

Research article



Evaluation of an intervention package developed to reduce pre-registration nursing student attrition rates: A mixed method study

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ARTICLE INFO

Keywords:

Pre-registration nursing
Attrition
Learning analytics
Retention
Engagement
Nurse education
Professional development

ABSTRACT

Background: Higher educational institutions strive to recruit and retain student nurses into pre-registration programmes to support a sustainable nursing workforce. Attrition rates for student nurses are high and escalating, with around one in three nursing students in the United Kingdom failing to complete their degree programmes. Risk factors for student attrition include the attributes students bring to their study environment, as well as their behaviours and academic outputs. Modern learning analytics engagement tool can monitor attrition risk through tracking students as they engage with learning resources and other institutional opportunities.

Aim: To evaluate the effectiveness of an intervention package aimed at reducing pre-registration nursing student attrition rates at a Higher Education Institute in South East England.

Design and methods: Our mixed methods study design had three phases. Phase 1: design of an intervention package and its planned implementation. Phase 2: piloted the intervention with 1198 student nurses. Phase 3: semi-structured interviews with five student nurses.

Results: The learning analytics engagement tool was able to identify 144 students who were struggling and/or disengaging with their academic studies. 17 % ($n = 24$) students responding to the initial email contact. Of these 24 students, 67 % ($n = 16$) did not want a meeting with the Intervention Officer, who they were unfamiliar with, and only one attended a meeting.

Conclusion: Our evaluation of the effectiveness of an intervention package in reducing pre-registration nursing student attrition rates revealed valuable insights. Findings revealed that a lack of trusting relationships with intervention facilitators is likely to diminish engagement with such interventions.

1. Introduction

Increasingly, concerns have been raised relating to chronic global nurse staffing shortages (WHO, 2020), with detrimental impacts on the quality and safety of patient care (Griffiths et al., 2023). Nursing workforce shortages were exacerbated during the Covid-19 pandemic, with unattractive and highly pressurised working conditions, coupled with insufficient recruitment and retention strategies magnifying this shortfall (Jester, 2023). Low retention levels of pre-registration student nurses substantially contribute to this shortfall and warrant close attention. In the United Kingdom in 2021, attrition rates of nursing students were as high as 33 % (Stacey, 2022); these troubling workforce

statistics appear to be a widespread global phenomenon (Mitchell et al., 2021).

There has been considerable research exploring nursing student attrition rates and related retention strategies. Commonly cited factors impacting on nursing student attrition include issues with placements, such as lack of support and unpleasant experiences, (Eick et al., 2012), curriculum challenges, such as high workload and insufficient student support (Chan et al., 2019), and personal circumstances, such as financial concerns and family commitments (Hamshire et al., 2013). The range of factors influencing student nurse attrition rates have been reflected in interventions which are often designed to tackle multiple attrition factors simultaneously (Chen et al., 2020; Czekanski et al.,

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<https://doi.org/10.1016/j.nedt.2024.106531>

Received 6 August 2024; Received in revised form 29 October 2024; Accepted 30 November 2024

Available online 2 December 2024

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2018; Donnell et al., 2018; Kramlich et al., 2020; Sanderson et al., 2022). These include intervention packages for nurses which aim to tackle social, academic, and financial issues, as well as promoting empowerment and responsibility (Chen et al., 2020), with individual intervention mechanisms including support groups, peer mentoring, faculty mentoring, pre-entry immersion workshops, monthly study sessions, and job-interview training. Another intervention package aimed to tackle institutional, academic, and psychosocial factors, with individual intervention mechanisms including implementing institutional changes, such as changes to admission criteria, additional support services, such as advisor meetings and online courses, and changes to teaching and curriculum (Sanderson et al., 2022). Both interventions reported improvements from students in relation to their academic, social and general life skills (Chen et al., 2020; Sanderson et al., 2022).

Personalised support plans have been embedded within several intervention support packages aimed at reducing student nurse attrition (Sanderson et al., 2022; Kramlich et al., 2020; Lewis et al., 2019; Czekanski et al., 2018) and can involve academic advisors based in higher education institutes meeting 'at-risk' student nurses to identify some of the key challenges they are experiencing. This can inform the development of personalised support plans and can positively impact on psychosocial, environmental, and academic factors influencing student nurse retention, with linked activities supported by academic teaching staff (Sanderson et al., 2022; Kramlich et al., 2020; Lewis et al., 2019; Czekanski et al., 2018). Retention intervention packages that can be effective in enhancing student retention outcomes offer multiple types of support mechanisms that address both academic and personal attrition risk factors (Chen et al., 2020; Donnell et al., 2018; Sanderson et al., 2022). They are often tailored to the needs of individual student nurses and incorporate personalised support plans to encourage students to access relevant support mechanisms, using a 'pick and mix' approach (Czekanski et al., 2018; Kramlich et al., 2020; Lewis et al., 2019; Sanderson et al., 2022).

Students at risk of attrition can be identified through a range of factors. Some of these are pre-determined and are based on the attributes a student brings to their study environment for instance, socio-economic status, being the first generation to attend university/college, pre-entrance performance, and gender (Hillman, 2021). Other factors are more fluid and are based on a student's behaviours and academic outputs, for example, academic performance, missing assignment deadlines and absenteeism (Rienties, 2022). An alternative way of identifying at risk of attrition students is to use modern learning analytics systems which can track students as they engage with learning resources and other institutional opportunities. Institution-wide learning analytics systems have emerged in universities across the world over the past two decades, with the intention of using a student's digital footprint to improve student outcomes, aid retention and drive improvements to academic practice (Campbell et al., 2007). As institutions have increasingly embraced digital working, the level of information available to analyse at-risk students has increased such that an individual students' contacts with their higher education institutes learning opportunities can be tracked on a real-time basis. In learning analytics systems these contacts might include lecture attendance, using the online library service or submitting an assignment online. All can be viewed as proxy measures of engagement, something that is widely regarded as essential for learning (Johar et al., 2023). However, despite the apparent benefits of learning analytics systems, there remains limited evidence of their value in enhancing learning performance or reducing attrition (Johar et al., 2023).

In this paper, we report on a study that aimed to pilot the effectiveness of an intervention package in reducing pre-registration nursing student attrition rates. Our study is distinctive in that it combines the identification of at-risk students using learning analytics with tailored support based on interventions already present in the higher education institutes current offerings, enabling a resource-efficient approach to retention intervention. The intervention included a learning analytics

engagement tool to identify student nurses at risk of discontinuing their pre-registration programmes and utilised an intervention officer to contact these students and facilitate the selection of suitable interventions for them from a student support tool kit. To achieve this a mixed methods study was devised that had three phases.

- Phase 1: Intervention package design to identify and support at-risk nursing students
- Phase 2: piloting of intervention package, including quantitative data collection and analysis
- Phase 3: qualitative evaluation of the intervention package using semi-structured interviews with nursing students

2. Methods

Our study was sequential mixed methods in design (Creswell, 2013). Quantitative data were generated by codifying and describing how students interacted with the intervention package, and complementary qualitative semi-structured interview data were collected, to ensure that the perspectives of students regarding the intervention package were gathered. Mixed methods approaches can result in obtaining greater breadth and depth of understanding (Creswell, 2013) by considering multiple viewpoints, perspectives, positions, and standpoints (Bryman, 2008); triangulation, and convergence (Lingard et al., 2008), more richly textured accounts and informative divergence (Brannen, 2005, Ritchie and Lewis, 2014). Ethical approvals were obtained from the participating University's Research Ethics Committee [Reference number: 231673]. Student data was routinely collected via the learning analytics engagement tool as part of the participating university's standard practice and therefore students were not explicitly informed that their data was being tracked for study purposes; this process was approved by the ethics committee. Furthermore, any participants identified by the learning analytics engagement tool as being in the bottom decile for engagement were invited to take part in the interview study. Those that agreed were provided with a participant information leaflet and provided written informed consent prior to commencing the interview.

2.1. Project design

Phase 1: Intervention Development:

Intervention development consisted of the creation of an intervention package that contained the learning analytics engagement tool, a student support toolkit, a short attrition-factors assessment form, and a personal support plan template.

2.2. Learning analytics engagement tool

The learning analytic engagement tool was designed and built in-house and functioned by collating data on, virtual learning environment usage, along with their interaction with the physical library); the electronic library, and university-subscribed academic digital resources). These interaction data were then analysed for their relationship with academic performance data using the open-source machine learning tool Weka (Witten and Hall, 2011). The tool was used to indicate the best combination of digital interaction variables (which we termed engagement variables) to use to predict a student's overall academic success as determined by their annual average percentage module mark. For the virtual learning environment we found that, best predictions of student performance were achieved using an algorithm based on how much time a student spends in the virtual learning environment and how many clicks they make on items within the virtual learning environment, whilst the best library engagement variables were the amount of time a student spends in the electronic resources combined with a measure of how much data a student downloads from the electronic resource. To produce an overall engagement score for each

student we combined using Weka the virtual learning environment interaction variables and the library interaction variables. The system displayed total engagement scores over time (daily) (Fig. 1) as well as student engagement scores for individual engagement elements.

We tested the robustness of the engagement score by using Jackknifing (Wu, 1986), essentially Jack-Knifing uses a sub-set of the original data to test the ability of the algorithm to make predictions of a student's academic performance. We did this so that we would know that the engagement score created was related to student success. We found using historical data from 12,000 students, the engagement score, was shown to predict an overall student's grade to within 12 % of the actual grade; this improved to 6 % when information such as student's ethnicity, study location, course studies and gender were included in addition to engagement scores, the project team decided that this level of accuracy was sufficient to make broad decisions as to whether a student was at risk or not.

In Phase 1 of the study, the learning analytics engagement tool was used to identify at-risk nursing students. We defined an at-risk student as being in the bottom decile for engagement in their cohort. The choice of the bottom decile was pragmatically determined, based on balancing the risk of not contacting all students who were disengaged from their studies versus the resources available. Previous work has indicated that very low engagement is predictive of poor student performance (Austen et al., 2021). Engagement itself is poorly defined within the higher education sector, for this study we have taken engagement to mean, activities provided by the university that a student undertakes to generate learning (Bryson, 2014). The measures of engagement used, essentially virtual learning environment usage and electronic library usage are pragmatically derived with their relationship to success as determined by our analysis indicating that they are reasonable proxy measures of engagement.

2.3. Student support toolkit

To develop the student support toolkit, a financially sustainable, resource-light intervention package that utilised already available support services within the participating university was created. The

information contained within the student support toolkit was compiled using the literature (Czekanski et al., 2018; Kramlich et al., 2020; Lewis et al., 2019; Sanderson et al., 2022) and feedback from student support coordinators (n = 3) working in the nursing department, who identified any existing support mechanisms, as well as scanning the participating university's website for any additional available student support resources. Examples of suggested content included, seeing the academic support unit, seeking advice from financial support and the counselling service.

The student support toolkit was developed as an online resource (available via Google Drive) and contained information about individual support mechanisms available to nursing students at the participating university. It comprised of a comprehensive list of available support interventions that were documented in an Excel spreadsheet and categorised according to intervention type. Intervention types were split into five key categories: psychological support; social activities; study skills, tutoring and literacy and student funding. The spreadsheet also contained detailed information about the services that were available, how to contact each service and/or any forms and processes required to engage with each service. All interventions were searchable according to the five key categories to enable students or the intervention officer to quickly search for all support mechanisms related to the specific categories. The finalised student support toolkit enabled the intervention officer who met with identified at-risk students to efficiently identify suitable support services that might be useful to the student depending on the nature of the challenges they were facing.

2.4. Attrition factors assessment form

To further understand and assess any individual attrition risk factors for nursing students, a short, multiple-choice, attrition factors assessment form was created and reviewed by the intervention officer. The attrition factors assessment form was based on a wide reading of the literature around retention particularly that relating to nursing students, for example Eick et al. (2012), Chan et al. (2019) and Hamshire et al. (2013). The form collected data on both academic and non-academic (personal) factors to provide an overview of the types of issues

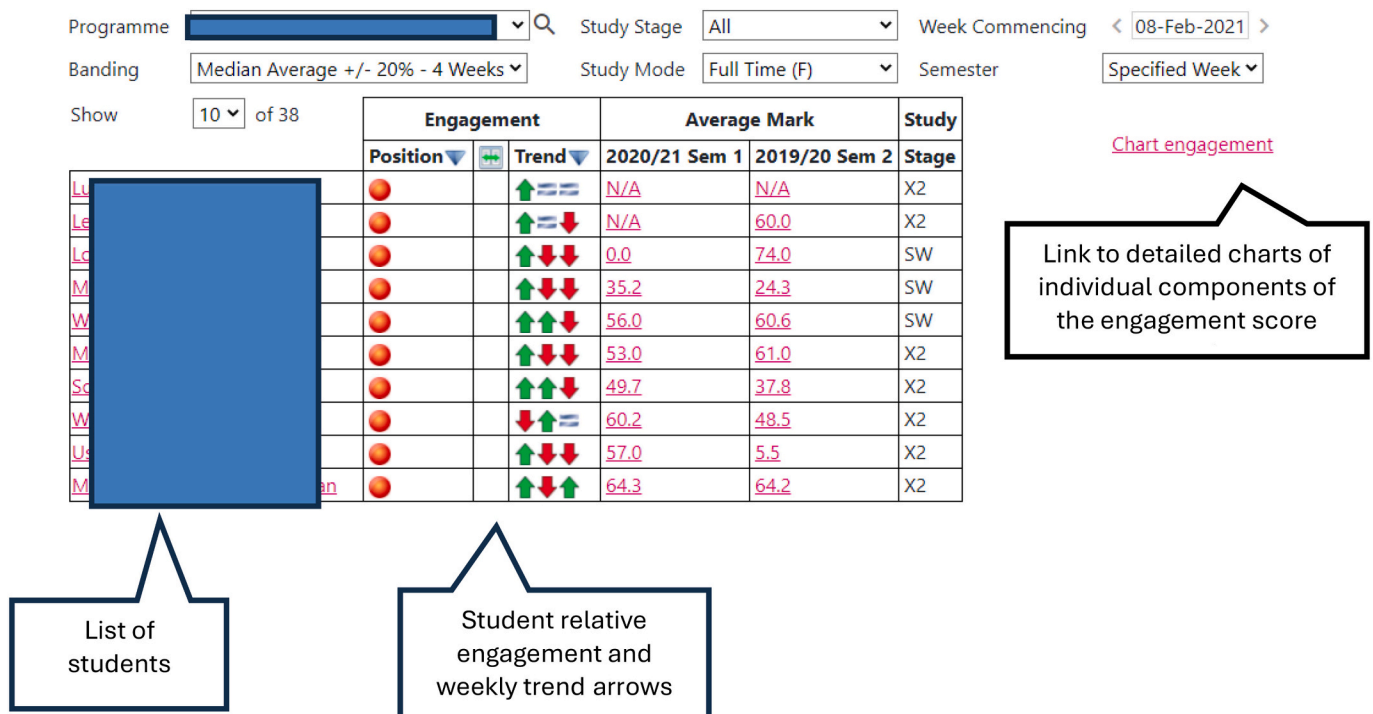


Fig. 1. Snapshot of the learning analytics dashboard.

students were encountering.

2.5. Personalised support plan template

A template with guide questions, following the structure of solution-focused therapy (Macdonald, 2007) was created for the personal support plan meetings. This personal support plan template was created to assist the intervention officer in defining with nursing students what their key challenges were, and any potential solutions to these challenges. The template was based on preexisting university support mechanisms which are already embedded in the university practices. The intervention officer had the appropriate training, experience, and accreditation status in psychotherapeutic counselling. The intention was for the personal support plan to be created during one-to-one meetings between the intervention officer and individual nursing students. The personal support plan was populated with any relevant resources from the student support toolkit, as well as containing any necessary signposting information.

Phase 2: Intervention.

The intervention was carried out between 9th October and 15th December 2023 at the participating university; these dates aligned with Semester 1 of the academic year.

2.6. Identifying students

Pre-registration nurses studying at the participating university from three fields of Bachelor of Nursing degree programmes - Adult, Mental Health and Childrens' - were eligible for inclusion in the pilot. This equated to 1198 students. Each week the project team reviewed a different year group (1st, 2nd, 3rd years) via the learning analytics

engagement tool to identify students at risk of leaving the programme due to being in the lowest decile for engagement. Student data collected via the learning analytics engagement tool included email addresses, degree name and stage, and time of contact. Data were exported into a Microsoft Excel spreadsheet and anonymised at this stage. Descriptive statistics summarised the data generated.

In total, 144 pre-registration nursing students were identified as being at risk and were sent an initial email from the Intervention Officer to check in on them and to prompt them to book a meeting to discuss any academic and non-academic challenges they were facing, as well as any potential support mechanisms. If a student responded to the email and expressed an interest in setting up a meeting, they were sent the attrition factors assessment form to complete and return to the Intervention Officer. This allowed the intervention officer to have access to any relevant information and to explore any alternative sources of support required as appropriate. If a student did not respond to the email, they were monitored using the learning analytics engagement tool and if their engagement failed to improve above the bottom decile, they were recontacted two to four weeks later via telephone. Email and telephone templates were developed to ensure that each student received standardised, consistent information and relevant prompts from the Intervention Officer. The email template wording was modified after the first week of the pilot due to some student feedback which implied that they had interpreted the initial email communication as an indication that they had failed an assignment or missed part of the assessment process. Nursing students' responses or non-responses to attempted email and telephone contacts were recorded within the learning analytics engagement tool, as well as data on the attrition status of at-risk students over the five-month period post the Intervention Officer's initial attempts at contacting them. Fig. 2 details the intervention process

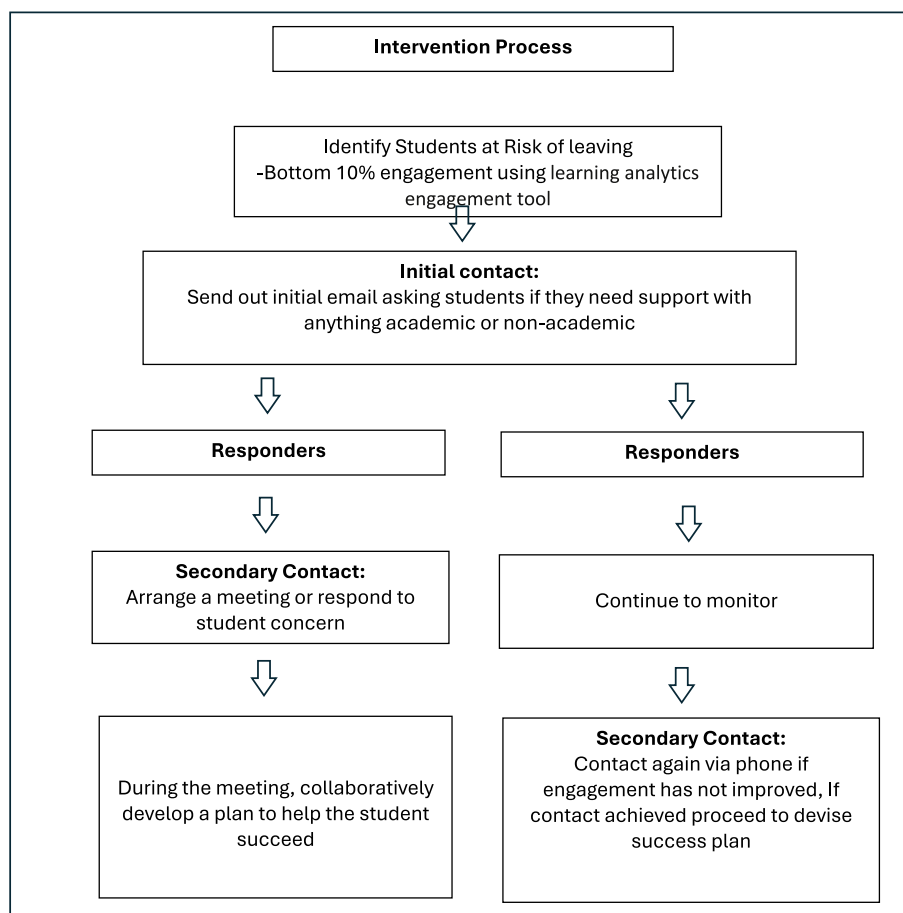


Fig. 2. Intervention process steps.

pathway.

Phase 3: Semi-Structured Interviews.

Phase 3 involved undertaking semi-structured interviews with students who had been contacted during Phase 2. An interview topic guide was drafted based on the wider literature on retention (Mitchell et al., 2021) and was modified based on the findings from Phase 2 to reflect the students' perspectives on the intervention process itself.

2.7. Recruitment and setting

All students (n = 144) were invited via email to take part in an interview to discuss their views on the intervention process. The email included a short message inviting students to take part, a brief explanation of the study purpose, how to take part, mention of the monetary incentive for participation (£20 Amazon voucher), as well as a copy of the participant information sheet. Nineteen students initially responded to the invitation and were sent a consent, and demographics form to complete, alongside some potential dates and times for the interviews. Of the 19 students, 10 scheduled an interview, and five undertook the interviews.

2.8. Data collection and analysis

Consent forms were completed prior to each interview. Interviews were conducted online via Zoom, were audio recorded and lasted approximately 40 min. Interviews were carried out, transcribed, and anonymised by the intervention officer. Transcribed interviews were double coded by members of the study team. Codes and categories were entered into an Excel spreadsheet and thematically analysed using the Framework method (Gale et al., 2013) to manage the dataset. The Framework approach is a seven-step approach to thematic analysis (transcription, familiarisation, coding, development and application of an analytical framework, data matrix charting and interpretation) (Gale et al., 2013). Relevant codes and categories that arose from the data were identified and these were later developed into themes following discussions with the study team and close, iterative engagement with the data set.

3. Results

Most (n = 120; 83 %) of the 144 students emailed were non-responders, with only 17 % (n = 24) students responding to the initial email contact. Of these 24 students, 67 % (n = 16) did not want a meeting with the Intervention Officer, saying that they did not need one or that they required information that could be answered over email instead of during an online meeting. Of the remaining eight responders, one attended a meeting online, four did not respond to a further request to schedule a meeting and three did not turn up to their scheduled meetings.

Thirty-one students met the criteria to be contacted by telephone as they had remained in the bottom decile for engagement in the 2–4 weeks post initial email contact. Fifteen of these students did not pick up the phone (48 %), nine had inputted either the wrong contact number or had no contact number documented (29 %), and seven responded to the telephone call (23 %). Of the seven who responded, all reported that they were coping well or had already accessed university services to deal with any issues they were trying to navigate. Following contact 88 of the 144 students emailed moved out of the designated 'at risk' zone.

Five months after the at-risk students were first contacted by the Intervention Officer, (n = 144), 82 % (n = 118) remained on their course, 6 % (n = 11) had permanently withdrawn, 4 % (n = 6) had temporarily withdrawn, 1 % (n = 1) had completed early or transferred to a different course, and 6 % (n = 8) had withdrawn shortly before the start of the intervention, before the learning analytics engagement tool had been updated.

Table 1 provides a summary of the demographic details of the interviewed student participants.

Interview data generated four main themes: 'level of engagement with current intervention', 'influence and importance of familiarity on responsiveness and help-seeking', 'influence of beliefs on student access to support services', and 'suggestions for helping students to stay'.

3.1. Theme

3.1.1. Level of engagement with current intervention

This theme captured information relating to factors that influenced students' decisions on whether to engage with the intervention process or not. One student participant reported already receiving support and therefore not needing to engage with the intervention package:

"I'd already been in contact with the University. I mean, honestly, the reason is just because I've been in contact with uni since September/October-ish with my struggles. I've had some video calls with my personal (academic) adviser." (P1).

Two student participants reported not needing help at the time, and therefore not responding to the email from the Intervention Officer:

"I didn't need any help then, so I didn't respond to it." (P2).

Two student participants reported not engaging with the intervention, because they did not read the email that was sent to them by the Intervention Officer. They stated that they infrequently read university emails, unless they were from a familiar person or directly related to their course, due to the large volume of emails they received they felt were irrelevant.

"I read my emails. But like I don't read them - I skim through them. So I only need to look at the ones that I know 'this is for me' or 'this is relevant'. So I've got my 5 subjects that I do... I look at it. Or if it's like a head of department... - I'll look at it. Or if it's to do with placement" (P4).

3.2. Theme

3.2.1. Influence and importance of familiarity on responsiveness and help-seeking

All student participants reported being more likely to engage with and/or seek and accept support from a familiar person within the university. Two participants commented that familiarity made them feel more comfortable with help-seeking and discussing any challenges they were facing:

"I think if it was a lecturer that I knew...I definitely would have been more inclined to take it up (the offer for support). I'd just be more comfortable. Talking to somebody that I knew and who knew my sort of history as well, which helps a lot instead of having to explain everything. If you're talking to so many people about the same thing, it gets a bit like... So I'd go back to the same person." (P1).

Four student participants also commented that familiarity enabled

Table 1
Demographic data of interviewed students.

Participant characteristic	N	
Age	20 or under	2
	21–30	2
	31–40	0
	41–50	1
Degree branch	Adult	4
	Mental Health	0
	Children	1
Year of Study	1	1
	2	1
	3	3
Degree Year Stage	1	2
	2	2
	3	1
Disability	Yes	4
	No	1

them to easily identify important communications and that they were more likely to respond to known names and people such as academic advisors, lecturers, and link lecturers, than to a communication from someone they didn't know:

"I don't really know. I get a lot of emails coming through. And so.. I have to filter them out. And I respond to my lecturers quite quickly just because it's them." (P2).

Communications and support from a single-point-of-contact person were reported to be valuable to two participants who were finding it difficult to navigate institutional systems and processes. Being able to check in with a known source of support was stated to be reassuring for participants who felt this facilitated their access to various types and levels of support:

"I tried to contact other people regarding different matters, but they've not really responded. So I think for me to just go through my advisor...It's easier and a lot quicker to go through him." (P1).

One student participant who did not recall receiving an invitation email from the project team provided feedback on what sorts of emails they were more or less likely to look out for:

"No, I don't (recall the email). I tend to.., unless it is directly related to a piece of work that I'm doing, I generally don't pay much attention to them...If the title is directly to do with a piece of work that I've got to do - I will always read that. If it's from one of my lecturers, or study support, or something like that." (P5).

3.3. Theme

3.3.1. Influence of beliefs on student access to support services

Three student participants commented that their prior beliefs about how easy or difficult it was to access a support service influenced their decision about whether to try to access it. For example, the physical location and/or environment where certain services were based sometimes prevented students from accessing them:

"Physically having somebody that you can go and see is so much better alongside having emails and maybe even phone numbers of somebody that you can go and access. But because of how the nursing is so completely separate...All of those services are on the main campus, which makes life very, very difficult...You're walking from one campus to the other." (P5).

One participant stated that they accessed a support service even though they felt that it was difficult to access, as it was necessary to cope with their financial situation:

"There's an emergency fund that [participating university] has available for such situations. But my God, the hoops you have to jump through to get what you need...It's not the right thing to have to ask for financial help...But when you're living month to month like that, it makes all the difference." (P5).

Two participants reported that if a service was difficult to access and its perceived utility and usefulness was perceived to be low or not essential, then often they would not access it:

"I did have the right to appeal it. But if I'm honest, the stress of trying to appeal it, and the time it would have taken to do that, kind of contradicted the concept. So, in my brain, I thought 'I may as well spend the time I would spend doing an appeal on just doing the assignment', if that makes sense." (P3).

Some participants reported finding it easier to ask for help than others. This often was because some of them did not know where to go to ask for help, whilst others felt uncomfortable explicitly asking for help:

"I'm one of those people that don't like asking for help. So, unless I feel like I'm in a really dire situation...I don't really ask for help. Although I'm struggling in terms of being a third year nursing student, I don't think I would potentially be struggling more than anyone else. So that's why I chose not to respond." (P3).

3.4. Theme

3.4.1. Suggestions for helping students to stay

Participants provided some suggestions as to what would be helpful

to overcome some of the challenges they faced during their nursing programmes. Better communication was cited as key by participants to make them feel more valued:

"I just thought that they just didn't really care. It just wasn't really that important for them to bother replying to my email really. Yeah, I think just communication could have been a lot better from the lecturers. I would feel a lot more supported - from the ones that weren't in contact with me." (P1).

Other suggestions from participants were for the provision of information packs and drop-in sessions where students could meet with support staff face to face to troubleshoot any problems they were experiencing:

"My personal preference would be to drop-in in-person. I'm already at [university], and they're there anyway. And yeah, just have a quick conversation like, 5-10 minutes from the day". (P4).

4. Discussion

The study findings have highlighted the potential usefulness of learning analytics engagement tool in identifying student nurses at risk of leaving their degree programmes due to poor course engagement. By looking at students' engagement with the digital environment the learning analytics engagement tool was useful in identifying students that were struggling and/or not engaging, however the overall intervention was not successful. Whilst some of the students contacted indicated they had already sought help, none indicated that they were not in some way struggling. The wider literature implies a positive but complex relationship between engagement, student retention and success, with part of the complexity being that neither engagement nor success are easily definable (Austen et al., 2021). A substantial number of the students whom we reached out to showed a subsequent improvement in their engagement. However, it is not known whether this increase in engagement would have occurred regardless of the contact made during the intervention process. It is possible that these individuals adjusted their behaviour because they were being observed (Mayo, 1993) and were aware that their engagement was being tracked.

Whilst the learning analytics engagement tool proved a useful indicator of student engagement, its value in preventing attrition is less clear. Many learning analytic tools track students' behaviours and so are lagging indicators. This means they are often data poor when they need to be data rich (e.g. at the start of the semester or module). More advanced analytics systems are seeking to incorporate more intrinsic variables such as student disposition data to enhance attrition predictions for individual students (Rienties, 2021).

The learning analytics engagement tool identified students who had already begun to disengage from their student learning environment. However, very few of them responded to an email from the Intervention Officer inviting them to discuss various support mechanisms available. Identifying students once they have already begun to disengage may have limited value in preventing attrition. Rather mechanisms aimed at supporting students earlier on in their nursing programmes to prevent their disengagement in the first instance may be more effective in reducing attrition longer term; in this sense the usefulness of the learning analytics engagement tool may be reduced as resources are being directed at students too late in their learning processes and course programmes. Students that did respond to the Intervention Officer said they were much more likely to reply to emails if the messages were sent from people that they knew, such as academic lecturers or placement coordinators. It is likely that the unfamiliarity of the project team contributed to the lack of engagement with the intervention process. Previous studies that have utilised personalised support plans have relied on academic staff to help implement them (Sanderson et al., 2022; Kramlich et al., 2020; Lewis et al., 2019; Czekanski et al., 2018); these staff are more likely to have preestablished relationships with their students, enhancing these two-way communication and engagement pathways. However, stretched financial resources across many academic institutions (Devinney and Dowling, 2020) means that this may not be a

financially viable option in the long term. However, when considering the best ways of providing support to, and reengaging with at-risk students, consistent communication from familiar, named points of contact may be the most effective way to promote initial contact.

Most students who were interviewed said that they had already sought support from either internal and/or external support services before meeting with the Information Officer. This again indicates that the learning analytics engagement tool may be identifying less engaged students too late in their course programmes, when they have already used other means to access relevant support. This could be alleviated by having more Information Officers to meet with students earlier in their course programmes. However, it is unclear where the support mechanisms accessed by students were sourced from, how aware students were of the range of possible supportive intervention available to them and to what extent the interventions accessed helped to reduce attrition rates or increase levels of engagement. Further research into the accessibility, availability and long-term impact of various supportive interventions and resources is required.

Our findings indicated that for many students' traditional communication modes such as telephone calls, emails and video-meetings were not necessarily favoured, with face to face or drop-in meetings often preferred. As such, careful consideration of the most appropriate modes of communication required to engage nursing students is required; this may be challenging due to generational differences in preferred modes of communication between student and staff populations, as well as differences in working patterns. However, this is crucial for ensuring that students in need of support are easily able to access the services and information networks that they can most benefit from.

The students in our study valued student support services to help them navigate their way through their nursing programmes. Receiving the optimum level of support is crucial for students on nursing degrees as they can face multiple challenges including juggling personal commitments, academic workloads, clinical placement demands, dissatisfaction with campus-based learning and support, and unsupportive university staff (Eick et al., 2012; Hamshire et al., 2013). When students perceive they have good support networks in place from staff, this can have a positive impact on their intent to graduate (Henderson et al., 2020) and resulting grades (Torregosa et al., 2016) and care must be taken to optimise these key relationships throughout course programmes. This could be addressed in part through more frequent meetings with familiar staff members to help students with specific academic and course challenges, and to help students integrate socially into the university, by feeling understood, acknowledged, and cared for.

5. Limitations

A limitation of this study is that it was carried out in only one Higher Education institution in England. It is not possible to know whether similar findings would be found across other Higher Education institutions and nursing programmes. However, students were invited to share their challenges, both personal and professional, which requires a level of familiarity & trust (Wampold, 2015). It is possible that these qualities may be less important depending on the service on offer. Methodological limitations are related to recruitment of students. Of the 144 students invited to participate in the study, only 24 initially responded. A contributing factor may have been that all contact with students during the study was made either online or via telephone, which may have impacted on students' level of engagement compared to other communications methods such as face to face meetings or social media interventions (Delahunty et al., 2013). To better tackle nursing student attrition, a holistic approach to retention is required, where all three factors - personal, institutional, and placement - are considered. This will require strong partnerships of all involved stakeholders: policymakers, universities and placement providers (Hamshire et al., 2019). The limitations of the learning analytics engagement tool and other learning analytics tools is that they seldom capture the multi-casual

nature of student engagement and thus whilst they may flag students at-risk, they do not identify why a student is at risk, which often instead requires a person-to-person intervention.

6. Conclusion

Our evaluation of the effectiveness of an intervention package in reducing pre-registration nursing student attrition rates revealed some valuable insights. The learning analytics engagement tool was able to identify students who were struggling and/or disengaging with their academic studies. Our findings suggest a key factor to the lack of engagement with the intervention could be because the students did not have a trusted relationship with the person contacting them. Future research should explore this in more detail so that nursing programme leads can tackle the ever-growing nursing workforce crisis and help develop a cadre of newly qualified nurses that are well supported and provided with the right opportunities at the right time for them, enhancing work quality, satisfaction and ultimately patient outcomes as a result.

CRedit authorship contribution statement

Milena Georgieva: Writing – original draft, Project administration, Formal analysis. **Catherine Henshall:** Writing – review & editing, Supervision, Resources, Project administration, Methodology, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Ian Scott:** Writing – review & editing, Validation, Supervision, Resources, Project administration, Methodology, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Clair Merriman:** Writing – review & editing, Resources, Project administration, Methodology, Funding acquisition, Data curation, Conceptualization.

Funding

This work was supported by Health Education England.

Declaration of interest statement

No conflicts of interest noted.

Acknowledgements

We would like to thank the participants who took part in our study.

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