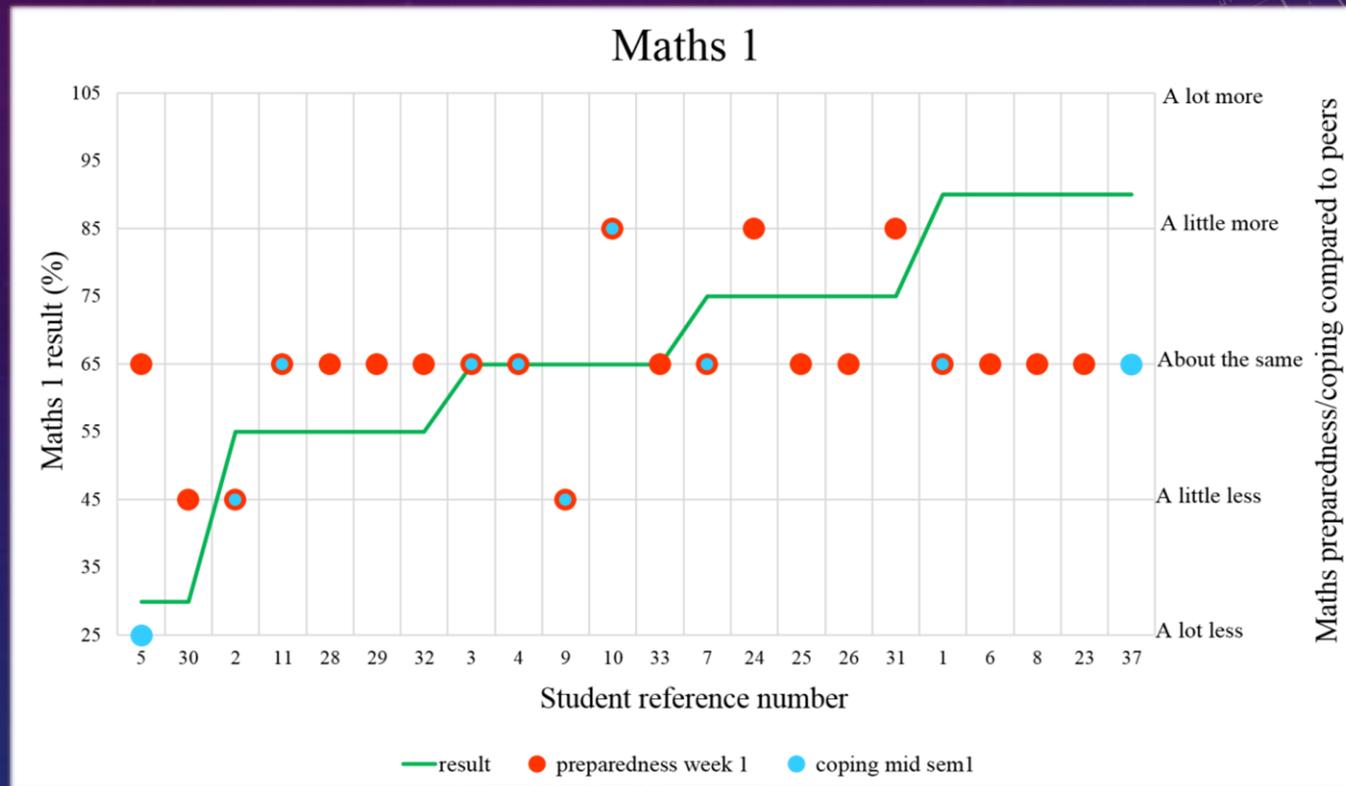
Module	< 40%	40 – 49 %	50 – 59 %	60 - 69 %	70 -79 %	> 80%
PHYSICS 1						
MATHS 1						
LAB 1						
Other: _____						

Exam results self-reported in class bins, to maintain anonymity.

Preparedness, coping and results



Preparedness, coping and results



Student 5 -- free text comments

Male, foundation year student

Survey 1

“After studying on the foundation year at Leeds, I'm well set for studying at the University and understand the processes. But as a mature student I'm at a disadvantage in term of fitting in compared to school/college leavers.”

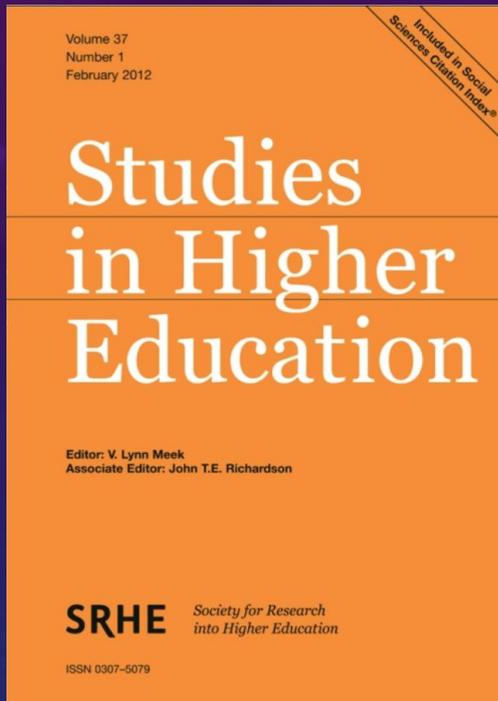
Survey 2

“I'm finding the step up from foundation year to 1st year quite difficult. The younger students seem more well-adjusted to using vectors and solving problems that I am.”

Survey 3

“Having got onto the course through a foundation year, I feel underprepared compared with students who have just done A-level. Especially further maths students.”

Mature students

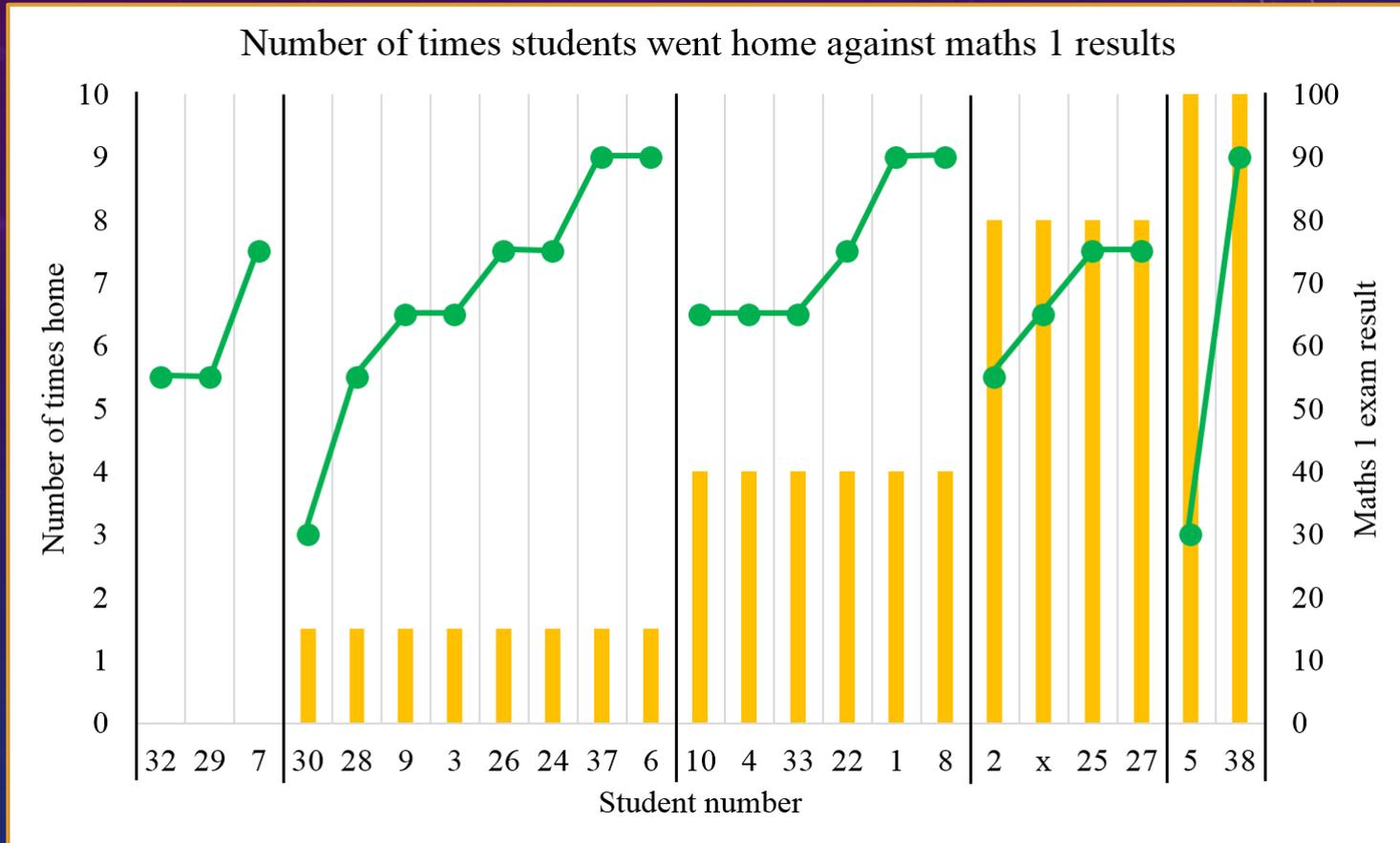


Read et al.:

- Mature students lack a sense of belonging
- They feel alienated by university promotional materials

This is inline with student 5's experiences however, he was the only student in the study that was known to be mature

Number of home visits



No correlation with performance

Visiting home

Student	No. of times home	Reasons								
		Visit parent (s)	Visit other friends	Special event	Miss home	Visit sick relative /friend	Visit significant other	School graduation	Don't get on with housemates	Watch or play sport
26	1-2	✓	✓	✓	✓	✓				
24	1-2	✓		✓						
9	1-2	✓	✓	✓						
37	1-2	✓	✓	✓	✓			✓		
28	1-2	✓								
30	1-2	✓		✓			✓			
3	1-2	✓	✓		✓			✓		
6	1-2	✓	✓							
10	3-5	✓		✓						
4	3-5	✓	✓							
1	3-5	✓	✓	✓	✓					
8	3-5	✓		✓	✓					
22	3-5	✓	✓			✓				✓
33	3-5	✓								
2	6-10	✓		✓	✓					
25	6-10	✓	✓	✓	✓		✓			
x	6-10	✓	✓	✓						
27	6-10	✓	✓		✓	✓			✓	
5	>10	✓					✓			
38	>10	✓	✓	✓	✓					
11		✓	✓							
31		✓	✓		✓			✓		
Totals		22	14	12	10	3	3	2	2	1

“To visit a significant other”

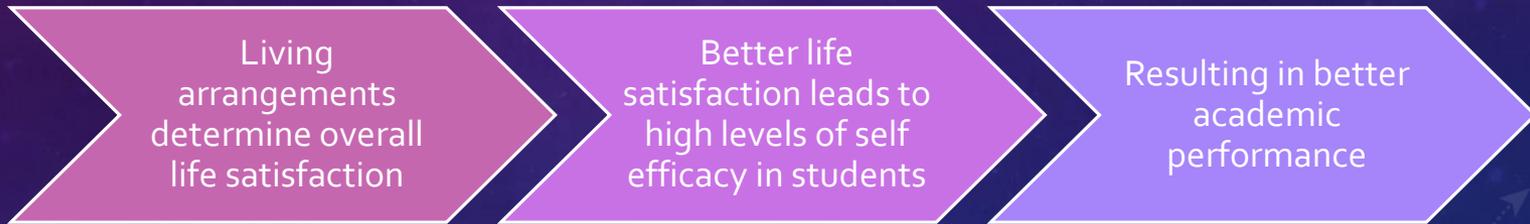
Students in a long distance relationship were less likely to participate in as many university activities as those not in relationships (Waterman et al., 2017) .

A lack of participation in university activities has been shown to result in lower achieved grades in first year university students (Kuh et al., 2008).

Visiting home

Student	No. of times home	Reasons								
		Visit parent (s)	Visit other friends	Special event	Miss home	Visit sick relative /friend	Visit significant other	School graduation	Don't get on with housemates	Watch or play sport
26	1-2	✓	✓	✓	✓	✓				
24	1-2	✓		✓						
9	1-2	✓	✓	✓						
37	1-2	✓	✓	✓	✓			✓		
28	1-2	✓								
30	1-2	✓		✓			✓			
3	1-2	✓	✓		✓			✓		
6	1-2	✓	✓							
10	3-5	✓		✓						
4	3-5	✓	✓							
1	3-5	✓	✓	✓	✓					
8	3-5	✓		✓	✓					
22	3-5	✓	✓			✓				✓
33	3-5	✓								
2	6-10	✓		✓	✓					
25	6-10	✓	✓	✓	✓		✓			
x	6-10	✓	✓	✓						
27	6-10	✓	✓		✓	✓			✓	
5	>10	✓					✓			
38	>10	✓	✓	✓	✓					
11		✓	✓							
31		✓	✓		✓				✓	
Totals		22	14	12	10	3	3	2	2	1

“I don’t get on with my housemates”



(van Zyl and Dhurup, 2018)

Conclusions

Longitudinal study to identify and understand the factors affecting settling in and success in physics.

Data gathered by questionnaires each semester

Analysis by statistics and 'case studies'

Early suggestions of predictors of needing support:

- Mature students
- From foundation year
- Living at home



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