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Article

The Promise and Limitations of Student Belonging as a Predictor of Retention

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Abstract: Efforts to improve student retention are regularly explored within higher education literature and practice due to their status as a noble aim shared by governments, universities, and students themselves. To this end, students' sense of belonging has become an increasingly popular topic of study due to its comprehensive links to student success. However, while student retention is understood as a binary, externally defined metric, student belonging is subjective, messy, and dynamic. This study utilises a longitudinal design to explore the changing relationship between student belonging, intention to persist, and eventual continuation with 101 first-year undergraduate students at two English universities. Regression analyses were utilised to build on previous research showing the near-perfect correlation between belonging and students' intention to persist. Sense of belonging was also a strong predictor of eventual continuation status for all time-point measures of belonging except at the start of the first academic year. These findings provide further evidence for the promise of student belonging as a tool for practitioners to pre-empt risks of withdrawal. However, the findings also suggest that early measurements of a sense of belonging could be less reliable.

Keywords: student belonging; student retention; student success; continuation; intention to persist; persistence; longitudinal research

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1. Introduction

The objective of this study is to explore how students' sense of belonging is associated with retention: their likelihood to successfully continue in their degree beyond the first twelve months of study. There has already been substantial exploration into the relationship between student belonging and both intention to persist [1–7] and eventual retention outcomes [8–14]; therefore, it is necessary to ensure that this study meaningfully builds on existing understanding of how these concepts relate.

Most existing literature on students' sense of belonging has taken place within the US context. As both of the institutions within this research study are based in England, this may affect the relationship between these two variables, given the difference in higher education systems and student demographics. Existing research has found that well-documented relationships between students' sense of belonging and associated student outcomes are not always replicated, especially when looking at different demographics of students [13,15].

The overarching research question for this study is: To what extent is a sense of belonging a predictor of student retention, measured by the continuation of first-year undergraduate students? However, to fully answer this question, it has been split into two sub-research questions:

Sub-research questions:

- RQ1: To what extent is students' sense of belonging a predictor of students' intention to persist?
- RQ2: To what extent is students' sense of belonging a predictor of retention?

The methodology section of this article expands on the approaches used to gather all data that was used within analyses, including how a bespoke intention to persist scale was developed to address the lack of consistent approaches to measurement in existing research. This section also defines key terms used throughout the article—such as 'continuation'—and justifies why specific approaches to data analysis were used.

The results are split into two sections. They begin with a set of preliminary analyses, which help to address underlying assumptions ahead of substantive analyses of the study. These preliminary analyses provide an initial reflection on the continuation data collected from the two participating institutions, show that the intention to persist scale has high internal consistency, and provide reassurance that missing data within any of the follow-up surveys was not associated with students' continuation results. The substantive results sections within this study address each of the two research questions. While it has been acknowledged that previous research has extensively explored intention to persist and retention, there is an absence of studies that have looked at both of these outcome variables together. Therefore, analyses for this article split out to explore the relationship between belonging and each of these variables in turn. This allows the results of this study to connect with all existing literature on the association between belonging and retention.

The results show that students' sense of belonging is almost perfectly correlated with intention to persist scores. Changes in student belonging were also a predictor of changes in students' intention to persist scores, suggesting very promising opportunities for practitioners to enhance students' intention to persist through their efforts to enhance their sense of belonging. A novel analysis, not explored within existing studies, also found that students' sense of belonging was a significant predictor of intention to persist at future time points in the academic year. Sense of belonging was also found to be a strong predictor of eventual continuation status for all time-point measures of belonging except for the October survey. The discussion section of this article explores the implications of these findings further, including how the questionable reliability of early measurements of students' sense of belonging may limit practitioners' ability to evaluate early belonging interventions.

2. Literature Review

2.1. Defining and Understanding Student Success in Different Contexts

The literature exploring definitions, domains, and factors affecting student success is expansive [16–19]. Different formal metrics used by universities and governments, such as continuation, completion, and on-time graduation, are often bundled together under the broader heading of 'success' [20,21]. Meanwhile, within academic studies on student success, the focus is often on terms such as "retention" and "persistence" [19]. A mature policy context has developed around these metrics within the UK, showing the importance of student outcomes to successive governments. Exercises such as the Teaching Excellence Framework and Access and Participation Plans (for English universities), as well as policies of the Quality Assurance Agency and regulatory requirements of the Office for Students, have been developed to measure and scrutinise universities' efforts to ensure student success [22].

Within the UK context, universities are measured by higher education regulators—such as the Office for Students within England—on student continuation: the proportion of students who remain enrolled after their first year of undergraduate study [23]. This focus on continuation into the second year is based on well-documented patterns of student withdrawal that show that students are most at risk during the first year of study [23,24], and therefore this is a crucial time for supporting students. More precisely, students often decide whether to continue at university by the end of their first term [25,26]. Given this higher risk, universities are encouraged to prioritise support at the beginning of students' time in higher education [21].

Beyond these regulatory and reputational drivers towards encouraging student success [27], individual institutions are also motivated financially to maximise the proportion of students with successful outcomes. Within the UK context, a substantial proportion of

universities' income comes from students' tuition fees and other government grants related to the number of students being taught. This means that universities that can successfully retain their students to completion will benefit financially from doing so. This is especially important within the context of UK higher education, where real-term cuts to the income that universities receive for each domestic student, along with other external factors, are placing extreme pressure on university finances [28,29]. This overbearing pressure of austerity on universities may lead to institutions placing more importance on successfully retaining students; however, it may also lead to cuts or reductions in support provisions, which leads to reductions in students' successful degree completion.

While there is a risk that these formal metrics may mask students' personal motivations and definitions of success, research with students suggests that at a broad level, there is an alignment between government, university, and student priorities. Within O'Shea's qualitative research with students about how they define success, the topic of persistence and degree completion is frequently cited: "Not giving up" [20] (p. 30), "having that piece of paper" even if it takes a long time to get it [20] (p. 30), "The ability to keep going despite any challenges" [20] (p. 31). While each student's definition of success may be different, they are mostly built around the idea of completing the degree that they started. In that sense, degree completion seems a laudable goal that aligns the interests of individual students, the institutions that teach them, and the governments that fund them.

2.2. Student Belonging and Its Links to Successful Student Outcomes

The concept of student belonging as a potential means to enhance students' experiences and success has been increasingly popular over the last few years, both within the UK and internationally [30,31]. There has been a sharp increase in the amount of published academic research, prominent sector reports [32,33], conferences dedicated to discussing the topic [34,35], a slew of books and edited collections [36–40] and the emergence of communities of practice [41].

The increased interest in student belonging is for good reason; existing research has shown how student belonging has a significant connection to many aspects of student success, from improved academic performance [42], engagement [43], mental well-being [5], and retention rates [13]. Work to address students' sense of belonging may also help to alleviate the current inequalities seen across retention rates. Students from minoritized backgrounds tend to report significantly lower levels of belonging than their majority counterparts [12,18,44–46]. This is not to suggest that these lower levels of belonging and continuation should be blamed on students from these widening participation demographics, as that would be letting universities "off the hook" [17]. Instead, it forms a hopeful premise: that attempts to improve student belonging may also have a disproportionately beneficial impact on students who are most likely to withdraw.

While continuation is measured through an externally defined, binary metric, belonging is known to be subjective and personal—in that it is an internally defined sense of belonging [47]—as well as being multi-dimensional [48] and dynamic, changing over time [49]. Many studies have used qualitative methodologies to provide space for students to richly describe what having a sense of belonging at university means to them; however, there is also a growing usage of belonging scales that quantitatively measure students' perceptions about their sense of belonging. The most well-used is the Psychological Sense of School Membership Scale [50], which was adapted by Zumbrunn et al. [43] for the higher education context. In fact, most of the popular scales have been adapted and changed in studies after their original development [51–53]. The risk in student belonging research, given the wide variety of scales used, is that we are not measuring like-for-like, which hinders comparisons across studies.

Despite belonging being recognised as fluid and transient in nature [49], most existing research looks at belonging at a single point in time. Where studies have been conducted that measure belonging at multiple points, results show that belonging tends to decrease during the first year of study [1,54], but that it is stable from year to year [55,56]. Each of

these studies has often warned that these general trends vary when examining students from different demographics and contexts. Students who entered university through contextual admissions routes and those from racial minority backgrounds saw declines in their sense of belonging relative to cohort averages [54–56].

Through these existing studies, multiple challenges have been identified in how to adequately measure changes in belonging. Studies have questioned how early we can begin reliably asking students to self-report their sense of belonging at university in a meaningful way, with little agreement. While some studies purposely excluded any measurements of belonging that were gathered within the first term of the first year of study [56], others decided to measure students' sense of belonging even before they had formally begun their teaching [54]. One of the other challenges presented in assessing the existing longitudinal research and how belonging changes over time is the variety of scales or measures used to quantitatively assess students' sense of belonging, discussed above. Despite critiques of assessing complex concepts of belonging with single-question items [57], there is pressure on longitudinal studies to use abridged versions of belonging scales [1] or single-item measurements of belonging [13] to reduce survey fatigue from participants.

2.3. Addressing Gaps in the Literature

In summary, academic research, policy contexts, financial constraints, and testimonies from students all suggest that improving students' likelihood of completing their studies is a noble aim that benefits all involved actors. The concept of students' sense of belonging is increasingly being seen as a promising route towards how universities can improve retention rates among their students. While there are already many examples of research that have explored the connections between students' sense of belonging and retention, most of these do not use a longitudinal approach that recognises the dynamic nature of belonging.

3. Materials and Methods

3.1. Participants and Data Collection

As part of an overarching study on student belonging, 101 participants have been included within the quantitative longitudinal analyses of survey data for this article because they provided baseline measurements for their sense of belonging, and continuation data were able to be provided for them from their respective institutions. Further, 66 of these 101 students also participated in at least one follow-up measurement activity of their sense of belonging and provided reflections on their intention to persist. A visualisation of the different stages of data collection is presented in Figure 1.

All participants also provided demographic data for their gender, age, fee status (UK or international), commute length, whether they attended private schooling, and their parents' education status. The demographic categories above were selected due to their prominence in the student belonging literature as potential factors that affect students' ability to build belonging [46]. To ensure that ethical approval could be agreed upon for the study, no special category data (e.g., sexual orientation or ethnicity) was collected within this research project.

Online surveys through the Qualtrics platform were used for the vast majority of data collection, including participants' initial registration for the research project and provision of demographic data, as well as baseline belonging measurements in October and follow-up collection of belonging and intention to persist scores in December, February, and May of the same academic year (2022/23).

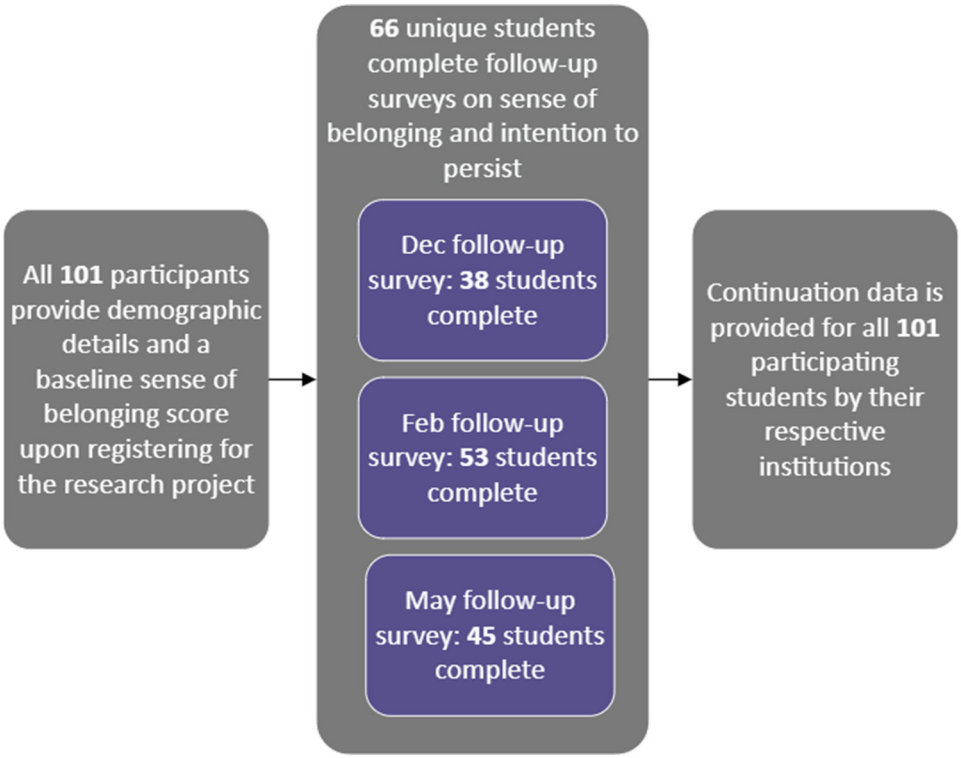

Figure 1. Research participant and data collection journey for all aspects of data utilised within the analyses. Demographic details, baseline belonging levels, and continuation data were collected for all 101 study participants. 66 unique students took part in at least one of the follow-up surveys, submitting a total of 136 survey responses across the three survey time points.

It was decided that relying on students to confirm their own continuation status would result in a biased sample, with students who had left university being much less likely to still respond to survey requests in the following academic year. Therefore, to ensure that continuation data could be supplied for all participating students, this was requested directly from their universities. Students consented to have their continuation data shared with the research project when registering themselves; however, additional data-sharing agreements were developed between each of the participating universities and the University of York, where the research project was based.

3.2. Measures

Most literature that looks at student belonging and its relationship to student success focuses on the terms 'retention' and 'persistence'. However, exactly what is meant by these terms varies across higher education systems internationally, and studies rarely discuss exactly how they define these measures. For this study, retention has been defined based on the concept of 'continuation' used by the Office for Students (OfS) in assessing student outcomes in the UK context [23]: a student who has continued studies at the same higher education provider for one year and 14 days after they have started their studies.

The OfS also includes two other categories of students within their reporting definition of continuation; however, they have both been excluded from the definition used within this study. Firstly, the OfS definition includes students who have qualified and received a higher education qualification; however, as this study is only focusing on first-year undergraduate students, this would not apply to any of the students considered within the study.

Secondly, the OfS also defines students as having a successful continuation status if they have continued their studies at another higher education provider. This has been excluded from the definition of continuation used in this study. This definition of con-

tinuation, which includes students who have changed institutions, while accurate from a regulatory point of view, does not align conceptually with what is trying to be tested within this research study around belonging. To assess the connection between students' sense of belonging and retention, while including students who have left the institution to study elsewhere, would not align with how this connection has been tested in other studies. There is a conceptual incompatibility between assessing belonging and whether students have changed institutions as a positive connection. This disconnect is made clearer by considering the questions used to measure belonging within the Yorke [58] scale (Table 1) where references are made to belonging with students' current institution—"this university"—rather than any university. Therefore, it is only students who have continued at their original institution that have been defined as having a positive continuation status in this study. Following on from the provision of this definition, the terms retention and continuation are used interchangeably within the rest of this article.

Table 1. Scales used to measure students' sense of belonging through the Yorke (2016) scale and measure students' intention to persist through a newly developed scale for this research project.

Yorke Belonging Scale	Intention to Persist Scale
All questions were asked as statements on a five-point Likert scale: strongly agree, agree, neither agree nor disagree, disagree, and strongly disagree	
1. I feel at home in this university. 2. Being at this university is an enriching experience. 3. I wish I'd gone to a different university (reversed scale). 4. I have found this department to be welcoming. 5. I am shown respect by members of staff in this department. 6. Sometimes I feel I don't belong in this university (reversed scale).	1. I intend to complete my course at university. 2. I sometimes consider withdrawing from university (reversed). 3. I sometimes consider changing my university (reversed). 4. I have doubted whether I should stay at university (reversed).

Scales relevant to the analyses of this study are shared below in Table 1, including the intention to persist scale. Intention to persist and its relationship with students' belongings have been explored in a variety of existing research studies [1–6]. However, there is no consistent approach used across these studies to measure intention to persist. Many studies use single-item measures, which are often criticised as being less reliable than multiple-item scales [57].

To build an intention to persist scale, questions were taken from existing studies around this topic:

- I intend to complete my course at university—taken from Hausmann et al. [1];
- I sometimes consider withdrawing from university (reversed)—adapted from Nemtcan et al. [59], changing 'drop-out' to 'withdrawing', as this is more neutral language, and removing the term 'before graduation', as this felt out of place in a question set only being issued to first-year undergraduate students who may not yet be thinking much about graduation;
- I sometimes consider changing my university (reversed)—adapted from Nemtcan et al. [59], removing the term 'before graduation' (for the reasons discussed in the point above);
- I have doubted whether I should stay at university (reversed)—adapted from Foster et al. [60].

At the beginning of the results section, Cronbach's alpha coefficients are calculated for the intention to persist scale to assess its internal validity.

In most studies, such as those referenced above, intention to persist is measured as a proxy for eventual student retention. This suggests that the intention to persist is utilised when the study design may preclude the use of actual retention data. Given that this study has been designed to include retention data, it could be argued that the intention to persist

data are redundant. However, there is also a benefit of the inclusion of intention to persist data above retention data, which is especially relevant for practitioners. Whilst there is a strong predictive relationship between students' intention to persist and eventual retention, data around whether students have doubted staying at university can be accessed much sooner and therefore potentially addressed before it becomes too late [60]. Intention to persist can be considered a lead indicator, while retention is a lag indicator. Given the focus of this overarching research project to provide recommendations for practitioners, there is a potential benefit of being able to assess how belonging and intention to persist interact.

To measure students' sense of belonging, the Yorke belonging scale [58] was utilised. This scale was selected for several reasons. Firstly, unlike other belonging scales such as Goodenow's [50], it has been created specifically for and tested within the context of UK higher education. Secondly, the questions recognise the multi-dimensional nature of belonging [48] as an important part of how this concept should be defined. Towards this point, questions cover topics of both relationships with others and spatial belonging. Finally, recognising the conceptualisations of belonging as dynamic [49], it was important to be able to run this survey with participants multiple times. Towards this end, the scale needed to not be burdensome or lengthy, as this would have increased the attrition of participants. The Yorke scale, at only six questions long (Table 1), is the shortest of recognised scales around belonging within an educational context.

3.3. Data Analysis

For both of the research questions, a combination of either linear regression or binary logistic regression models, along with data visualisation, are utilised. Binary logistic regression has been utilised in this article when the binary outcome variable of continuation is being investigated. Given that estimate values for binary logistic regression models cannot be reliably used to interpret effect measures across different groups [61], average marginal effects have been added to the results of logistic regression models. Average marginal effects provide a much more intuitive way of interpreting the strength of the relationship between predictor and outcome variables. As all belonging and intention to persist scores have been normalised to sit between 0 and 100, the average marginal effect values within this article represent the association between a one percent difference in the predictor variable—for instance, student belonging scores—and a percentage difference in the outcome variable: student continuation. All analyses were conducted in R.

4. Results

The results begin with a brief exploration of the top-level descriptive data included within this article, followed by a summary of preliminary analyses, which are discussed further in Appendix A. Following this, the remaining sections of the results focus on addressing the two substantive research questions in turn.

As many of the analyses use students' continuation status as the outcome variable, descriptive data of the count and percentage of students with positive continuation statuses is presented in Table 2.

Table 2. Descriptive data showing the count and percentage of students with a positive continuation status across the overall study population and split by institutional status.

		Both Institutions		**Widening Participation Institution**		**Selective-Recruiting Institution**	
		Count	**%**	**Count**	**%**	**Count**	**%**
Study participants	Continued	84	83.2%	72	92.3%	12	52.2%
	Not	17	16.8%	6	7.7%	11	47.8%
Overall populations	Continued	4471	79.7%	1933	75.9	2538	82.9%
	Not	1138	20.3%	614	24.1%	524	17.1%

4.1. Preliminary Analyses to Validate Methodological Approach for Remaining Analyses

A set of preliminary analyses were carried out to explore assumptions in data that may problematise the planned methodological approach. Firstly, the intention to persist scale was analysed for internal reliability. Cronbach's alpha analysis of this scale resulted in a score of 0.823, which suggests a strong level of internal consistency. This positive result suggests that the scale can be utilised in subsequent analyses within this article. Secondly, a series of regression models were developed to assess the relationship between missing datapoints and students' eventual continuation. This analysis was included to test whether missing data would need to be accounted for within future analyses. Binary logistic regression models showed that there was no statistically significant relationship between students' likelihood to miss any survey datapoint and their continuation status. Furthermore, there was no statistically significant relationship between the number of surveys that a participant completed and their eventual continuation status. This suggests that missing data can be excluded from future analyses without a risk of skewing the data. Further details on these preliminary analyses, including regression data tables, can be found in Appendix A.

4.2. To What Extent Is Students' Sense of Belonging a Predictor of Students' Intention to Persist?

To address this particular research question, plots have been developed to show the absolute levels of students' sense of belonging and intention to persist at each of the four survey points (Figure 2). This shows a consistent pattern in that students' sense of belonging and intention to persist are closely linked. It should be noted that the intention to persist scale was not asked of students at the beginning of the study, as it was felt that it was too early into students' time at university to ask about persistence.

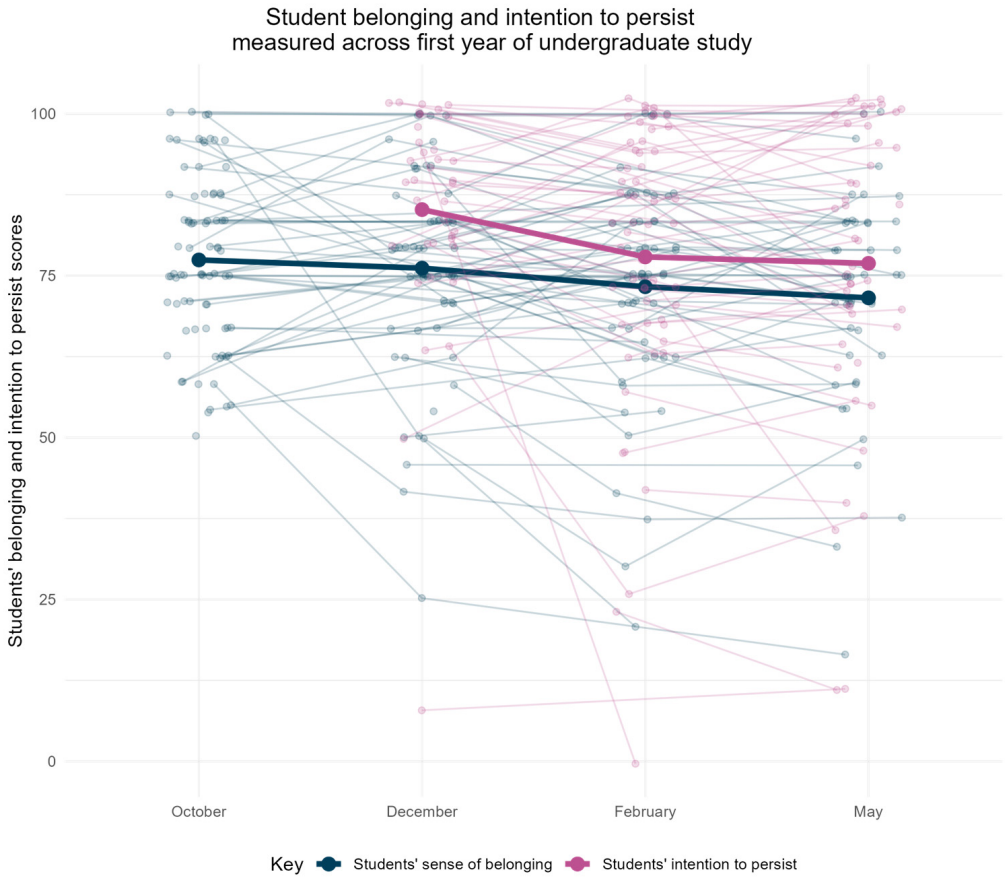

Figure 2. Changes in students' intention to persist and sense of belonging—including averages for all participants.

Given that they were measured by separate scales, little focus should be given to the fact that intention to persist was consistently greater than students' sense of belonging at all measurement points. Whilst, the questions in each scale were devised using the same Likert scale—from strongly disagree to strongly agree—they are different scales. Instead of focusing solely on absolute values, instead more insight can be gained by exploring changes over time. Through this lens, it is clear that both students' sense of belonging and intention to persist decreased slightly on average through the first academic year of study.

The strength of the connection between these two constructs is explored further through the use of linear regression analyses. Given the longitudinal nature of this study, there are multiple ways to assess the connection between student belonging and intention to persist through regression analyses. Four connected analyses were conducted to explore this looking at the strength of the relationship between the following:

1. Belonging and intention to persist at each survey measurement point (Table 3)—to explore whether the relationship between the variables is stronger or weaker at certain points in the year;
2. Average sense of belonging against the average intention to persist (Table 4 and Figure 3)—to explore the strength of the relationship between the variables when looking at a students' experience across all data points;
3. Students' sense of belonging and intention to persist at the next survey measurement point (Table 5)—to explore whether the sense of belonging is a reliable predictor of future intention to persist. This could then indicate how belonging could be used as a lead indicator of intention to persist—in a similar way to how intention to persist is seen as a lead indicator of continuation itself;
4. Change in students' sense of belonging against change in students' intention to persist (Table 6)—to explore whether efforts to affect students' sense of belonging could be expected to have corresponding shifts in students' intentions to persist.

For all of these regression models, while the focus of the analyses was exploring the relationship between a sense of belonging and intention to persist, students' demographic variables were included in the models so that any differences across demographic categories could be accounted for. As none of the demographic variables showed statistically significant relationships with intention to persist in these models, they have not been presented in the below results tables for clarity of presentation. Full regression results tables can be found in Appendix B.

Table 3. Multiple linear regression analyses explore the extent to which belonging at each measurement point is a predictor of students' intention to persist at that same measurement point. This was modelled as a multiple linear regression model to explore whether this relationship was explained by students' demographic factors. As there was no significance amongst students' demographic variables, these variables have not been included within this results table, but can be found within Appendix B. Number of observations is included within each model in the table.

	Term	Estimate	Std. Error	*p*-Value
December intention to persist (n = 32)	(Intercept)	25.589	15.593	0.114
	December belonging	0.919	0.169	0.000
February intention to persist (n = 44)	(Intercept)	18.724	15.248	0.227
	February belonging	0.920	0.154	0.000
May intention to persist (n = 38)	(Intercept)	28.799	16.068	0.083
	May belonging	0.955	0.190	0.000

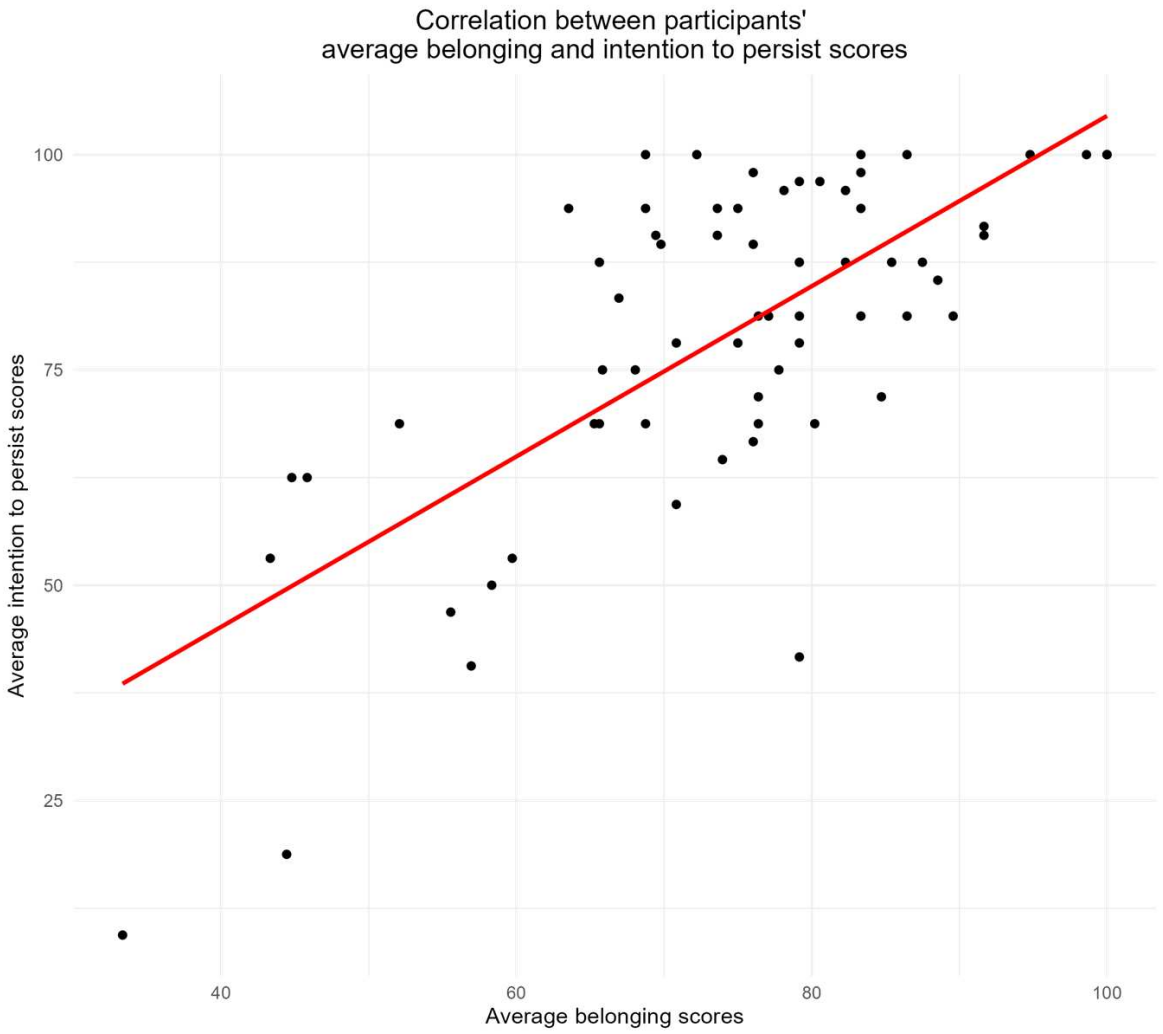

Figure 3. Scatterplot showing the correlation between students' average sense of belonging scores and average intention to persist scores, as reported in surveys across the first academic year. Line of best fit in red. Correlation coefficient (r) = 0.71.

Table 4. Multiple linear regression analyses to explore the extent to which students' average sense of belonging is a predictor of students' average intention to persist, as measured in surveys through the first academic year. (n = 66).

Term	Estimate	Std. Error	*p*-Value
(Intercept)	5.596	9.196	0.545
Average sense of belonging	0.989	0.121	0.000

Table 5. Multiple linear regression analyses to explore the extent to which belonging at each measurement point is a predictor of students' intention to persist at the next measurement point—e.g., belonging in December as a predictor of intention to persist scores in February (n = 103).

Term	Estimate	Std. Error	*p*-Value
(Intercept)	33.333	11.929	0.006
Sense of belonging	0.804	0.128	0.000

Table 6. Multiple linear regression analyses to explore the extent to which changes in students' sense of belonging were a predictor of changes in students' intention to persist (as calculated by subtracting each participant's first survey measurement from their last for both the belonging and intention to persist scales) [n = 26].

Term	Estimate	Std. Error	*p*-Value
(Intercept)	9.891	19.878	0.625
Change in sense of belonging	0.858	0.319	0.015

Table 3 shows the first of four linear regression analyses to explore the strength of the relationship between students' sense of belonging and intention to persist. At each survey measurement point, there was a very strong, positive relationship between the two constructs. Estimate values ranged from 0.919 to 0.955, suggesting that each percentage increase in students' sense of belonging was associated with slightly less than a one percent increase in students' intention to persist. All coefficients had a statistical significance of less than 0.001. These analyses also suggest that the positive relationship between a sense of belonging and intention to persist was slightly stronger at the end of the academic year (in the May survey) compared to the February and December survey points.

Building on the above analysis, a regression model and scatter plot were created to show the relationship between each participant's average sense of belonging and average intention to persist (Table 4).

Given that belonging and intention to persist were strongly correlated within each survey measurement point, it perhaps could be expected that the relationship between the average values for these two constructs would be similarly high. In fact, the average sense of belonging was almost a perfect predictor of students' average intention to persist ($\beta = 0.989$, $p < 0.001$, n = 66).

Whilst not true for all constructs measured in surveys, there is a risk that the extremely high correlations between these variables could be explained by common method bias, as students were completing their questions about the sense of belonging and intention to persist within the same overarching questionnaire. There is a risk of acquiescence bias: if students had been responding positively to the questions about belonging, then this could have primed them to also respond more positively to all subsequent questions: those around intention to persist.

To explore whether the relationship between a sense of belonging and intention to persist remained beyond a single time point—and therefore beyond a single measurement point—a regression model was developed to explore the relationship between a sense of belonging at any survey point and the corresponding intention to persist score at the next survey measurement point (Table 5).

The above regression model produced another very strong, positive, and significant correlation, suggesting that even though both belonging and intention to persist are fluid concepts, students' sense of belonging can be a useful predictor of where students' intention to persist will be in the future. It should be noted that whilst this regression model produced a significant result ($p < 0.001$), the estimated value was slightly lower than in the previous set of models ($\beta = 0.804$), suggesting that students' sense of belonging has a stronger association with intention to persist at the same point in time than it does for future intention to persist measurements. Given this fluidity, one further analysis was carried out to explore the relationship between changes in students' sense of belonging and changes in intention to persist (Table 6).

Table 6 shows that when looking at the overall change in students' sense of belonging across the first academic year of study—in essence, their final self-reported sense of belonging score minus their first—this is once again very strongly, positively and significantly correlated with changes in students' intention to persist.

Overall, this suggests that students' sense of belonging is positively correlated with their intention to persist at an overall average level and at each individual time point. Sense

of belonging is also a predictor of future intention to persist, as measured through the relationship between any belonging measurement and the intention to persist measurement for that same student within the next survey—for example, students' sense of belonging in December being able to predict students' intention to persist scores in February.

Given the strength of the relationship between belonging and intention to persist, an immediate question to explore would be whether the two scales are just measuring the same constructs. Whilst most of the questions in the Yorke belonging scale do not appear related to the questions included within the intention to persist scale, there is one that has the risk of conceptual overlap. The question: "I wish I'd gone to a different university (reversed scale)" does seem at least somewhat conceptually related to the questions being asked in the intention to persist scale, as it is asking students to reflect on whether they perceive regret in choosing their current university of study. This is not asking the same thing as any of the questions in the intention to persist scale, as it is asking the student to reflect rather than asking about their commitment to make a forward-looking decision that would involve them leaving their current university. However, it is somewhat conceptually related as a question to the intention to persist scale. How this potential conceptual overlap should be addressed is included in the discussion section of this article. Another possible explanation is that both a sense of belonging and an intention to persist may reflect deeper psychological traits within participants, which explains why they are so closely correlated over time.

4.3. To What Extent Is Students' Sense of Belonging a Predictor of Continuation?

Similar to the previous section of this article, this research question was explored through a combination of data visualisation and regression analyses. Unlike the intention to persist, whether students continue in their studies or not is a binary variable. Therefore, binary logistic regression has been utilised to explore the strength of the relationship between this outcome variable and students' sense of belonging. As noted within the methodology section of this article, average marginal effects have also been calculated and included within the regression tables to support meaningful interpretation of the strength of relationships.

To begin the analyses to address this research question, students' sense of belonging was plotted across the first academic year of study but split based on students' eventual continuation results (Figure 4).

This visualisation of students' sense of belonging, split by students' eventual continuation status, begins to show that there is a clear connection between these variables. Interestingly, the average October survey measurements for belonging are almost the same across the continuation split. This suggests that this October measurement of belonging was no indicator of students' eventual continuation status. However, all subsequent average measurements of belonging show a clear separation between those who continued and those who did not.

Binary logistic regression analyses (Table 7) were then utilised to explore the extent of the relationship between students' sense of belonging and continuation. Given the previous analyses, which showed that the relationship between belonging and intention to persist is incredibly strong, only belonging has been included in these analyses, rather than including both belonging and intention to persist—as the inclusion of another highly correlated item would not be valuable in the regression model. These regression models were developed to include students' demographic variables for consistency with previous analyses within this article; however, the results shown below only include the results of the overall intercept, belonging values, and average marginal effects. Full demographic details of these regression results are included in Appendix B.

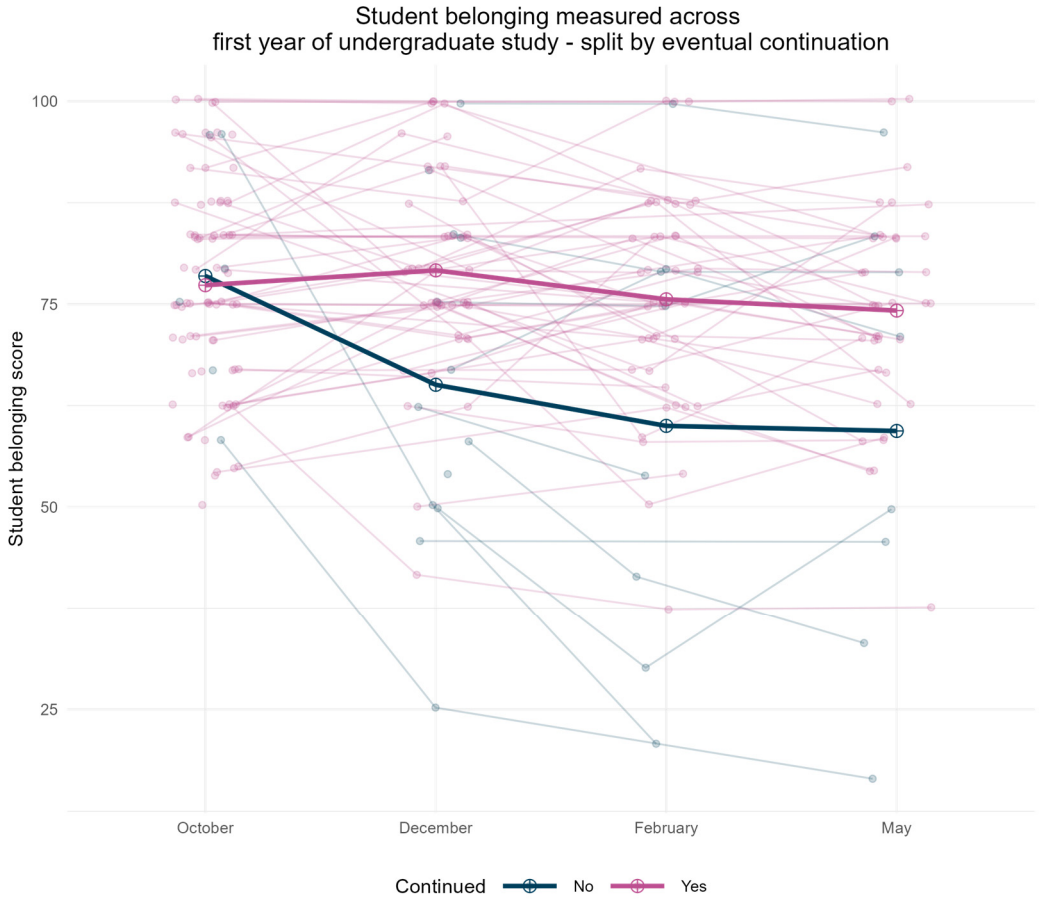

Figure 4. Plot showing students' sense of belonging across the first year of undergraduate study—split by students' continuation status.

The above regression models show that there are positive and significant relationships between students' sense of belonging and eventual continuation. As was noted from Figure 4, October sense of belonging survey results were not a predictor of eventual continuation—with a very low estimated coefficient value and no significance. However, all subsequent belonging surveys were strong, significant predictors of belonging. For each additional percentage point in students' sense of belonging, students' likelihood of successfully continuing also increased by roughly one per cent for the December, February, and May surveys. Students' change in belonging was not a significant predictor of continuation. Students' average belonging was a significant predictor of belonging; however, this is more likely to be expected, as averaging across the different surveys reduces measurement error, thus increasing the chances of a significant result. Furthermore, each percentage point increase in belonging predicted an increase in students' continuation rate of 0.6%, less than when looking at the December, February, and May surveys individually.

Overall, these results strongly suggest that students' sense of belonging is a significant predictor of students' eventual continuation. However, two important caveats to this are that students' measurement at the start of the academic year—in October—was not significantly associated with students' eventual continuation, and neither was students' change in sense of belonging.

Table 7. Multiple binary logistic regression analyses explore the extent to which belonging at each measurement point, along with students' demographic variables, are predictors of students' eventual continuation status. Multiple binary logistic regression models were also calculated with students' change in belonging (last survey measurement minus their first) and students' average belonging across all surveys that they took part in. Average marginal effects for each model are also presented to help better interpret the strength of the relationships between belonging measurements and continuation. Average marginal effect estimates represent a predictive percentage change in continuation. For example, February belonging's average marginal effect of 0.010 represents that every percentage point increase in belonging represents a percentage increase in the likelihood of a student successfully continuing. The number of observations is included within each model in the table.

Term	Estimate	Std. Error	*p*-Value
(Intercept)	4.478	3.890	0.250
October belonging (n = 67)	−0.021	0.039	0.598
Average marginal effects	−0.001	0.003	0.598
(Intercept)	−4.654	2.299	0.043
December belonging (n = 52)	0.071	0.029	0.016
Average marginal effects	0.008	0.003	0.003
(Intercept)	−5.735	4.256	0.178
February belonging (n = 44)	0.161	0.068	0.019
Average marginal effects	0.010	0.003	0.002
(Intercept)	−4.866	3.201	0.128
May belonging (n = 38)	0.108	0.055	0.047
Average marginal effects	0.009	0.004	0.018
(Intercept)	0.884	1.684	0.600
Change in belonging (n = 38)	0.046	0.049	0.352
Average marginal effects	0.005	0.005	0.333
(Intercept)	−2.881	1.786	0.107
Average belonging (n = 87)	0.053	0.022	0.016
Average marginal effects	0.006	0.002	0.008

5. Discussion

5.1. Student Belonging Is a Strong Predictor of Intention to Persist and Eventual Continuation

The results of this study closely align with previous research establishing the close relationship between students' sense of belonging and their intention to persist [1–7]. Given that a near-perfect relationship exists between these two variables, this article briefly explored the conceptual overlap between the scales measuring belonging and intention to persist. The Yorke student belonging scale [58] has been used throughout this study, and one of its six questions does at least somewhat overlap conceptually with the questions included in the intention to persist scale. More detail about how the intention to persist scales vary across different studies is discussed within the methodology section of this article. Given that sense of belonging is measured in many different ways within existing research, and often with just single-item measures [57], more criticality is welcomed in future research into the conceptual overlap between sense of belonging and potential outcome variables being investigated—such as intention to persist. If this criticality does not exist, then there is a risk that we are not measuring the relationship between two distinct concepts but instead, the extent to which two different scales overlap. Furthermore, these two concepts could both be strongly influenced by other underlying psychological variables.

Beyond the top-level alignment to previous research, the longitudinal nature of this study provides opportunities to explore the nature of this relationship in ways that have not been investigated before. This study was able to find that students' sense of belonging was a statistically significant predictor of future intention to persist scores at the next available survey opportunity. Furthermore, changes in students' sense of belonging were a significant predictor of changes in intention to persist. This latter finding is especially promising for practitioners hoping to positively influence students' sense of belonging as a means to positively affect student outcomes. However, whilst there was a significant relationship between changes in belonging and changes in intention to persist, changes in belonging were not a significant predictor of students' eventual continuation status. Whilst there have been previous studies that have measured a sense of belonging and intention to persist at multiple measurement points and found a significant relationship [6], this study is novel in its analyses exploring how a sense of belonging can predict future intention to persist and how changes in sense of belonging predict changes in intention to persist.

Given that students' intention to persist is just a proxy for whether students will continue in their degrees, this study also sought to build on previous research by investigating the association between students' sense of belonging and continuation beyond the first year of study. Similar to the relationship with intention to persist, the results of this study align with previous research in finding a strong, positive, and significant association between students' sense of belonging and retention—as measured by continuation beyond the first twelve months of study [8–14]. Each percentage point increase in students' sense of belonging was associated with a percentage point increase in the likelihood of successfully continuing beyond the first year.

This is not to suggest that it was only students with consistently high sense of belonging scores that continued into their second academic year. Previous qualitative research has already provided useful insights into the reflections of graduates—those who had successfully completed their degree—around their sense of belonging during their degree [62,63]. These studies show that even students who go on to achieve successful degree outcomes still experience plenty of challenges to their sense of belonging. This article contributes to our understanding of this phenomenon through its visualisation of belonging and continuation data, showing how each participant's sense of belonging changed throughout the first academic year and whether they then successfully continued in their degree.

In summary, this study provides more insight into the close relationship between students' sense of belonging and retention that has been explored in previous research. However, there is one large caveat for this, which is addressed in the next section.

5.2. Students' Sense of Belonging, When Measured at the Beginning of the First Year, Is Not a Reliable Predictor of Continuation

While there was a positive, significant relationship between continuation and students' sense of belonging at all subsequent measurement points, there was no such relationship established in the October survey data. In essence, students' sense of belonging in October had no relationship to whether they were likely to continue beyond the first year of study. This result links to previous research that has questioned how early we can begin reliably asking students to self-report their sense of belonging at university in a meaningful way [56].

This presents a problematic situation for those seeking to enhance students' sense of belonging. The beginning of students' time at university is often regarded as the most important for developing a positive sense of belonging [52,64,65]. Transition periods often present many challenges to feeling a strong sense of belonging [3,66]. However, if this is also a period of time when students may be less able to meaningfully understand and report on their own sense of belonging at university, then this problematises attempts to evaluate the success of efforts and interventions on this subject. Existing research around student belonging interventions recognises the importance of pre-and-post-test evaluation of students' belonging levels [67] and comparison against non-participatory

groups [12,68,69], given that belonging is known to fluctuate over time [49]. However, these evaluation approaches rely on an assumption that belonging can reliably be measured at this early point in the academic year, which is at least partially challenged by findings from this study.

Another interpretation of the results in this article could be that the October measurements of belonging are reliable—in the sense that they accurately capture what students are feeling at that point in time—but that it is too soon into the academic year to be reliable predictors of their eventual continuation. There is so much that students are yet to experience, which may also affect their sense of belonging and retention. A way to potentially explore this would be to look at the sense of belonging for continuing students at the start of the second academic year and see whether this predicts their likelihood to still be at that university a year later (in their third year of study). This would allow exploration into whether the lack of association between October sense of belonging and eventual continuation found within this study is a reflection of there simply being too long a time gap between the two variables, or if it is about students not being able to reliably report their sense of belonging right at the beginning of their time at university. This would also be especially valuable as most research into students' sense of belonging and retention focuses on the first-year experience. Some research has been scoped to investigate the sense of belonging and retention among second-year students, which is welcomed [70].

5.3. Limitations and Future Research Opportunities

Participation rates limited the analyses within this study through the much lower number of participants from the selective-recruiting university compared to the widening participation institution. The disparity in participation rates affected the ability to explore meaningful comparisons around a sense of belonging, intention to persist, and continuation at an institutional level. The two institutions were chosen due to their differences. If the study had enough participants to run the analyses separately for each institution, then this would have improved the external validity of the results by being able to show the strength of the relationship between the variables across two different types of universities. The low number of participants may also have contributed to why none of the regression analyses found significant correlations against students' demographic characteristics. Full details of the regression analyses, including estimates, standard errors, and *p*-values, for demographic variables are included in Appendix B.

Missing data are an underlying limitation of longitudinal studies. Within this study, this limitation was mitigated through the use of regression models to assess the relationship between students' likelihood to miss surveys and their eventual continuation. These results found that there was no significant association, which suggests that it is acceptable to ignore missing data in the substantive analyses.

One final limitation of the analyses within this article has been the approach taken to assess statistical significance. Given the number of significance tests carried out within this study, there is a risk that at least one of them may be a false positive [71]. Two mitigations have been used to address this risk. Firstly, significance values are always reported when regression models have been carried out. This allows readers the ability to see whether a relationship may only just go below the somewhat arbitrary value of 0.05 or indeed be way beyond this boundary. The second mitigating action has also been to report and discuss the meaningful interpretation of coefficient values within regression results so that the focus is not just on significance but on the strength of the association between variables.

6. Conclusions

In conclusion, whilst this study has aligned with previous research by showing very strong, significant relationships between students' sense of belonging and both intention to persist and retention, this article's main contribution has been through utilising the longitudinal design to build upon these previously explored findings. Firstly, regression analysis in this study found that students' sense of belonging was able to predict future intention

to persist scores (β = 0.804, $p < 0.001$, n = 103) and that changes in the sense of belonging also predicted changes in intention to persist (β = 0.858, $p = 0.015$, n = 26). Whilst this may seem promising, as it suggests that efforts to enhance the sense of belonging may lead to improvements in students' intention to persist, changes in the sense of belonging were not significantly associated with increased retention likelihood. Through these analyses, this article has also highlighted that students' October measurements of belonging were not associated with continuation. This aligns with previous research that questions the reliability of asking students about their sense of belonging so early at university. This has practical implications for practitioners attempting to influence students' sense of belonging at the beginning of their time at university, as it suggests a limitation in the reliability of evaluation efforts.

Overall, this study provides more robust evidence of the utility of exploring students' sense of belonging as a predictor of retention.

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Institutional Review Board Statement: Ethical approval was sought and received from the University of York Education Ethics Committee on 23 August 2022. The ethics committee member confirmed: "I believe that this study, as planned, meets normal ethical standards. I have checked that any informed consent form (a) addresses the points as listed in this [ethics audit form] document, and (b) uses appropriate language for the intended audience(s)".

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Due to the ongoing nature of the wider student-belonging research project related to this article, data has not yet been made publicly available. Data may be able to be shared if requested.

Conflicts of Interest: The authors declare no conflicts of interest.

Appendix A. Full Preliminary Analyses Around Scale Internal Consistency and Missing Data Correlations with Continuation

Appendix A.1. Preliminary Analysis—Checking Internal Validity of the Intention to Persist Scale

As discussed within the methodology section of this article, a search of existing research exploring students' intention to persist was carried out to develop a scale that could be utilised within this research study. As no pre-validated intention to persist scales were discovered by the authors, with most existing studies using single-item measures to assess intention to persist, a combination of these single-item measures was brought together. Given that these questions have not been validated together for their use as a combined scale, Cronbach's alpha analysis was conducted to assess the scale's internal validity—the extent to which each student responded consistently to questions within the scale.

Cronbach's alpha analysis of this scale resulted in a score of 0.823, which suggests a strong level of internal consistency. Similarly, a testing of the Yorke belonging scale, including all follow-up responses from students on their sense of belonging, showed that this has a Cronbach's alpha score of 0.842—also a very strong level of internal consistency.

The strong Cronbach's alpha scores for the intention to persist scale suggest high internal consistency for these questions—in essence, that they are measuring a similar underlying construct. Cronbach's alpha analysis cannot be used to assess construct validity or whether the scale is measuring the intended phenomenon. This caveat is slightly mitigated by the fact that all of the individual questions that comprise the scale have been used in previous research looking at students' intentions to persist. Overall, with these

cautions in mind, the Yorke belonging scale and intention to persist scale have been used in the substantive analyses of this study, unaltered.

Appendix A.2. Preliminary Analysis—Assessing the Relationship Between Missing Data and Continuation

The longitudinal nature of this study allows it to potentially contribute to the gaps in knowledge around how belonging and intention to persist change over time. However, a risk with longitudinal studies is that missing data from participants could be correlated with the outcome variables being assessed. In the context of this article, if it was found that missing data were significantly correlated with variances in students' continuation rates, this would prove problematic for subsequent analyses. In the design of binary logistic regression analyses, missing data has been excluded by default; however, if missing data were significantly correlated with continuation, this would mean that this would need to be accounted for in these analyses.

To investigate the possible relationship between missing data and continuation, two types of binary logistic regression results were utilised. Firstly, three binary logistic regression models (Table A1) were developed to explore the relationship between continuation and whether students missed each of the three optional survey data points. Secondly, an additional variable was created for each student to represent the number of surveys that they missed throughout the study, with a separate model developed for each university (Table A2). These binary logistic regression models investigated the relationship between the number of missed surveys and students' continuation status.

Table A1. Binary logistic regression analyses to explore the extent to which whether students missed any of the survey opportunities was a predictor of students' continuation—i.e., successfully continuing in their studies beyond their first year of study. The number of observations for each model is included in the table.

Term	Estimate	Std. Error	*p*-Value
(Intercept)	2.890	0.726	0.000
Missed December survey (n = 78)	−0.693	0.898	0.440
Average marginal effects	−0.047	0.060	0.427
(Intercept)	1.749	0.383	0.000
Missed February survey (n = 101)	−0.309	0.533	0.562
Average marginal effects	−0.043	0.075	0.564
(Intercept)	1.531	0.390	0.000
Missed May survey (n = 101)	0.121	0.533	0.820
Average marginal effects	0.017	0.075	0.821

The results of these binary logistic regression analyses suggest that whether students missed any of the survey opportunities did not have a significant predictive relationship with whether those students then went on to successfully continue. Average marginal effects for all three models were low—between two percent and negative five percent—and none of the models showed statistical significance. These results show that there was no individual survey point where the students who missed the survey were significantly more or less likely to successfully continue in their studies. The relationship between the number of surveys missed and student continuation is then explored in Table A2.

Table A2. Binary logistic regression analyses to explore the extent to which the number of surveys missed by students was a predictor of students' continuation. Separate models have been developed for each institution. The number of observations for each model is included in the table.

	Term	Estimate	Std. Error	*p*-Value
Widening participation in university participants (n = 78)	(Intercept)	3.519	1.031	0.001
	Number of missed surveys	−0.517	0.408	0.206
	Average marginal effects	−0.036	0.03	0.231
Selective-recruiting university participants (n = 23)	(Intercept)	0.505	0.534	0.344
	Number of missed surveys	−0.818	0.641	0.202
	Average marginal effects	−0.189	0.127	0.136

Focusing on the average marginal effects from these binary logistic regression models show that whilst for each additional survey missed, the predicted probability of continuation decreased—by 3.6% for the widening participation university students and 18.9% for the selective-recruiting university students—in neither case was this statistically significant. Overall, therefore, while there may be a trend suggesting that missing more surveys is linked to a lower probability of continuation, the association within these models was not statistically significant. This suggests that this article's analyses can continue to explore the relationship between continuation and other factors without the need to actively account for missing data.

Appendix B. Full Regression Model Results, Including Demographic Coefficients

For clarity of presentation, multiple linear regression model tables within this study excluded demographic variable lines in the data tables displayed within the main text. These full regression model results are presented here in this appendix within Tables A3–A13.

Table A3. Multiple linear regression—December Intention to Persist as predicted by October Belonging and demographic variables (n = 32).

Term	Estimate	Std. Error	*p*-Value
(Intercept)	25.589	15.593	0.114
October belonging	0.919	0.169	0.000
Gender—Male	−5.579	7.826	0.483
Age—Under 25	−6.095	9.364	0.521
Commute length—short commute	6.583	7.777	0.406
Private education—Yes	−4.676	11.392	0.685
Fee status—UK student	−9.370	11.309	0.416
Parent(s) attended university—yes	4.737	7.537	0.536

Table A4. Multiple linear regression—February Intention to Persist as predicted by December Belonging and demographic variables (n = 44).

Term	Estimate	Std. Error	*p*-Value
(Intercept)	18.724	15.248	0.227
December belonging	0.920	0.154	0.000
Gender—Male	−2.980	8.185	0.718

Table A4. *Cont.*

Term	Estimate	Std. Error	*p*-Value
Age—Under 25	−3.175	9.937	0.752
Commute length—short commute	−0.346	7.972	0.966
Private education—Yes	−3.453	9.385	0.716
Fee status—UK student	2.701	10.356	0.796
Parent(s) attended university—yes	−6.587	7.348	0.377

Table A5. Multiple linear regression—May Intention to Persist as predicted by February Belonging and demographic variables (n = 44).

Term	Estimate	Std. Error	*p*-Value
(Intercept)	5.596	9.196	0.545
Belonging average	0.989	0.121	0.000
Gender—Male	−0.979	4.640	0.834
Age—Under 25	−5.718	5.435	0.298
Commute length—short commute	−1.048	4.330	0.810
Private education—Yes	−4.923	5.446	0.370
Fee status—UK student	−7.103	5.372	0.192
Parent(s) attended university—yes	−0.955	4.526	0.834

Table A6. Students' average Intention to Persist as predicted by their average sense of belonging score and demographic variables (n = 56).

Term	Estimate	Std. Error	*p*-Value
(Intercept)	33.333	11.929	0.006
Belonging value	0.804	0.128	0.000
Gender—Male	−3.422	4.528	0.452
Age—Under 25	−7.144	5.458	0.194
Commute length—short commute	−0.864	4.263	0.840
Private education—Yes	−7.207	5.495	0.193
Fee status—UK student	−5.663	5.701	0.323
Parent(s) attended university—yes	−0.556	4.097	0.892

Table A7. Multiple linear regression—Students' sense of belonging as a predictor of their next Intention to Persist score (n = 103).

Term	Estimate	Std. Error	*p*-Value
(Intercept)	9.891	19.878	0.625
Belonging change	0.858	0.319	0.015
Gender—Male	1.609	11.801	0.893
Age—Under 25	−2.968	13.169	0.824
Commute length—short commute	−9.838	8.804	0.278
Private education—Yes	2.344	12.793	0.857
Fee status—UK student	1.865	13.099	0.888
Parent(s) attended university—yes	−6.907	9.507	0.477

Table A8. Multiple linear regression—Changes in belonging as a predictor of changes in students' Intention to Persist (n = 26).

Term	AME	Std. Error	*p*-Value
October belonging	−0.001	0.003	0.598
Age—Under 25	0.027	0.088	0.764
Commute length—short commute	−0.014	0.073	0.848
Fee status—UK student	−0.031	0.099	0.757
Gender—Male	−0.196	0.103	0.057
Parent(s) attended university—yes	0.117	0.075	0.120
Private education—Yes	0.041	0.094	0.661

Table A9. Binary logistic regression—Average marginal effects for October sense of belonging and demographic variables as predictors of continuation (n = 67).

Term	AME	Std. Error	*p*-Value
December belonging	0.008	0.003	0.003
Age—Under 25	0.081	0.177	0.649
Commute length—short commute	−0.119	0.114	0.297
Fee status—UK student	0.134	0.137	0.328
Gender—Male	−0.079	0.117	0.497
Parent(s) attended university—yes	0.008	0.103	0.938
Private education—Yes	0.195	0.105	0.062

Table A10. Binary logistic regression—Average marginal effects for December sense of belonging and demographic variables as predictors of continuation (n = 52).

Term	AME	Std. Error	*p*-Value
February belonging	0.01	0.003	0.002
Age—Under 25	−0.15	0.047	0.001
Commute length—short commute	0.029	0.1	0.775
Fee status—UK student	0.01	0.003	0.002
Gender—Male	0.124	0.232	0.595
Parent(s) attended university—yes	−0.107	0.13	0.408
Private education—Yes	0.031	0.093	0.738

Table A11. Binary logistic regression—Average marginal effects for February sense of belonging and demographic variables as predictors of continuation (n = 44).

Term	AME	Std. Error	*p*-Value
May belonging	0.009	0.004	0.018
Age—Under 25	−0.095	0.093	0.308
Commute length—short commute	−0.056	0.11	0.611
Fee status—UK student	0.055	0.122	0.651
Gender—Male	−0.18	0.18	0.318
Parent(s) attended university—yes	0.122	0.158	0.441
Private education—Yes	0.163	0.108	0.132

Table A12. Binary logistic regression—Average marginal effects for May sense of belonging and demographic variables as predictors of continuation (n = 38).

Term	AME	Std. Error	*p*-Value
Belonging change	0.005	0.005	0.333
Age—Under 25	0.016	0.17	0.923
Commute length—short commute	−0.091	0.111	0.413
Fee status—UK student	0.126	0.166	0.448
Gender—Male	−0.188	0.185	0.309
Parent(s) attended university—yes	0.183	0.17	0.282
Private education—Yes	0.168	0.139	0.227

Table A13. Binary logistic regression—Average marginal effects for changes in sense of belonging and demographic variables as predictors of continuation (n = 38).

Term	AME	Std. Error	*p*-Value
Average belonging—	0.006	0.002	0.008
Age—Under 25	0.067	0.112	0.551
Commute length—short commute	−0.113	0.081	0.162
Fee status—UK student	0.073	0.106	0.487
Gender—Male	−0.081	0.091	0.371
Parent(s) attended university—yes	0.053	0.079	0.503
Private education—Yes	0.171	0.084	0.041

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