



Project report:

Using learning analytics to prompt student support interventions

Findings from two randomised controlled trials

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February 2024

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1. EXECUTIVE SUMMARY

In higher education (HE), learning analytics (LA) systems are used to collect, analyse and display data to help understand student engagement and learning. Such data includes demographics (such as gender and age), prior attainment and data generated when students interact with university services (e.g. lecture attendance, library book checkouts, virtual learning environment (VLE) logins).

This data can be used to identify students who may be at risk of withdrawing from their studies or failing some (or all) of their course due to low or no engagement over a period of time. These at-risk students can then be targeted with interventions (e.g. emails or phone calls) designed to support them to get their learning back on track. There is, however, little causal evidence to support the impact of this type of LA-prompted intervention on student engagement or success, and almost none in a UK context.

To address this evidence gap, the Centre for Transforming Access and Student Outcomes in Higher Education (TASO) commissioned two English HE providers (HEPs) – Nottingham Trent University (NTU) and Sheffield Hallam University (SHU) – each to carry out a randomised controlled trial (RCT) of different interventions prompted by LA systems. The trial at NTU tested established practice while that at SHU focused on a pilot intervention.

At each HEP, students on the trial were randomly assigned to one of two groups (Intervention 1 or Intervention 2) which determined which intervention they would receive if the LA system identified them as being at risk. In both groups, at-risk students received an email alert which contained details of available support. For at-risk students in the Intervention 1

group, the email was automatically followed by a support phone call from a student adviser.

At NTU, 26,667 students were randomly allocated to one of the two groups and 2,207 students (8.2%) generated an at-risk alert.¹ At-risk alerts occurred after 10 days (for first-year students) or 14 days (for other students) of no engagement with university systems. The randomisation resulted in 1,045 students being placed in the Intervention 1 group and 1,162 students in the Intervention 2 group.

At SHU, 1,552 students were randomly allocated to one or other intervention and 514 students (33.1%) generated an at-risk alert. At-risk alerts occurred after 14 days of low or no engagement, and interventions were delivered at Weeks 5 and 8 of the academic year. The randomisation resulted in 256 students being placed in the Intervention 1 group and 258 students in the Intervention 2 group.

Key findings

- Neither HEP found a measurable difference in post-intervention engagement rating between at-risk students who received an email followed by a support phone call and at-risk students who received only the email.
- Neither HEP found any significant impact of the additional support call on the likelihood of a student generating additional at-risk alerts.
- Qualitative feedback indicated that students welcomed the intervention. For some, the phone call was appreciated as a means of breaking down barriers between themselves and the institution and stimulating their re-engagement with learning. For others, the email alone was cited as a sufficient motivator to re-engage with learning.

¹ The at-risk alert for students at NTU is generated by a period of complete non-engagement with university systems and is referred to as a no-engagement alert in the related impacted analysis report. It will be referred to here as an at-risk alert for convenience.

Key recommendations

- Our findings suggest that an additional support call may not provide significant benefits over and above an email. Future research should aim to replicate this work, but also to identify whether an email-only intervention is sufficient to help students re-engage with their learning, compared with no intervention. At institutions that are beginning to implement LA-prompted interventions, this may be most easily evaluated as the support is designed, iterated and its roll-out refined. For those HEPs with established LA systems, phasing the timing of interventions and monitoring short-term outcomes may balance the HEP's responsibilities for the wellbeing of non-engaging students with the need for better evidence on the effectiveness of LA-prompted interventions. Appropriate evaluation designs must be decided on a case-by-case basis.
- Interventions prompted by LA systems must be evaluated with clear pre-specified endpoints to determine their effectiveness; these evaluations should be accompanied by a comprehensive [Theory of Change](#) that identifies the issue the intervention aims to solve, the assumptions underlying the intervention and the outcomes that will be measured.
- Developers of LA systems should consider incorporating features that facilitate the evaluation of interventions, for example, in-system randomisation of at-risk students into different intervention groups, the ability to use different interventions with those groups, and the means of testing different methods of identifying at-risk students.
- HEPs should gather data to determine what support, if any, students access after receiving interventions, in order to understand whether the services are used, whether they are effective and whether particular groups of students are more or less likely to make use of them depending on the intervention they receive.

Next steps for TASO

- TASO will continue to explore the potential for better evaluation of post-entry support, including interventions promoted by LA systems, in our [Institutional data use](#) project. We will be working with a number of HEPs to provide practical resources, guidance and evaluation examples for the sector.
- HE student support champion Edward Peck has previously made the case for the [potential of institutional data to better support student wellbeing](#). The Office for Students appointed TASO to lead a consortium to help HEPs identify and make use of effective practice in supporting student mental health. As part of this project we launched a Student Mental Health Evidence Hub which we will continue to support with findings from across our research portfolio.
- Our research has found LA is one of the most common approaches being used to address the [ethnicity degree awarding gap](#). We are now running a project to generate Theories of Change for interventions designed to tackle this issue, which may include LA and associated interventions.



2. INTRODUCTION

In HE, LA systems are used to collect, analyse and display data to help understand student engagement and learning. The data may include demographics and assessment data as well as that generated when students interact with university services, such as lecture attendance, library book checkouts and VLE logins.

Predictive analytics is the use of LA data to identify those students who may be *at risk* of withdrawing from their studies or failing some or all of their course. These students may be identified by using machine-learning techniques – trained using past data to establish relationships between engagement and student success (e.g. Jayaprakash et al., 2014) – or algorithmically, by selecting those students whose engagement is below a certain threshold over a period of time (e.g. Foster & Siddle, 2020). *At-risk* students can then be targeted for interventions designed to support them to get their learning back on track. Interventions may take the form of an email directing students to support resources, or phone calls with a student support officer or personal tutor. The impact of these interventions is usually measured in terms of student success, such as increased engagement with studies or improved attainment and retention.

A recent TASO evidence review, however, found little causal evidence to support the impact of LA-prompted interventions on student success, and almost none in a UK context. Only two large-scale trials (N>1000 students) with control groups have been conducted on interventions prompted by LA systems (Jayaprakash et al., 2014; Milliron, Malcolm & Kil, 2014); both took place in the USA and only that by Milliron et al. (2014) is reported to be a RCT. The results of these studies are mixed. Jayaprakash et al. (2014) compared the effects of no intervention with two treatments – an ‘awareness message’ that directed students to support resources, or a message encouraging students to take up opportunities to engage in online support and mentoring. *At-risk*

students in both treatment groups performed better than those in the control group by around six percentage points. However, withdrawal rates in the treatment groups (26%) were much higher than those in the control group (14%), perhaps because the *at-risk* flagging system prompted those students to consider their ability to succeed in the course. As a result of higher withdrawal rates in the treatment groups, the remaining students may have been more likely to have higher attainment even without the intervention, because the academically weaker students were no longer in the sample for analysis. This limits the strength of the findings. Case study 1 in Milliron et al. (2014) reported three pilot studies that compared no intervention with a personalised email intervention. Two of these pilots showed no significant effect on student retention, while the third improved retention in the treatment group by three percentage points (no baseline was reported). In neither case was students’ post-intervention engagement reported.

To address this evidence gap, TASO commissioned the Behavioural Insights Team (BIT) to evaluate RCTs of interventions prompted by LA systems at two English HEPs – NTU and SHU.

At each HEP, students on the trial were randomly assigned to one of two groups (Intervention 1 and Intervention 2), which determined which intervention they would receive if the LA system identified them as *at risk*. In both Intervention 1 and Intervention 2, *at-risk* students received an email alert that contained details of available support. Additionally, for the Intervention 1 group, the email to *at-risk* students was followed by a support phone call from a student adviser.

The primary outcome for each trial is post-intervention student engagement as measured by each HEP’s LA system. By comparing the outcomes of the two interventions, we can assess the additional impact of the support call given in Intervention 1 over Intervention 2.

Table 1: Project personnel

Organisation	Name	Role and responsibilities
BIT	Patrick Taylor	Project lead (evaluation)
	Pujen Shrestha	Quantitative Analyst
	Tim Hardy	Quantitative Analyst
	Anna Bird	Policy QA
	Jessica Hunt	Project lead (interim)
	Will Cook	Research QA
	Laure Bokobza	Research QA
TASO	Eliza Kozman	Deputy Director (Research); Responsible for commissioning
	Rob Summers	Research Manager; Responsible for overseeing the management of the study
NTU	Emma Hynd	Interim Head of Student Engagement and Analytics
	Eleanor Turpin	Learning Analytics Research Manager
	George Cox	Student Engagement Research Coordinator
SHU	Carolyn Fearn	Head of Operations (Teaching and Learning)
	Helen Parkin	Senior Lecturer in Research Evaluation and Student Engagement
	Felicity Woodhouse	Senior Administrator (Research and Evaluation)
	Katie Smaylen	Senior Student Support Adviser

3. IMPACT EVALUATION – RCT

Methodology

Interventions

The timeline for the intervention phase is shown in Figure 1. This period covered the autumn term of 2022. Although the interventions at each HEP are broadly similar (Table 2), the processes that trigger them and their timings differ greatly.

At NTU, monitoring of student engagement begins on the first day of term and continues daily. At any point during the term, an at-risk alert is triggered when a student does not engage with any of the institutional

systems (see Table 2) for a period of 10 days (first-year students) or 14 days (other students). The list of at-risk students is checked by a member of the support staff within two working days, and the appropriate intervention emails are sent. Details of the intervention emails and scripts for the support call are shown in the appendices of the [NTU IPE report](#).

At SHU, during Week 4 and Week 7 of the university term, a student is flagged as *at risk* if they do not attend any lectures or do not log in to the VLE for 14 consecutive days. The appropriate interventions for each at-risk student are delivered during the following week – either Week 5 or Week 8 as appropriate. Details of the intervention emails and scripts for the support call are given in the appendices of the [SHU IPE report](#).

Figure 1: Timeline of interventions at each HEP. Week 1 commenced on 26 September 2022.

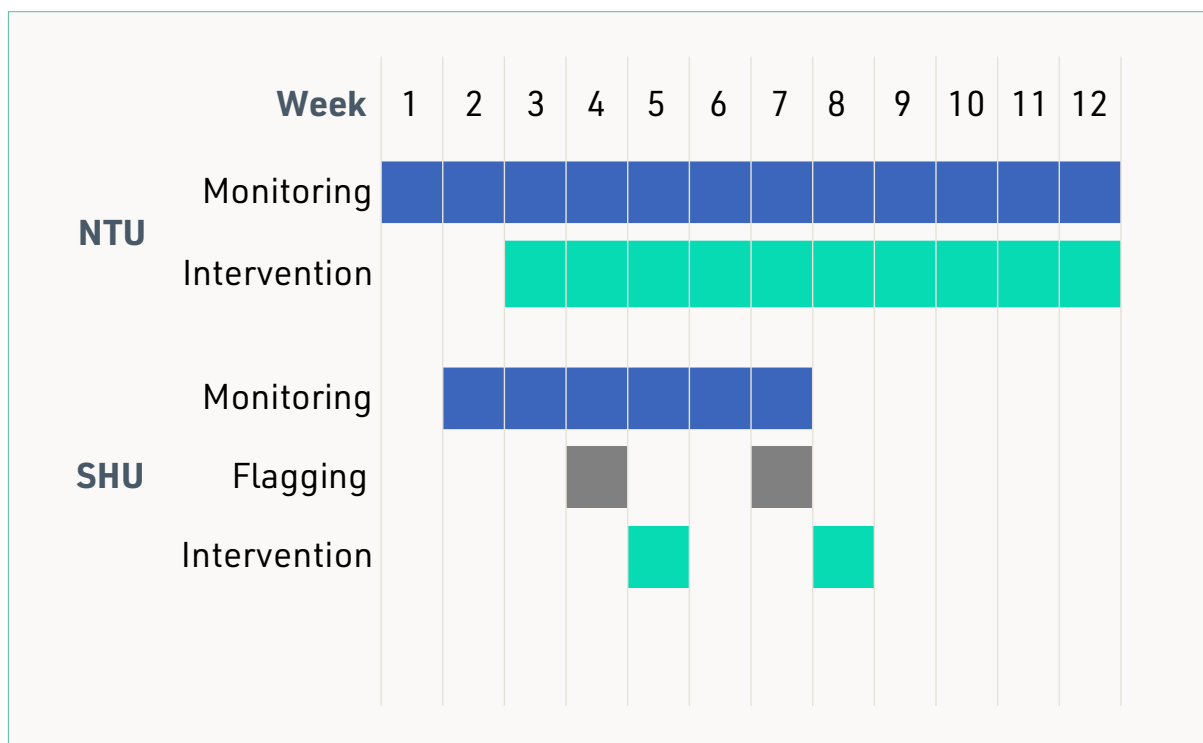


Table 2: Interventions at each HEP

	NTU	SHU
Systems monitored	<ul style="list-style-type: none"> VLE logins VLE learning rooms Attendance monitoring Online submissions Online resource use Building access Library loans 	<ul style="list-style-type: none"> Attendance monitoring VLE access
Trigger	<ul style="list-style-type: none"> 10 days (1st year), or 14 days (other years) of no engagement with university systems 	<ul style="list-style-type: none"> 14 days of no attendance, or 14 days of no engagement with the VLE (flagged at Week 4 and Week 7)
Intervention 1	<ol style="list-style-type: none"> Email Support phone call 	<ol style="list-style-type: none"> Email Text message to advise that a call will be made Support phone call
Intervention 2	<ol style="list-style-type: none"> Email Option to book support phone call 	<ol style="list-style-type: none"> Email



Sample

Prior to monitoring their engagement, the population of undergraduate students in the trial at each institution was randomly assigned to one of two intervention groups. As a result of practical constraints on randomisation imposed by both HEPs, BIT was unable to randomise the pool of *at-risk* students directly. In each institution, the randomisation was stratified by ethnicity, year of study and entry qualification.² Only students who generated an *at-risk* alert during their first term were included for further analysis.

At NTU, 26,667 undergraduate students were randomly assigned to one of the two interventions:

13,334 to Intervention 1 and 13,333 to Intervention 2. During the autumn term, 2,207 students generated at least one *at-risk* alert – 1,045 in Intervention 1 and 1,162 in Intervention 2 – and were included for subsequent analysis.

At SHU, 1,552 undergraduate students from three university departments were randomly assigned to an intervention: 776 to each intervention. During the autumn term, 514 students generated at least one *at-risk* alert – 256 in Intervention 1 and 258 in Intervention 2 – and were included for subsequent analysis.

Full tables of demographics can be found in the relevant impact reports for [NTU](#) and [SHU](#).

Table 3: Sample population for the RCT

		NTU	SHU
Randomised Sample		26,667	1,552
Analysed Sample (Students flagged as <i>at-risk</i>)	Intervention 1	1,045	256
	Intervention 2	1,162	258
	Overall	2,207	514

² At both HEPs, entry qualification is a binary variable but it is coded differently. At NTU it is coded as A-levels or other qualifications. At SHU it is coded as A-levels (incl. equivalent Level 3 qualifications such as BTEC) or other qualifications.

Outcome measures

The outcome measures for each trial are shown in Table 4.

The primary outcome measure for both institutions is student engagement after the intervention, albeit measured differently for each institution. Secondary outcome measures include the likelihood of additional at-risk alerts, the effect of answering a phone call, attendance and withdrawal.

Measuring engagement

A brief description of the measures of engagement used by each HEP is given below. Full details can be found in the respective impact reports.

Student engagement ratings at NTU are calculated from daily reports on seven types of data: VLE logins, use of VLE learning rooms, attendance, online submissions, online resource use, building access and library loans. NTU's engagement ratings are graded from 1 (very low engagement) to 5 (very high engagement).

Engagement ratings for students at SHU are calculated from separate RAG (Red-Amber-Green) scores for physical engagement (attendance) and virtual engagement (VLE logins) for each module of study (three or four per student) such that each student has six to eight RAG scores. Red RAG scores signify low or no engagement. The engagement ratings at SHU take the form of the percentage of

each student's RAG scores that are red and lie between 0% (very high engagement) and 100% (very low engagement).

Data analysis

Ordinary least squares (OLS) regression was used to estimate the effects of the intervention on engagement ratings (both HEPs) or average attendance (NTU).

Logistic regression was used to estimate the effects of the intervention on the likelihood of a student generating an additional *at-risk* flag in Term 1 (both HEPs), answering a phone call (NTU), or withdrawing from university (SHU).

Both the OLS and logistic regressions included covariates as follows:

- NTU: gender, ethnicity, postcode-level marker of disadvantage (IMD quintiles), academic year group, week in which the intervention was delivered, entry qualification, and university department;
- SHU: gender, ethnicity, age (mature or young student), postcode-level marker of disadvantage (POLAR4 quintiles), academic year group, fee status (Home/EU & International), disability status, university department, date intervention was delivered, Week 3 % red RAG engagement score, and minimum entry qualification.

Table 4: Outcome measures for each trial

NTU		SHU	
Outcome Measure	Point of Collection	Outcome Measure	Point of Collection
PRIMARY: Student's short-term engagement rating	Days 1–10 of the intervention period*	PRIMARY: Proportion of red RAG engagement scores at Week 9	Week 9 Term 1
PRIMARY: Student's medium-term engagement rating	First 4 weeks of Term 2	SECONDARY: Proportion of red RAG engagement scores at Week 12	Week 12 Term 1
SECONDARY: Additional <i>at-risk</i> flag generated in Term 1	Mid-line (end of Term 1)	SECONDARY: Additional <i>at-risk</i> flag generated in Term 1#	Week 12 Term 1
SECONDARY: Student answers phone call	Mid-line (2 weeks following intervention, Term 1)		
EXPLORATORY: Attendance	Days 1–10 of the intervention period*	EXPLORATORY: Withdrawal from SHU	Week 12 Term 1

* Originally, days 7–21 post-intervention. Revisions were made to the point of collection for these measures due to stages of the intervention delivery that were not considered when drawing up the trial protocol; students in Intervention 2 who triggered an additional *at-risk* alert received an automatic phone call. Many of these additional alerts occurred between 11 and 21 days after the first intervention. To avoid contamination of these outcome measures in the Intervention 2 group, the data collection period was changed to days 1–10 following the intervention. Full details of the changes are given in the full NTU impact report.

This outcome has been changed from the Trial Protocol, where it was specified as the number of *at-risk* flags. Since all students eligible for the analysis have either 1 or 2 *at-risk* flags, converting this outcome into a binary variable does not lose any information but makes results more intuitive and matches the outcome measure for NTU.

The outcome data presented in the text and figures of this summary report are estimated from the descriptive mean of the raw data for Intervention 2 and adding in the effect of Intervention 1 obtained from the fitted regression models. The estimated outcomes for Intervention 1 are used because they take into account any differences between the two intervention groups in terms of the modelled covariates. The raw data is presented in the individual impact reports for each HEP.

Findings

Engagement

Across the two HEPs, no measurable effect of the email plus support phone call (Intervention 1) was found on post-intervention student engagement over the email alone (Intervention 2); see Figure 2.

At NTU, and as predicted, the short-term engagement rating for Intervention 1 (1.80) was slightly larger than that for Intervention 2 (1.78). Although, contrary to expectations, there was a slight fall in medium-term engagement rating for Intervention 1 in comparison with Intervention 2 (2.28 vs 2.24). In both outcomes, however, the 95% confidence intervals of the

engagement ratings for Intervention 1 overlap the estimated engagement rating for Intervention 2, indicating that the ratings for each intervention are comparable.

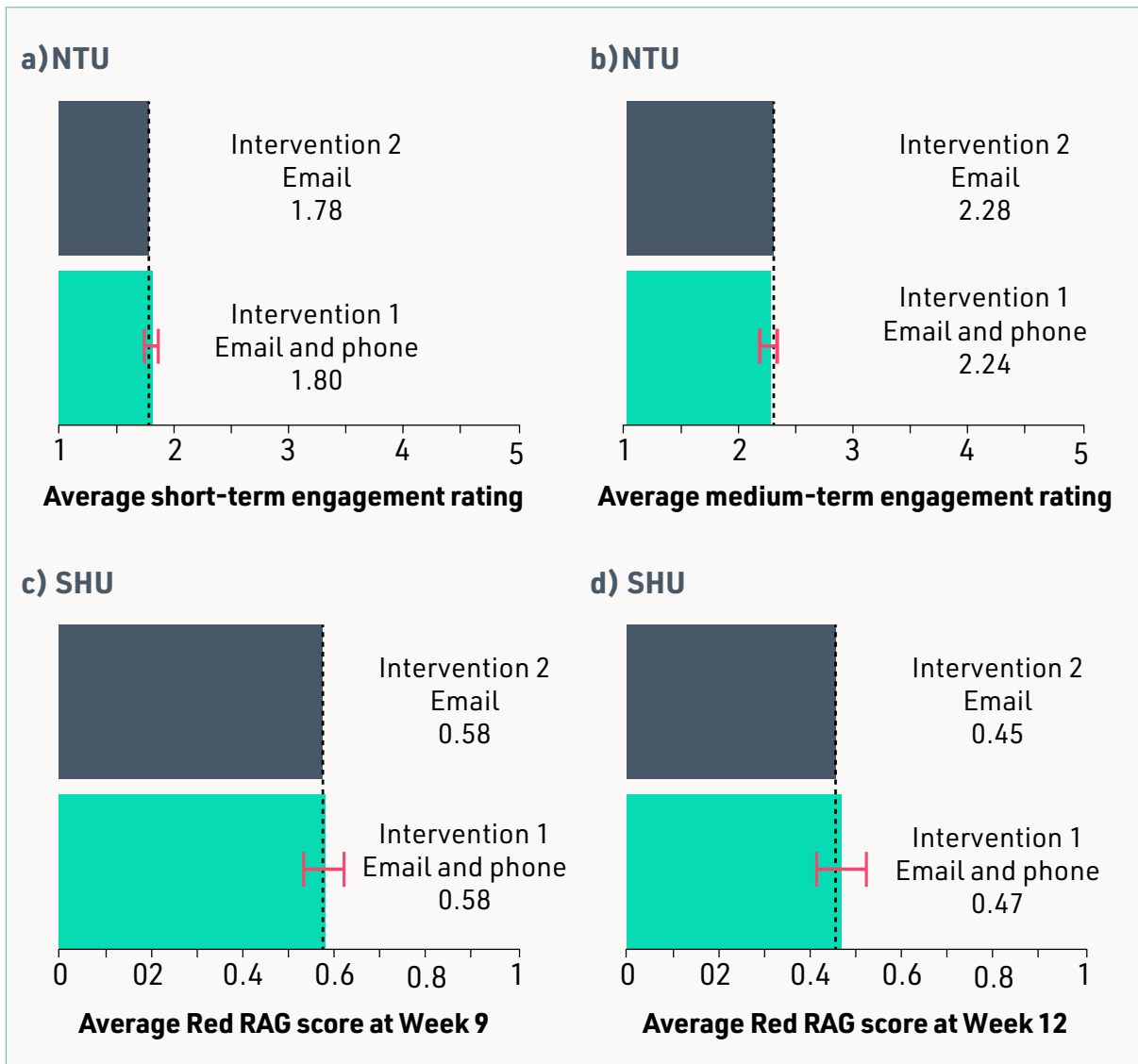
At SHU, the proportion of red RAG scores at Week 9 was identical for Intervention 1 and Intervention 2 (0.58). Contrary to expectations, at week 12, the proportion of red RAG scores was higher for Intervention 1 than Intervention 2 (0.47 vs 0.45) indicating that engagement decreased for those students who received a phone call. For both outcomes, however, the 95% confidence intervals of the red RAG ratings for Intervention 1 overlap the estimated ratings for Intervention 2, indicating that the ratings for each intervention are comparable.

An additional analysis was performed on the data for SHU to determine whether students who answered the phone in Intervention 1 (rather than those who did not accept the call) had a lower red RAG score (i.e., higher engagement), were less likely to generate an additional *at-risk* flag post-intervention than those students in Intervention 2, or less likely to withdraw from their studies. This additional analysis revealed no effect of answering a phone call on any of the outcomes tested.



Figure 2: Post-intervention engagement rating

Estimated levels of post-intervention engagement ratings for NTU (Panels a and b) and SHU (Panels c and d) for each intervention group (different bars). NTU engagement ratings range from 1 (no engagement) to 5 (very high engagement). For SHU, the engagement rating is defined in terms of the proportion of red RAG engagement scores; therefore, higher red RAG scores indicate lower engagement (and vice versa). See text for details of how each measure is calculated. Interventions 1 and 2 both comprise a support email. In Intervention 1, the email is followed by a coaching phone call. Dotted lines indicate the relevant magnitude for Intervention 2. Red bars are 95% confidence intervals.



Additional at-risk flags

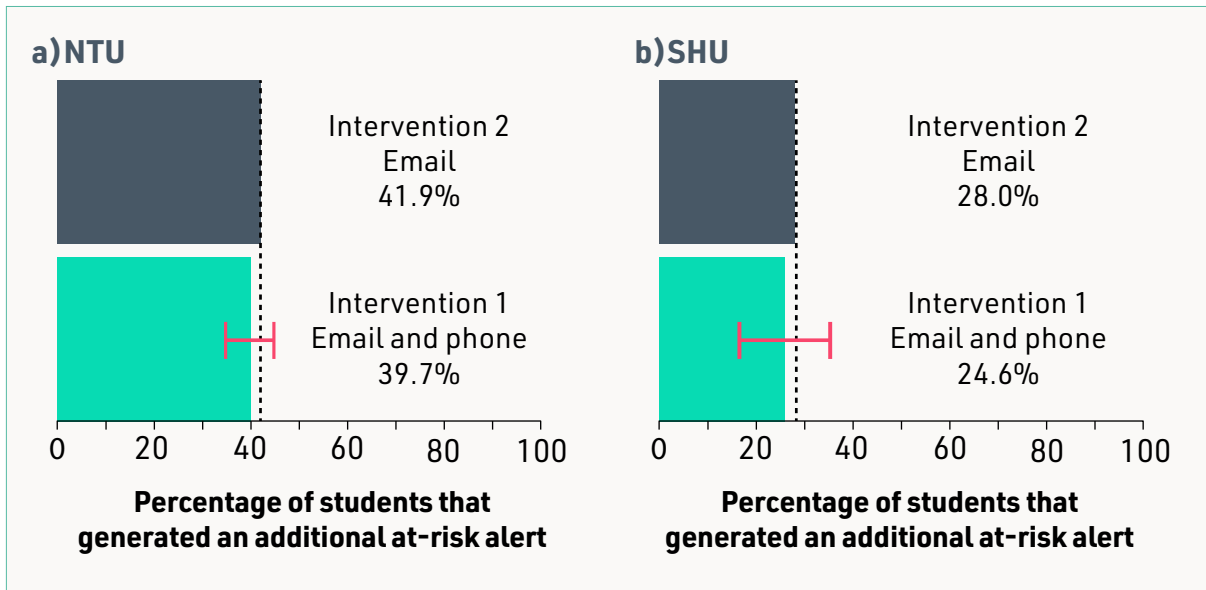
Across both HEPs, there was no measurable effect of Intervention 1 over Intervention 2 in reducing the likelihood of students receiving additional *at-risk* flags (Figure 3).

At both NTU and SHU, the percentage of students generating an additional *at-risk* flag was lower

among students who received an automatic phone call (Intervention 1) compared with Intervention 2 (NTU: 39.7% vs 41.9%; SHU: 24.6% vs 28.0%). However, the 95% confidence intervals for the percentage of *at-risk* flags for Intervention 1 overlap the estimated percentage for Intervention 2, indicating that the two values are compatible with each other.

Figure 3: Additional at-risk flags

The effect of each intervention on the estimated percentage of participants that generated more than one at-risk flag at (a) NTU, and (b) SHU. Interventions 1 and 2 both comprise a support email. In Intervention 1, the email is followed by a coaching phone call. Red bars are 95% confidence intervals.



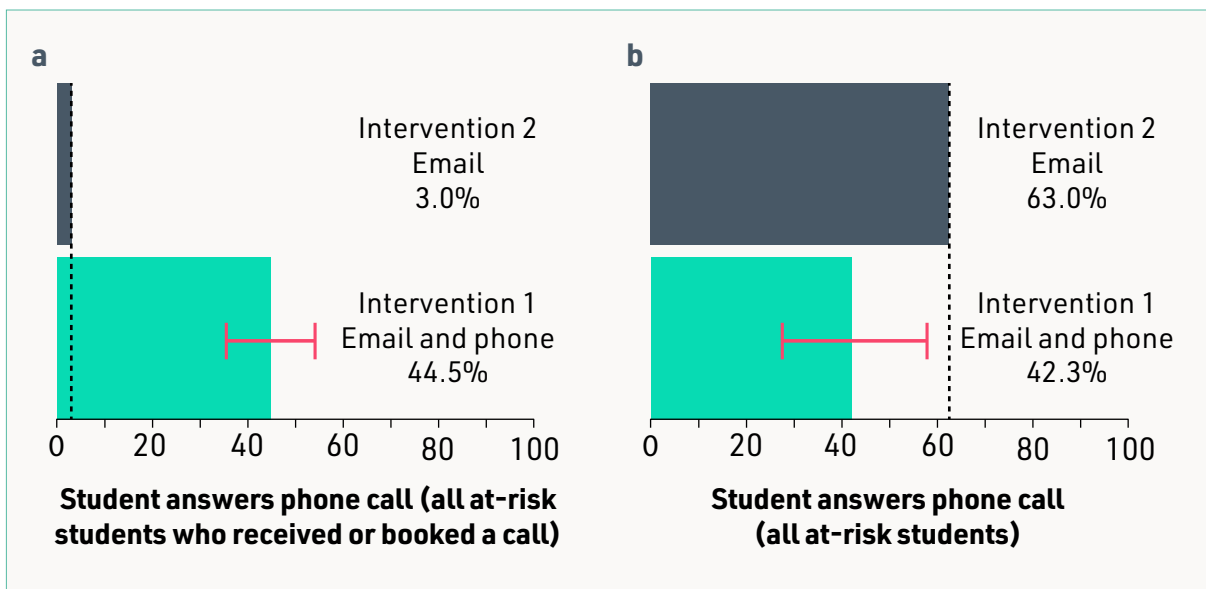
Likelihood of answering a phone call (NTU only)

The likelihood of students answering a phone call in each intervention was tested at NTU (Figure 4). Students in Intervention 2 who booked a support call were more likely to answer it than those in Intervention 1 who received an automatic phone

call (63.0% vs 42.3%). However, only 50 students in Intervention 2 opted to book a support phone call and the percentage of students who answered a phone call (Figure 4b) was much higher for Intervention 1 (44.5%) than Intervention 2 (3.0%) because more phone calls were made in Intervention 1 (1,045) than in Intervention 2 (50).

Figure 4: Student answers call (NTU only)

The effect of each intervention at NTU on the likelihood of a student answering a phone call; students in Intervention 1 automatically receive a support call whereas students in Intervention 2 have the option to book a support phone call. In Panel a, the percentage of students answering a call is presented in relation to at-risk students who received an automatic call (Intervention 1) or booked a call (Intervention 2). In Panel b, the percentage of students answering a call is assessed relative to all at-risk students in each intervention. Red bars are 95% confidence intervals.



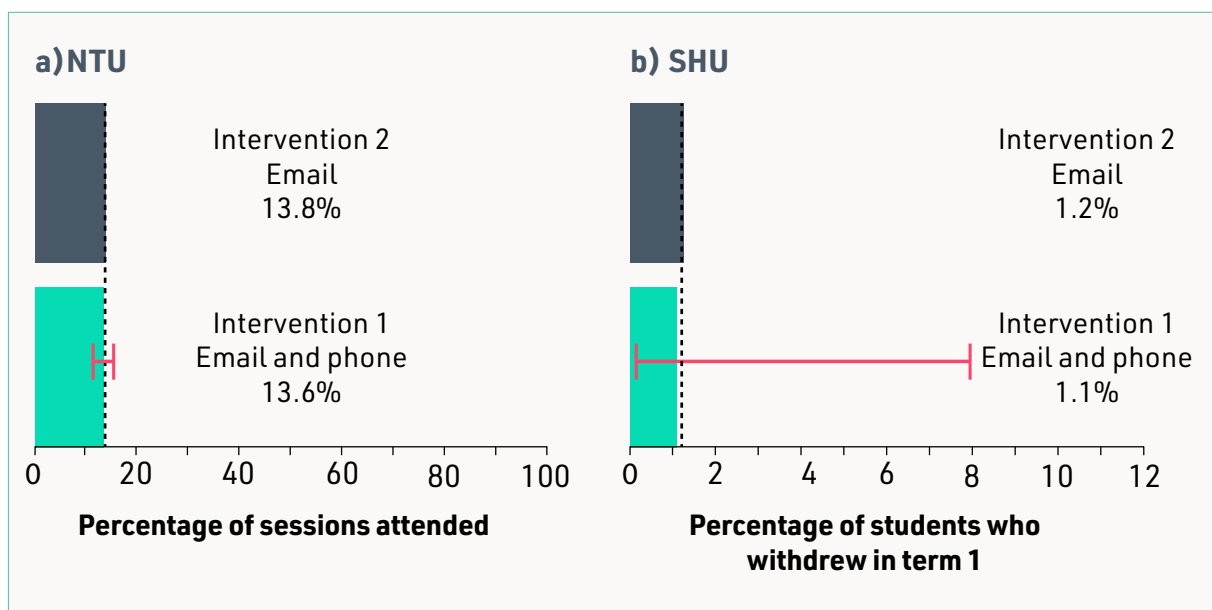
Attendance (NTU) and withdrawal (SHU)

At NTU, the exploratory analysis on post-intervention attendance (Figure 5a) found no effect for students in Intervention 1 over those in Intervention 2. The percentage of seminars/lectures attended after an intervention was 13.6% and 13.8% for Interventions 1 and 2 respectively; however, the 95% confidence intervals for Intervention 1 overlap the estimated attendance for Intervention 2, indicating that the values are compatible with each other.

At SHU, the exploratory analysis of the effect of each intervention on the likelihood of students withdrawing from their studies (Figure 5b) found that although a smaller proportion of Intervention 1 students withdrew (1.1% vs 1.2%), the confidence intervals for this estimate were so large as to easily encompass the estimate for Intervention 2, indicating that the values were compatible with each other.

Figure 5: Post-intervention attendance (NTU) and Withdrawal (SHU)

The effect of each intervention on (a) post-intervention attendance (NTU) and (b) the percentage of students withdrawing from their studies (SHU). Interventions 1 and 2 both comprise a support email. In Intervention 1, the email is followed by a coaching phone call. Red bars are 95% confidence intervals.





4. IMPLEMENTATION AND PROCESS EVALUATION (IPE)

Methodology

The findings from the IPE help to explain the impact of evaluation outcomes. While the impact evaluation aims to establish whether the intervention is or is not effective, the IPE seeks to demonstrate how and why this is the case. The purpose of the IPE, therefore, is to investigate whether the interventions were implemented as planned, whether the intervention outcomes were achieved, and whether the assumptions underlying the intervention were met.

Data collection

Interviews and focus groups

At both institutions, students flagged as *at risk* were invited to share their experiences of the interventions via interviews. Staff involved in the calling service reported their experiences at NTU through interviews or focus groups or, at SHU, through an informal analysis by their senior administrator.

Sample

Recruiting participants to take part in these interviews was challenging since the sample population comprised the least engaged students. In an attempt to boost recruitment, monetary compensation was offered in the form of Amazon vouchers to the value of £40 (NTU) or £20 (SHU).

Overall, across both HEPs, 19 students were interviewed (see Table 5).

Table 5: Sample of participants for student interviews at NTU and SHU.

	Intervention 1	Intervention 2	Total
NTU	9	4	13
SHU	5	1	6

NTU conducted interviews with 13 students who had been identified as *at-risk* by their LA system; nine of these students were from the Intervention 1 group. These interviews were carried out by the research coordinator.

SHU conducted interviews with six students who had been identified as *at-risk* by their LA system; five of these were from the Intervention 1 group. These interviews were carried out by a member of staff who conducted the telephone support.

Staff reflections were sought by both HEPs. At NTU, these reflections were gathered via an interview with the coordinator of the calling service and a focus group with the five members of the calling team. These interviews were conducted by an external facilitator. At SHU, the head of operations gathered informal reflections on staff experiences.

Data analysis

At NTU, the interviews were recorded and automatically transcribed using Microsoft Teams prior to the correction of errors in the transcription.

At SHU, notes were taken of the telephone interviews with students.

In each case, an inductive approach was taken to analysing the transcripts or notes to identify any themes, following Braun and Clarke (2006).

Findings

This section of the report outlines the findings from the interviews with students and the focus groups with those involved in delivering the coaching calls. The findings are captured under four key themes from each HEP's Theory of Change: student self-efficacy, motivation, sense of belonging and knowledge of support services.

Student self-efficacy

Evidence for increased self-efficacy and improved knowledge of university support can be seen in the actions taken by students after the call intervention, including discussions with the course tutor or addressing their non-engagement directly.

"I did email my personal tutor and that's been really helpful."

(NTU Student, Intervention 2)

"I engaged a bit more with the course after it, because from now on I was able to engage the course leader."

(NTU Student, Intervention 2)

"I chose to make more of an effort to go to my lectures."

(NTU Student, Intervention 1)

The responses of the students at NTU contrasted with those at SHU, where students who were interviewed did not report increased levels of confidence as a result of the applied intervention and did not report taking steps to manage their own lack of engagement.

Sense of belonging

The Theories of Change for both institutions predicted an increased sense of belonging as a result of the intervention. However, the reports from the student interviews indicated that the telephone call also fostered a sense of mattering; that is, not only do the students feel that they belong to an institution, they also feel valued by it.

"I feel like I'm definitely part of the uni, the way the uni were very keen to help, and how quick they were to help."

(NTU Student, Intervention 2)

"It felt good to know that the university cared."

(SHU student, Intervention 1)

At NTU, this sense of mattering was deliberately fostered by the calling team through active listening.

"Although we're not really a counselling service, there are better listening skills and better communication, I think, between ourselves and the students. Just letting them know that we're there for them, that they're not a number, I think that's really important it came across."

(NTU Staff)

An important aspect of this rapport was a sense of authenticity from the caller. Students felt that the callers were genuine in their care and desire to help, which emphasised their sense of mattering.

"It just felt like they genuinely wanted to know about me and what was going on."

(NTU Student, Intervention 1)

According to some students, the synchronous communication allowed for a greater rapport to build between the caller and those called.

"I could tell she really meant it from the tone and emotion to her voice, and that's a nice thing to hear that they care and makes you feel like you're not alone."

(NTU Student, Intervention 2)

“With a call it feels more personal and the person on the end of the phone really cares.”

(NTU Student, Intervention 2)

Motivation

Some students reported that their realisation of the extent of their non-engagement was a motivating call to action.

“I needed that kick up the arse.”

(NTU Student, Intervention 1)

“It was a little bit of a push, to show me my engagement was low.”

(NTU Student, Intervention 1)

While some students were confident they had the resources to improve their non-engagement, they identified the call as a source of empowerment to bring this about.

“I felt more motivated because I could now see the links and the resources that I have always had access to, and I wasn’t making use of them, so I just felt motivated enough to start accessing all those resources.”

(NTU Student, Intervention 2)

This was particularly true of those students who felt that the earlier email notification, rather than the call itself, was enough of an impetus to change their behaviour.

“The email is the wake-up call.”

(NTU Student, Intervention 1)

Knowledge of support services

Students also accessed wider university support, from teams such as student support services (including disability services). This was either mediated through their newly restored tutor relationship or via signposting from the call itself:

“My personal tutor then took over and helped with the pastoral support that I needed, and NECs [notification of extenuating circumstances] and stuff like that.”

(NTU Student, Intervention 2)

“After the call, I actually got into contact with the disability team, which was via a link I was sent with regards to help going back to university. And I also looked at a mental health and wellbeing link, I did read through that.”

(NTU Student, Intervention 2)

“I feel like I know where I need to go for support now, thanks.”

(SHU Student)



5. LIMITATIONS

A number of limitations in the trial and IPE have been identified in the respective reports. Through robustness checks and other additional analyses, the effect of most of these limitations on the outcomes has been determined to be minimal. However, the following are worthy of note:

Duration of study

The time constraints of the study (Term 1 of the 2022–23 academic year) limited the extent of the data collected. The data measured by the LA systems are only proxies for engagement. The ultimate test of students' engagement and learning is their attainment, which was not available within the time frame of this study.

Variations in timing of interventions

The interventions at SHU were intended to be delivered in Weeks 5 and 8 of the academic year but were actually delivered in Week 4 and Week 9. This discrepancy in timing may have led to an underestimation of the short-term effect of the intervention for those students identified in Week 9. However, the estimate of medium-term engagement at Week 12 should not have been affected.

Administrative error

There was an administrative error at NTU during the trial period (on 7 November 2022) which led to members of both intervention groups being given the wrong intervention. An additional robustness check, where only the compliant sample was analysed, replicated the direction of the effect of Intervention 1 in comparison to Intervention 2 with respect to all outcomes except attendance.

Monitoring of support services

Neither HEP was able to effectively monitor whether students in either intervention group used the support services to which they were signposted, although SHU could track those students who answered a phone call and accessed the support services. This lack of monitoring hindered the evaluation of how effective telephone calls were compared to emails alone in guiding students towards support services. It also made it challenging to assess the services' capacity to meet the needs of students.

Sample population for IPE

Both HEPs experienced difficulty in recruiting students who did not answer a phone call or students from the Intervention 2 group (email-only) for their interviews. These most disengaged students may have quite different views as to the usefulness and utility of either intervention, so this represents a limitation of the IPE.

6. DISCUSSION

Interpretation

Overall, across two HEPs with different methods of identifying *at-risk* students, there was no measurable difference in post-intervention engagement rating or the likelihood of generating additional *at-risk* flags between those students identified as *at-risk* who received an email followed by a support phone call (Intervention 1) and those students who received an email alone (Intervention 2). Similarly, there was no effect of intervention type on post-intervention lecture/seminar attendance (only tested at NTU) or the likelihood of a student withdrawing from their studies (only tested at SHU).

An analysis conducted only at SHU, comparing students in Intervention 1 who answered the phone with *all* students in Intervention 2, also found no difference in post-intervention engagement for students who answered the phone. At NTU, students who booked an optional support call, rather than being called by default, were more likely to answer the phone. However, as few students in Intervention 2 actually booked a call, default calling resulted in far more successful calls taking place, despite the lower rate of students answering the phone in Intervention 1.

Despite the lack of additional effect of the support phone call over the email alone, students interviewed by HEP staff reported welcoming the phone call and found it motivated them to re-engage with their studies. However, other students found that the email alone was a sufficient motivating factor. These views may help explain why, overall, there was little difference between the outcomes of each intervention, given the low call success rate for Intervention 1 at each HEP.

Opportunities for future research

The Theories of Change for both HEPs included clear assumptions, outcomes and endpoints that enabled the evaluation and testing of their success. After the conclusion of the impact analysis, discussions with both HEPs indicated a willingness to revisit these assumptions and outcomes in order to drive improvements. A core assumption for both HEPs was that students would engage with the phone call. While students who took part in the interviews indicated that these calls were successful, there was a relatively low call success rate. It may be useful to trial different modes of delivery for the intervention message. For example, text messages containing hyperlinks could be used to provide information and

support, or a chatbot could be provided to encourage students to book a support phone call.

Given that students who book a support call are more likely to answer the phone, it would be worth exploring whether providing students with a choice of times to receive the call would increase the percentage of students who answer a call (with the caveat that students who do not choose a time still receive a phone call).

Future work should consider monitoring students' access to support services post-intervention. For example, the results of this trial could be explained if students who were called were more likely to access support services than those who were emailed, but the support services themselves were not addressing students' needs.

This trial also did not employ a pure control group that received no intervention, which would have allowed us to establish the effect of the intervention compared with doing nothing at all. Any evaluation must recognise the ethical considerations around this type of investigation and the HEPs' responsibility towards their students' wellbeing. One solution could be modifying the timing of support so that an intervention is delivered earlier than usual for a subset of students but all *at-risk* students receive the same support by the usual deadline. Alternatively, a quasi-experimental design using a comparison group of students from different departments that have not yet implemented interventions may help unpick the impact, if any.

HEPs introducing LA systems with associated interventions may consider running a 'no intervention' control group with pre-specified evaluation points to determine the intervention's efficacy by identifying the most effective approaches in their context. Should evidence emerge that the intervention is effective, it can then be rolled out to the control group as well. Ideally, this should form part of an iterative evaluation cycle in which HEPs refine and improve their student support interventions, underpinned by robust evidence.

Finally, the nature of the data from, and interventions prompted by LA systems make them ideally suited to generating causal evidence of activities and interventions directed at the student experience. However, to the best of our knowledge, the systems currently installed in UK HEPs lack features that facilitate evaluation, such as the allocation of students to different interventions. This requires manual processes to be used that risk mistakes in the conduct of a trial. We call on the developers of these systems to improve their systems' capacity to facilitate evaluation of the student experience.

7. REFERENCES

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APPENDIX 1: THEORIES OF CHANGE

Theory of change for NTU

Situation	Student mental health and wellbeing is in decline, exacerbated by the COVID-19 pandemic. Students desire someone to talk to above any other form of support. Students may be low- or non-engaging for a variety of reasons, including poor mental health and well-being. The Student Engagement Dashboard at Nottingham Trent University already effectively identifies low- and non-engagers, and the Contact and Engagement Service (CES) can then initiate a conversation with them about their lack of engagement.
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Aims	We aim to coach low- and non-engaging students to develop self-efficacy, and to signpost these students to relevant support services if necessary. This will motivate and empower them leading to an increase in academic engagement, with a resulting increase in attainment and progression rates for these students.
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Inputs	Activities	Outputs	Outcomes	Impact
Process			Impact	
<ul style="list-style-type: none"> • Student participants • Calling team • CES Coordinators • Academic Tutors • Student support staff • Budget • Student Engagement Dashboard • Administrative Data • IT systems & telephony 	<ul style="list-style-type: none"> • Collection of engagement data through learning analytics • Engagement alert automatically generated by system • Analysis of engagement/alert data • Personal tutor review of alerts for students not needing a call • 'Expect a call' email sent to student • Coaching telephone call with CES, unless student opts out • Referral to student support services • Follow-up via email to student and tutor with synopsis and links • Annotate dashboard to record contact 	<ul style="list-style-type: none"> • Student self-efficacy • Raised student motivation • Raised sense of student empowerment • Improved student knowledge of university systems and available support services 	<ul style="list-style-type: none"> • Increased sense of belonging at NTU • Being a more socially active member of the campus community • More frequently accessing support when needed • Increased academic engagement 	<ul style="list-style-type: none"> • Raised student attainment • Increased student progression

Rationale & Assumptions	According to research, learning analytics provides an effective platform from which early alert systems for low engagement can be implemented. Moreover, coaching approaches have been seen to increase student progression. We assume the following: students engage with the telephone call; the telephone call leads students to change behaviour over both short and long term; and changed behaviour patterns (inc. engagement levels) result in higher levels of progression and attainment.
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Theory of change for SHU

Situation	Student engagement, retention and outcomes are a priority for Sheffield Hallam University. Students may be low- or non-engaging for a variety of reasons, currently unknown to the University. Learning Analytics at the University identifies low- and non-engaging students and seeks to implement interventions that help and support students re-engage with their learning.
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Aims	The aim of the intervention is to increase the engagement, progression rates and ultimately the outcomes of students who have been identified as 'at risk' of dropping out of their studies.
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Inputs	Activities	Outputs	Outcomes	Impact
Process			Impact	
<ul style="list-style-type: none"> 0.5fte Project support staff Student Support services and resource Academic Advisers Academic Advising framework Learning Analytics platform (student engagement dashboard) Telephone and text messaging service IT systems (eg. Customer Relationship Management (CRM)/Unihub) Parameters for identification of students 'at risk' Staff training and development Learning analytics guidance for staff/ students 	<ul style="list-style-type: none"> Data collected and analysed by learning analytic system to identify 'at risk' students Email to all 'at risk' students outlining support services available Manual email communication to Academic Advisers giving details of their 'at risk' students Text to 'at risk' students notifying them of impending telephone call Phone calls to 'at risk' students offering tailored guidance and referral to appropriate support mechanisms/services Manual tracking of data and interventions undertaken as a result of telephone call 	<ul style="list-style-type: none"> Increased student and Academic Adviser engagement with communications Students are more aware of where to go for support. Increased engagement with support service/ mechanisms (CRM) Increase confidence in self (as observed through qualitative mechanism) Number of phone calls made Number of referrals made No of calls answered Number of support appointments delivered 	<p>Short</p> <ul style="list-style-type: none"> Increased student awareness of own engagement Students feel more supported by the university Students are more aware of where they need to go to receive support <p>Medium</p> <ul style="list-style-type: none"> Increased student engagement in learning (% red to green) Reduction in students going through SHARP (Sheffield Hallam At Risk Pathway) Reduction in students being withdrawn for non-engagement at Department Assessment Boards 	<ul style="list-style-type: none"> Increased student engagement Raised student attainment (progression to next level of study) Increased student progression (Graduate Outcomes – post intervention timeframe)

Rationale & Assumptions	<p>The term 'at risk' is used to describe students who could benefit from earlier interventions from tutors or support staff to improve student outcomes, specifically, students who are deemed to be potentially 'at risk' from becoming disengaged with HE.</p> <p>Learning analytics provides an effective platform from which early alert systems for low engagement can be implemented. We assume the following: students engage with the telephone call; the students engage with our support services leading students to change their engagement behaviour, resulting in continuation with academic studies and improved outcomes</p>
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