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Undergraduate student messengers: Reinforcing young people's higher education ambitions? Follow-up research

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EXECUTIVE SUMMARY

This report provides the results of follow-up research to further test the findings of a published randomised controlled trial study, which found mixed evidence with regards to how '*low cost, high volume*' university outreach interventions change subsequent application behaviour.[1] This original study found a positive effect size in terms of intervention received and higher application and acceptance rates to a specific university (Nottingham Trent University). However, this effect size was insufficiently large and/or the sample size was too small to detect a statistically significant result. Therefore, the seemingly positive results could have feasibly occurred by random variation (chance). Nevertheless, the study provided some evidence of promise and, as the cost of delivering the intervention is minimal, and the potential benefits (not least in financial terms) gleaned from recruiting additional students massively outweighing these costs, it was decided to repeat the experiment under similar circumstances.

Results of the supplementary trial were also mixed, insofar as application rates were actually lower amongst the treatment group (13.1%), compared with the control group (14.3%). However, of those who did apply to Nottingham Trent University (NTU), treatment group conversion rates (50.0%) were higher than those of the control group (41.2%). By combining application and conversion rates, a slightly higher proportion of the treatment group (6.5%) effectively ended up as an undergraduate student at NTU, compared with the control group (5.9%). None of the results were statistically significant, hence the treatment could be said to have a null effect. Moreover, it was originally hypothesised that if the 'nudge' intervention was to have an impact, this would be more likely to affect application behaviour, rather than conversion behaviour, as the latter is likely to be more influenced by open days and other post-application decision points. Therefore, based on the results of our two null-result experiments, it can be concluded that, for NTU at least, sending letters from undergraduate student messengers in the attempt to 'nudge' potential applicant behaviour, does not work as it had previously done so for Russell Group institutions (results from which had inspired our own research).[2] It is therefore recommended that the intervention is discontinued.

[1] The results of our original study, as well as all supporting references are provided in Kerrigan, M. & Harvey, G. (2021), Undergraduate student role models: Reinforcing the higher education message?, in Journal of Behavioural Public Administration, 4(2). Available to download at https://www.researchgate.net/publication/359091240_Undergraduate_student_role_models_Reinforcing_the_higher_education_message.

[2] For further details see Kerrigan & Harvey (link above) or download the original research from Sanders et al, at https://www.ingentaconnect.com/content/openu/jwpll/2023/00000025/00000001/art00002;jsessionid=7tb5u6uvj0sgl.x-ic-live-02

INTRODUCTION

Despite over two decades of UK sector policy interventions aimed at narrowing higher education (HE) participation gaps between under-represented groups and their more advantaged counterparts, there remains a dearth of causal evidence of the impact of widening participation interventions. Some of the most intensive outreach activities are '*low volume, high cost'*, rendering experimental evaluation design problematic. 'L*ow cost, high volume*' outreach, however, delivered via role models or trusted messenger communications as part of a wider package of interventions, is ideally suited for experimental research.

A recent UK experimental study found that communications written by current undergraduates to potential applicants significantly increased the recipients' chances of applying to a specific group of research-intensive universities, as well as increasing their chances of receiving and accepting offers from those institutions (Sanders et al, 2019). These findings were consistent with a similar US experiment (Hoxby and Turner, 2013). Yet, whilst these studies demonstrate the opportunities for meaningful impact of high-volume, low-cost outreach, these nudges were characteristically context specific. They focused on increasing applications and enrolments to more 'selective' institutions or groups of institutions using letters written by students. Crucially, these studies have found little evidence of impact across the HE sector as a whole. There had been no known comparative studies in the UK with 'less selective' institutions, so it was not yet known if such methods of nudging were transferrable.

To address the dearth of relatable studies, we undertook our own randomised controlled trial, specific to our context as a 'medium-tariff' institution. This trial comprised two arms; one arm received two letters from existing undergraduates, whilst the other arm (the control group) received no such communications. Importantly, both the recipient cohorts *and* the type of higher education provider the messengers were affiliated to, differed considerably from previous and comparable studies.

The results of our initial trial found a positive effect size in terms of intervention received and higher application and acceptance rates to our university (Nottingham Trent University). However, this effect size was insufficiently large and/or the sample size was too small to detect a statistically significant result. Therefore, the seemingly positive results could have feasibly occurred by random variation (chance). Nevertheless, the study provided some evidence of promise and, as the cost of delivering the intervention was minimal, and the potential benefits (not least in financial terms) gleaned from recruiting additional students massively outweighing these costs, it was decided to repeat the experiment under similar circumstances.

In both our original trial and this repeated trial, the research participants had previously engaged with the university through its outreach programme, which specifically targets and works with disadvantaged young people. Therefore, our experiment can be seen as an additional nudge to serve as a reminder of this prior experience, and specifically considers the impact of nudging disadvantaged learners. Whilst offering similar messaging to previous sector research, therefore, our studies were very different in terms of context.

METHODOLOGY

In our randomised controlled trial experiment, we asked two current NTU undergraduates to each write a letter describing in their own words their transition to NTU and their experiences so far. NTU was specifically named, both in the letter content and on the letter headed paper, and the recipient's first name used in the introduction. The first letter was delivered by post to the treatment group in May 2022, when the research participants would be towards the end of their first year of post-compulsory education (year 12; aged 16 or 17), should they have progressed to that level of study. The second letter, which referred to the original letter written by the other undergraduate, was delivered to the same treatment group four months later in September 2022; the start of the next academic year. The two dates were purposefully chosen in line with our previous experiment; the May letter was seen as a way of reacquainting the recipients to NTU and encouraging them to think about their next steps over the summer break. The following September letter coincided with NTU's upcoming Open Days, and potentially provided an additional nudge to this cohort when they would typically be thinking about applying to HE. A transcript of the two letters is provided in Appendices 3a and 3b.

With appropriate parental/guardian consent, information on young people who had taken part in NTU's 'pre 16' outreach programme had been systematically collected and stored on the Higher Education Access Tracker (HEAT) database for several years. A total of 948 unique former participants reached the requisite age (18) to enter HE by 1st September 2023. Whilst the cohort was age-specific, they may have commenced participation in the outreach programme in different years. For example, the sample comprised a mix of pupils who first engaged with the programme in the 2016/17 academic year (aged 11), through to those who first participated in 2020/21 (aged 15).

The participants were randomised into two groups and stratified by the school the pupil had attended whilst participating in the outreach programme. Several additional covariates, pre-determined through existing internal and external evidence were included in the statistical modelling (Appendix 4):

- Student WP status (based on Indices of Multiple Deprivation) (factor, based on whether student resided in 40% most deprived neighbourhood nationally or not)
- Student ethnicity (factor, based on whether participant was an ethnic minority or white)
- Student free school meals eligibility (factor, based on whether participant had been eligible for free school meals or not eligible)
- Student gender (factor, based on whether participant was female or male)

It has long been established that prior educational attainment is by far the strongest predictor of the likelihood of a young person entering HE (Chowdry et al, 2012). Ideally, therefore, this variable would have been included in the model. Moreover, similar studies have included high pupil attainment as a pre-requisite for inclusion in the trial (e.g. see Sanders et al, 2019). Unfortunately, due to data protection regulations, these data were not available. Whilst this could be seen as a methodological weakness, the school stratification measures, the covariates included, and the randomisation process ensured that these limitations were minimised. Furthermore, the context of

our study, and the sample size available to us, meant that it would not be appropriate to determine eligibility based on student attainment. In effect, every young person who had previously taken part in an outreach programme and given consent for further research were included in our trials, thus eradicating any potential selection bias.

A random number generator was applied to determine which group in the two-armed design each research participant was allocated to. The treatment group (n=474), who were to receive the two letters, and the control group (n=474) who would receive no communication, were split 50/50. Full participant home addresses complete with postcode are mandatory fields in the participant database, hence letters were sent to all 474 participants. Of course, some of the research participants may have moved house since the data were collected, and there was no way of establishing how many letters were opened and read. However, the research aimed to establish if the specific act of sending the letters influenced subsequent behavior, and therefore an intention to treat analysis was conducted, with all research participants in both the treatment and control group tracked in terms of applications and acceptances to NTU for the 2023/24 admissions cycle (when all research participants would be aged 18 as of 31/08/23).

RESULTS

Data were analysed in Genstat 24th edition statistical software, with additional verification checks using SPSS. We find no evidence against the null hypothesis of no difference in application rates between treatment and control (Table 1a), both with (p=0.55; Column 2) and without covariates (p=0.57; Column 1). Contradicting our hypothesis, we find that the effect sizes for the treatment are negative (Table 1b), with average application rates of 13.1% for the treatment group, and 14.3% for control, although as noted, these differences were statistically insignificant.

We find a positive effect size of the treatment in terms of conversions of applications to acceptances (Appendix 1a), with average conversion rates 50.0%, compared with 41.2% control (Appendix 1b). However, with a diminishing sample size (hence only participants who applied to NTU are included) this was, again, statistically insignificant (p=0.30 with covariates, Column 2; p=0.31 without covariates, Column 1).

By combining the application and conversion rates, we find that average 'accepted applicant' rates (i.e. the percentage of the original research participants who were expected to enrol at NTU) were 6.5% for the treatment group and 5.9% for the control group (Appendix 2b). With a very large margin of error (confidence interval), these results could feasibly have been derived by chance (Appendix 2a; p=0.74 with covariates, Column 2; p=0.69 without covariates, Column 1).

Table 1a: Logit regressions of applications to Nottingham Trent University on treatment allocation

	Dependent variable:	
	Applied to NTU	
VARIABLES	(1)	(2)
Treatment: Student letters	-0.107	-0.115
	(0.189)	(0.190)
WP (IMD): WP Student		0.082
		(0.210)
Student Ethnicity: Ethnic Minority		0.145
		(0.248)
Student FSM: FSM eligible		-0.651**
		0.254
Student gender: Male		-0.245
		0.192
Constant	-1.787***	-1.578***
	(0.131)	(0.208)
Observations	948	948

Note: Standard errors in parentheses; *** p<0.001; ** p<0.01; * p<0.05

Table 1b: Average Application Rates to Nottingham Trent University and 95% Confidence Intervals by Treatment

	Average Application Rate	Lower bound CI	Upper Bound CI
Control	14.3%	10.4%	19.6%
+ Letters to prospective applicant	13.1%	9.4%	17.9%

p=0.571 for diff between treatment and control

DISCUSSION

The messaging medium of our experiments - the sending of letters to the treatment group – was closely aligned with other studies that had found positive nudging effects on applicant behaviour (Sanders et al, 2019). However, both of our studies found a null result, with some effect sizes positive (e.g. application rates of the treatment group in our initial trial) and others negative (e.g. application rates of the treatment group in the current trial).

Our initial experiment a few years ago found no significant difference, but the sample size available to us was relatively small, and a very large positive effect size would have been required to eliminate chance as the main influencer. Arguably, we should not have expected a large effect size for what are effectively 'nudge' interventions. Bearing in mind the sample size available to us was fixed, it was perhaps always going to be unlikely to achieve a statistically significant result. Nevertheless, the positive effect size promoted us to repeat the experiment. Alas, for our main outcome of interest (application rates to NTU), the direction of the effect of the treatment for our second trial was negative. As a result, by combining our two trials to give us a larger sample size, we still find a null result. Whilst one null value from a single trail does not preclude further investigation, to find the same null result (this time with a negative effect) from our subsequent trial gives us further confidence in our original results. It seems that letters written by existing undergraduates of our post-92 institution, delivered to former outreach participants of the same institution that aims to 'nudge' their application behaviour, makes no discernible difference to their actual behaviour.

CONCLUSION

This report has provided the results of follow-up research to further test the findings of a published randomised controlled trial study, which had found mixed evidence with regards to how '*low cost, high volume*' university outreach interventions change subsequent application behaviour. The original study had found a positive effect size in terms of the intervention received and higher application and acceptance rates to NTU. However, the effect sizes had been insufficiently large and/or the sample size was too small to detect a statistically significant result. Nevertheless, the study provided some evidence of promise and, as the cost of delivering the intervention was minimal, it was decided to repeat the experiment under similar circumstances.

Results of the supplementary trial were also inconclusive, insofar as application rates were actually lower amongst the treatment group (14.3%), compared with the control group (13.1%). However, of those who did apply to NTU, treatment group conversion rates (50.0%) were higher than those of the control group (41.2%). By combining application and conversion rates, a slightly higher proportion of the treatment group (6.5%) effectively ended up as an undergraduate student at NTU, compared with the control group (5.9%). None of the results were statistically significant, hence the treatment could be said to have a null effect. Moreover, it was originally hypothesised that if the 'nudge' intervention was to have an impact, this would be more likely to affect application behaviour, rather than conversion behaviour, as the latter is likely to be more influenced by open days and other post-application decision points. Therefore, based on the results of our two null-result experiments, it can be concluded that, for NTU at least, sending letters from undergraduate student messengers in the attempt to 'nudge' potential applicant behaviour, does not work as it had previously done so for Russell Group institutions. It is therefore recommended that the intervention is discontinued.

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[3] Additional references can be found in our original published research at https://www.researchgate.net/publication/359091240_Undergraduate_student_role_models_Reinforcing_the_higher_education_message

Appendix 1a: Logit regressions of conversion of applications to acceptances to Nottingham Trent University on treatment allocation

	Dependent variable:	
	Conversion of application to acceptance at Nottingham Trent University	
VARIABLES	(1)	(2)
Treatment: Student letters	0.357	0.385
	(0.354)	(0.373)
WP (IMD): WP Student		0.281
		(0.408)
Student Ethnicity: Ethnic Minority		0.124
		(0.485)
Student FSM: FSM eligible		0.887
		0.516
Student gender: Male		0.484
		0.373
Constant	-0.357	-0.976*
	(0.246)	(0.411)
Observations	130	130

Note: Standard errors in parentheses; *** p<0.001; ** p<0.01; * p<0.05

Appendix 1b: Average Application to Acceptance Conversion Rates to Nottingham Trent University and 95% Confidence Intervals by Treatment

	Average Conversion Rate	Lower bound CI	Upper Bound CI
Control	41.2%	25.9%	58.4%
+ letters to prospective applicant	50.0%	33.4%	66.7%

p=0.313 for difference between treatment and control

Appendix 2a: Logit regressions of accepted applications to the Nottingham Trent University on treatment allocation

	Dependent variable:	
	Applied and Accepted to Nottingham Trent University	
VARIABLES	(1)	(2)
Treatment: Student letters	0.109	0.089
	(0.269)	(0.270)
WP (IMD): WP Student		0.299
		(0.313)
Student Ethnicity: Ethnic Minority		0.171
		(0.343)
Student FSM: FSM eligible		-0.217
		0.326
Student gender: Male		0.005
		0.270
Constant	-2.768***	-2.938***
	(0.195)	(0.323)
Observations	948	948

Note: Standard errors in parentheses; *** p<0.001; ** p<0.01; * p<0.05

Appendix 2b: Average Accepted Application Rates to Nottingham Trent University and 95% Confidence Intervals by Treatment

	Average Accepted Applicant Rate	Lower bound CI	Upper Bound CI
Control	5.9%	3.5%	9.5%
+ letters to prospective applicant	6.5%	4.0%	10.6%

p=0.687 for difference between treatment and control

Appendix 3a: Copy of letter one sent to former NTU outreach participants May 2022

Tilly Underwood

C/O Centre for Student & Community Engagement

Nottingham Trent University

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Hi there!

My name is Tilly and I have just finished my second year at Nottingham Trent University. I just wanted to tell you about my transition and experience so far of university. To begin with, I found university a big adjustment to what I was used to in compulsory education, but it got a lot easier as I am genuinely interested and love the course that I'm doing (psychology). I think it's definitely important to choose a course that you enjoy because you have to motivate yourself to do the work, no one is there to hold you accountable for missing work and that's a lot easier when you love what you're working on.

My first year of university was a lot different to normal as I started in 2020 when covid was still really bad and everything was online. This made it harder to meet people on my course and make friends outside of my flat, but it made me realise that in the beginning it's so important to try and take every opportunity you can to meet people, as they could be your friends for life. For example, saying yes to meeting up with people from accommodation group chats, joining societies, asking people in your seminars to do something afterwards, like go for a coffee.

Looking back at where I was and where I'm at now, university is the best thing I ever could've done. It's made me grow so much as a person and have chances to do opportunities I never thought were possible. I've been able to experience a new city I love, have volunteering opportunities with the university that's given me great experience, and been able to be taught a course that I love by great lecturers that are also passionate about teaching you and have given me insight into what psychology is like post university.

Overall, personally, university was the best choice for me that I could've made. It helped me meet people I never would've met and have experiences that never would've happened if I'd stayed at home. However, make sure you make the right choice that works for you; a gap year, an apprenticeship, university or a job that suits you.

This was just to help you get insight from someone who chose the university route and loves it.

Good luck with what you choose to do,

Tilly

Appendix 3b: Copy of letter two sent to former NTU outreach participants September 2022

Nishat Khan

C/O Centre for Student & Community Engagement

Nottingham Trent University

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A message from Nishat, a current student studying at Nottingham Trent University who has just finished first year.

Hi there,

I work with Tilly as a Student Ambassador and I know she sent you a letter earlier this year. I wanted to do the same to tell you about my journey to University. My name is Nishat, and I'm a first year BSc (Hons) Psychology with Counselling student at Nottingham Trent University. I would like to give you a glimpse of my first year at university, as I know you must be going through a cluster of emotions and dilemmas about what to do next. University, for me, was a roller-coaster of experiences. I was quite surprised to have so many opportunities available to explore, as I was under the illusion that university only meant studying 24/7. I got to focus on my education and enhance my skills through participating in a wide range of activities while also enjoying my social life.

I loved studying my course at university because I was genuinely interested in Psychology since my A-levels. This positively impacted my learning as I focused on the subject I wanted to pursue. On top of that, I was constantly receiving academic and well-being support from my personal tutor, which kept me on track. Aside from that, I involved myself in voluntary and part time roles from the NTU job shop, a website that allows you to scroll through the latest work opportunities both within and outside the university. I gained valuable skills and learned how to balance my daily activities, which is something I struggled with before.

No matter where you live or where you go, you will have lots of opportunities to meet new people from different places and begin friendships. Even though I did not live in student accommodation, I still got the chance to meet amazing people through spending time in the global lounge, attending social night events and exploring the never-ending societies. You will find a society ranging from sports to cultures, and it is a great step to make friends and engage in new roles. I personally enjoyed connecting with people from different cultures and exploring the city of Nottingham together as we all learnt the history, cuisine and unique facts about each other and where we come from.

While applying to university may seem daunting, it is much easier once you are in, as you will be provided with countless support. Just remember to put yourself first. If you are interested in a particular apprenticeship or a course, look into it. Things that helped me reach a decision were attending open days, UCAS university and job fairs, and utilising the Unibuddy app. The app allows you to talk to current student ambassadors of your interested course and gives you an honest and realistic opinion.

Good luck with whatever you choose to do.

Nishat

If you don't want to receive further letters from the Centre for Student & Community Engagement, please email researchandinsights@ntu.ac.uk to let us know

Appendix 4: Statistical Modelling Applied

Our main dependent factors are:

1. Applications to NTU (Tables 1a & 1b)
2. Conversion of these applications to accepted applications; i.e. expected to enroll at NTU (Appendices 1a & 1b)
3. A combination of 1 & 2 (i.e. whether the research participant applied to, and was accepted at NTU (Appendices 2a & 2b)

Each of these outcomes are intrinsically binary; e.g. participants either did or did not apply to NTU. Therefore, binary logistic regression models were developed for each separate dependent factor. The linear logistic regression model for the dependence of p_i (probability of outcome of interest) on the corresponding values of k explanatory variables $x_{1,} x_{2,} \ldots x_{i,k,}$ is illustrated as follows:

$$\operatorname{logit}(p_i) = \log\left(\frac{p_i}{1-p_i}\right) = \alpha + \sum_{j=1}^{k} \beta_j x_{i,j}.$$

The regression coefficients of this model are estimated by the method of maximum likelihood. The logit function, $\operatorname{logit}(p) = \log[p/(1-p)]$, is a link function.

From this we calculate the probability of the outcome of interest (e.g. participant applying to NTU) given the fixed effects of the covariates, as follows:

$$p = e^{\alpha+\sum^{B}_{j} xi,j} / (1 + e^{\alpha+\sum^{B}_{j} xi,j})$$