

## Submissions Abstract Book - All Papers (All Submissions)

0331

K5 | Conwy 2

Thu 12 Dec 2019

11:30 - 12:00

Undergraduate Research and the Attainment Gap: Analysing the Impact of Undergraduate Research on Disadvantaged Groups

Jonathan Parker<sup>1</sup>

<sup>1</sup>*Keele University, Keele, United Kingdom*

**Research Domain:** Access and widening participation (AWP)

**Abstract:** This study analyses the impact of undergraduate research on student attainment for disadvantaged groups, particularly BAME, disabled, and international students. Previous research has found that undergraduate research provides greater benefits to students from these groups, largely using student survey evidence. This study tests impact by analysing grades in credit-bearing modules. Six cohorts of students from 2011 to 2017 at a mid-sized UK university are analysed in degrees across the sciences, social sciences, and humanities, providing a sample of over 6000 students. The analysis compares research project grades to other final year grades to gauge the improvement for students' achievement and conducts a multiple regression to analyse what factors affect this gain. It finds significant and substantial attainment gaps for international students, Asian students, but not for disabled or Black students. This gap highlights the needs for a better understanding of the students experience around this key aspect of undergraduate education.

**Paper:** Undergraduate research is seen as a 'high impact' practice that benefits student engagement and achievement (Laursen et al., 2010; Lopatto, 2009). Not only do scholars largely agree that this pedagogical approach achieves good outcomes, but there is also evidence that it particularly benefits students that are most at risk of underachieving (Egan et al., 2013; Jones et al. 2010; Lopatto 2009). However, this impact has not been analysed in the UK, where final-year projects are a widespread and important part of the degree. This component could have a large potential impact on degree outcomes, so its impact for disadvantaged groups is an important issue.

White students are above or on sector-adjusted averages for degree outcomes, but BAME students do not achieve as highly on these measures, and prior qualifications or achievement accounts for only a part of this attainment gap so it cannot entirely explain these levels of underperformance (Broecke and Nicholls 2007; Richardson 2015). The attainment of international students also causes concern and research has provided evidence of patterns of underperformance of international students in the UK (Ianelli and Huang 2013). Finally, disabled students also achieve lower degree outcomes than other students, even after controlling for prior attainment (Pumfrey 2008). This study calculates the impact of undergraduate research on degree attainment and particularly analyses this impact for

particular groups of underperforming students so see how it affects any attainment gaps.

Previous research findings from the US suggest that underachieving groups benefit from undergraduate research experiences even more than the average student and that these experiences provide a means of reducing achievement gaps (Egan et al. 2013). However, there is little evidence of this impact in the UK, and no research has addressed the performance of international students in undergraduate research.

## Methods

This study examines student achievement at one mid-sized UK university and compares student performance in undergraduate research across the sciences, social sciences, and humanities. The university enrolls just under 7,000 undergraduate students. Almost all students across the humanities, social sciences, and sciences complete a yearlong project that counts for a quarter of their final year. This study examines students' grades for these research projects to see if their performance improves, relative to their performance in their other classes. Results are analysed across six graduating cohorts, which provides a very large sample size of over 7,300 students in total. This difference is analysed to evaluate how this benefit from research projects varies across different subgroups, particularly international, BAME, and disabled students.

Student grades from 2011 to 2016 are analysed and project (ISP) modules are compared to the average for other final-year modules. The gain in grade between the ISP and the average of other classes is used as the dependent variable in a multiple regression to analyse the impact of these other factors:

- Prior Attainment:
- Gender:
- Ethnicity:
- Disability:
- Domicile:
- Discipline
- Year:

## Results

Model		Unstandardized Coefficients			Sig.	
		B	Std. Error	t		
1	(Constant)	7.165	.831	8.624	.000	
	Prior Attainment	-.107	.013	-8.244	.000	**
	Disabled	-.374	.279	-1.339	.181	
	Female	.764	.186	4.118	.000	**
	International	-1.124	.266	-4.228	.000	**
	Sciences	1.056	.252	4.191	.000	**
	Social Science	-.383	.262	-1.464	.143	
	Asian	-1.325	.291	-4.544	.000	**
	Black	-.611	.391	-1.562	.118	
	Y2013	-.465	.285	-1.628	.104	
	Y2014	-.370	.283	-1.309	.190	
	Y2015	.258	.295	.873	.383	
	Y2016	.453	.294	1.542	.123	

## Discussion

Students demonstrate a significant positive impact from undergraduate research on their degree, gaining an average that is 1.01 points higher than their other final year grades.

The negative coefficient for prior attainment shows that the research experience benefits lower achieving students even more than higher achieving ones. This result suggests that undergraduate research are not simply an experience best suited to more advanced or elite students, which contradicts previous findings (Taraban and Logue 2012).

The disabled students' coefficient is not statistically significant, suggesting that disabled students do not face systematic obstacles to completing their projects.

Female students demonstrate a significant gain of .764 points over male students on a 100 point grading scale. This gap replicates the higher levels of performance by female students in higher education in the U.K.

International students return a significant and large negative coefficient of 1.124, which more than eliminates the benefit that students gain, on average. While it is not the largest negative impact, it is a close second to that and means that international students, on average, do not benefit from doing a project compared to home students. This finding confirms that research also adds to the achievement gap for international students identified in other research.

Degree disciplines also have a significant impact on how well students achieve. The sciences do relatively well compared to the humanities, showing a gain of 1.056, which is a substantial gap. Social sciences do now show any statistically significant difference from the humanities.

Ethnicity shows a strong impact on the benefits from research. Black students show no statistically significant impact, but Asian students show the highest impact of any variable, with a coefficient of

-1.325. This result more than eliminates the average gain from research projects. It is particularly worrying because it is independent of international status, applying equally to Home Asian students. Further, since many of the international students are also Asian, they demonstrate a particularly large, negative achievement gap compared to the average student.

These findings are important because most prior research has indicated that disadvantaged students tend to benefit more from undergraduate research than other students, on average. This study analyses students' coursework using actual grades, which provides a very approach to most research, which is based upon student surveys. Further, it is conducted in a British university, which provides a very different environment for the impact of race and prior attainment compared to the North American context. The results will provide a much needed broadening of the research evidence for the impact of undergraduate research as a pedagogical practice and how it interacts with other factors and is not necessarily a positive impact in all cases. It would appear imperative for universities to discover what sorts of obstacles add to these gaps if the research experience is to play such a substantial role in the undergraduate degree.

#### References:

Broecke, S. and Nicholls, T. (2007) *Ethnicity and Degree Attainment*. DfES Research Report RW92. London: DfES.

Eagan, K., Hurtado, S., Chang, M. J., Garcia, G. A., Herrera, F. A., & Garibay, J. C. (2013). Making a Difference in Science Education: The Impact of Undergraduate Research Programs. *American Educational Research Journal*, 50(4), 683-713.

Iannelli, C. and J. Huang. 2013. Trends in participation and attainment of Chinese students in UK higher education. *Studies in Higher Education* 39, no 5: 805-22.

Jones, M. T., Barlow, A. E., & Villarejo, M. (2010). Importance of undergraduate research for minority persistence and achievement in biology. *The Journal of Higher Education*, 81(1), 82-115.

Laursen, S., Hunter, A-B., Seymour, E., Thiry, H., & Melton, G. (2010). *Undergraduate Research in the Sciences*. San Francisco: Jossey-Bass.

Linn, M. C., Palmer, E., Baranger, A., Gerard, E., & Stone, E. (2015). Undergraduate research experiences: impacts and opportunities. *Science*, 347(6222), 1261757.

Lopatto, D. (2009). *Science in Solution*. Tucson, AZ: Research Corporation for Science Advancement.

Pumfrey, P. D. (2008) 'Moving towards inclusion? The first-degree results of students with and without disabilities in higher education in the UK: 1998–2005. *European Journal of Special Needs Education*, 23, pp. 31– 46.

Richardson, J. T. (2015). The under-attainment of ethnic minority students in UK higher education: what we know and what we don't know. *Journal of Further and Higher Education*, 39(2), 278-291.

Taraban, R., & Logue, E. (2012). Academic factors that affect undergraduate research experiences. *Journal of educational psychology*, 104(2), 499.