



(No) time to engage: an exploratory mixed-method study into factors predicting the engagement of postgraduate research students in Ireland

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Abstract

Worldwide, HEIs strive to provide the best possible training for their PGRs, the next generation of researchers. PGRs engagement is crucial for a successful completion of their training, however, research on the experiences of PGRs is limited. Moreover, the number of international PGRs has increased steadily over the last decade, which poses the question whether international PGRs have different engagement levels compared to local PGRs. Therefore, this study is aimed at filling this research gap by investigating the mechanisms that influence the engagement of these groups of students. The paper focuses on the dimensions of (1) students' engagement with the supervisor, (2) their engagement within the department, and (3) their cognitive engagement, by taking a mixed-method approach that draws on the Irish PGR StudentSurvey.ie 2019 data and 14 semi-structured interviews conducted with PGRs at Trinity College Dublin (TCD) in 2021. The findings indicate that differences in engagement between Irish and international students are mainly influenced by perceived financial security and familiarity with institutional structures and environments, are mediated by their relationship with the supervisor, and ultimately influence the time available for engagement. Therefore, the findings will be relevant to policymakers and HEIs as they offer insights into how challenges for PGR students can be mitigated through supervisor support to encourage higher levels of engagement.

Keywords Postgraduate research students · Student engagement · International students · Mixed-method research, Ireland

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Introduction

The past decades have brought unprecedented levels of social and ecological change, stemming from shifting environmental, political, social, and economic trends. Some of these changes, and the challenges they create, were observable during the global COVID-19 pandemic, which demonstrated the importance of research-led solutions (IUA, 2021) and the growing demand for strategies based on rigorous scientific methods by governments, private sectors, and the general public (Altbach & Peterson, 2007). To meet these growing demands and stay internationally competitive, an increasing number of higher education institutions (hereafter HEIs) focus on building dynamic environments that support the education of the next generation of national and international researchers (Hazelkorn et al., 2018; McCormick et al., 2013). In this endeavour, training postgraduate research students (hereafter PGRs) to engage critically and independently in research processes is vital for global efforts to increase individual well-being, economic prosperity, environmental protection, and expanding and disseminating knowledge (Hazelkorn, 2015; Lovitts, 2008).

The influence of these trends also shows in the growing number of HEIs, which increased by 27% between 2006 and 2018 globally to cater for the increasing number of students (Williams & Usher, 2022). In 2018, most OECD countries reported that around 22% of doctoral students and 13% of Master's students were international students, while less than 5% of Bachelor's students were international (OECD, 2020). These trends indicate an increasingly ethnoculturally diverse body of PGRs across the globe. However, contrary to the growing numbers of tertiary international student enrollments in many countries globally (*ibid.*) and the importance of PGRs, they remain a critically under-researched group. Existing research has highlighted challenges faced by international students in host HEIs, including student-faculty interaction, different approaches to teaching and learning (Darmody et al., 2022), and financial considerations (Xiong, 2022). Challenges of this nature have been shown to impact on student engagement, which correlates with overall academic satisfaction and success (Kuh, 2008; Kuh et al., 2013; Wang & BrckaLorenz, 2018; Algeo, 2021; Darmody et al., 2022).

The number of international students in Irish HEIs has grown in line with international trends. The current demographic composition within these programmes shows that around 34% of all PGRs enrolled in Irish HEIs in 2020/21 are international students (HEA, 2021). The growing internationalisation of higher education has contributed to creating new plans and strategies like the National Development Plan 2000–2006, the Strategy for Science and Technology 2006–2013, and the International Strategy for Ireland 2016–2020 to increase the number of PhD graduates even further in Ireland. The funding for these plans and strategies came through different streams, including Science Foundation Ireland, the Irish Research Council, and the Programme for Research in Third-Level Institutions. In 2020/21, most PGRs in Ireland came from the United States of America, the United Kingdom, China, India, Malaysia, Canada, and Saudi Arabia (HEA, 2021). Between 2018 and 2021, enrolment numbers of PGRs grew by 11% (*ibid.*) and are expected to further increase due to the Brexit-related rise in study fees for European students enrolling at British HEIs, making Ireland an attractive alternative destination (Mayhew, 2017; Highman, 2017; Marginson, 2017; Clarke, Yang, & Harmon, 2018; Griffin, 2018a, 2018b).

This article seeks to contribute to the limited existing body of knowledge on the experiences of international students in higher education institutions by sharing insights into inter-related factors that influence PGR's engagement with the academic environment. Therefore, this study adopts an exploratory mixed-methods approach drawing on the 2019

PGR StudentSurvey.ie data complemented by 14 semi-structured interviews with PGRs at Trinity College Dublin (hereafter TCD) in Ireland. The paper is aimed at answering the following question: what factors predict the engagement of PGR students in Irish HEIs?

Student engagement in theory and practice

Kuh (2008) and Kuh et al. (2013) demonstrated that student engagement is a vital predictor of a student's learning, development, and academic success. However, students' non-academic experiences, like leisure activities and socialisation, which can influence engagement (Coates, 2006), are not adequately included in current theories. Furthermore, research on students' engagement in the UK has pointed towards demographic characteristics as an explanation for differences in engagement. For example, being female, a distance learner or a part-time student was negative predictors of engagement, while being from Africa, Asia, or a Black minority ethnicity was a positive predictor (Bokhove & Muijs, 2019). Lastly, Arambewela and Maringe (2012) identified that HEI staff and students in their study had divergent perceptions of issues concerning the quality of higher education, student support, language proficiency, and cultural integration.

When focusing on student-centred forms of engagement, Fredricks et al. (2004) suggest differentiating the three distinct dimensions of behavioural, emotional, and cognitive engagement that influence a student's overall engagement level. Through behavioural engagement, students comply with the institution's behavioural norms and typically demonstrate the absence of negative or disruptive behaviours. A student's emotional engagement shows in the experience of positive affective reactions like feeling a sense of belonging in their HEI. Lastly, cognitive engagement is defined as a student's investment of time in learning and understanding. These aspects resemble Harper's and Quayle's (2014) definition of student engagement, which additionally incorporates a student's degree of involvement within their HEI, feelings, and meaning-making processes.

Challenges to engagement

Given the complexity, intersectionality, and contextuality of aforementioned factors that influence student engagement, in the context of the global trends identified above, HEIs in Ireland and around the world are confronted with several challenges when seeking to improve the quality of their educational programmes and the supervision of PGRs to become independent researchers (HEA, 2016). Further issues can arise from different levels of necessary language skills PGRs have, which can be a barrier to engagement with their host HEI. Additionally, in Ireland, non-EU student fees can be up to three times that of EU/Irish students, effectively decreasing access to these HEIs for PGRs without the necessary financial support. In Ireland, HEIs have a fee structure based on a residency principle, allowing non-EU students who have resided in Europe for the three preceding years to qualify for domestic student fees (Faas, 2020).

Some studies have found international students to be a motivated and engaged group (Darmody et al., 2022), with differences between different groups of international PGRs based on their domicile of origin (Cho et al., 2021).¹ However, existing studies on student

¹ A domicile of origin is defined under the Recognition of Foreign Divorces Act 1986 and refers to a student's country of permanent address prior to the current study programme. For example, suppose a student has been residing in Ireland for three out of the last five years before registering for their current course of study. In that case, their domicile is recorded as Ireland.

engagement often focus on students' specific country of origin compared to domestic students and treat international students as a homogenous group. For example, many studies focused on the engagement of Asian students—one of the largest groups of international students in many HEIs outside of Asia (Ramburuth & McCormick, 2001; Zhao et al., 2005), thereby assuming homogeneity of a geopolitically diverse continent. Looking at Central and Eastern European students in the EU, Jankowska (2011) showed that, while they are treated as domestic students based on study fees, they come from distinctively different academic traditions that diverge from the education system they now find themselves in.

Student engagement has become a hallmark of successful learning, positive experiences, and better research outputs for students and HEIs (Coates, 2006, p. 27; HEA, 2016). While European HEIs acknowledge some of these challenges and barriers for international students to participate successfully, the impact and complexity of factors associated with engagement are still largely under-researched (O'Connor, 2010). In this article, student engagement is understood to reflect two key elements. The first is the amount of time and effort PGRs spend studying, researching, and other educationally beneficial activities. The second is HEI's deployment of resources to organise opportunities that facilitate and encourage students to participate in learning and professional development activities. The StudentSurvey.ie data used in this study are based on measurements of students' subjective perceptions, and thus, engagement is explored through PGRs' perceptions rather than an institutional resource lens. Therefore, this study is aimed at investigating the complex and interrelated mechanisms that facilitate or hinder PGRs' engagement and their occurrence of similar and dissimilar challenges within the Irish context.

Methodology

The research design consisted of two phases. In phase one, an analysis of the PGR StudentSurvey.ie, 2019 data was conducted to examine predictors of PGRs' engagement. In the second phase, the results of the quantitative analysis informed a semi-structured interview schedule used for 14 semi-structured interviews at TCD.

PGR StudentSurvey.ie

PGR StudentSurvey.ie is a biennial national survey, first introduced in 2018. The survey adopted a census approach to collecting cross-sectional data, sampling students from 22 HEIs across Ireland. All PGRs were invited by their HEI via email to participate in the online survey, with the exception of PGRs on a short-term study exchange and those not registered as residents in Ireland during their study period, like ERASMUS students. In 2019, the national response rate for the survey was 30%, and the respondents' profile closely resembled the current demographic composition of PGRs in Ireland (HEA, 2021). After a listwise deletion of cases with missing values the original data set was reduced from $n=2721$ cases to $n=2243$ cases with no observable patterns of variables with missing value rate.

The quantitative data captured in the survey included a range of items measuring PGRs' engagement across dimensions of activities (e.g., internship participation, research conference participation, and publishing), support services (e.g., financial support, institutional support, and supervisor contact hours), and motivation (e.g., reasons for studying, type

Table 1 Individual items loaded onto three engagement indicators

	Indicators		
	1 – Supervisor	2 – Department	3 – Cognitive
Supervisor support	0.905	0.191	0.180
Supervisor contact	0.875	0.149	0.177
Supervisor feedback	0.884	0.213	0.196
Supervisor development	0.828	0.272	0.219
Research Access	0.164	0.711	0.168
Research ambience	0.255	0.769	0.202
Discussions	0.144	0.795	0.111
Involvement	0.162	0.741	0.202
Induction	0.170	0.356	0.601
Understanding requirements	0.186	0.188	0.824
Understand thesis	0.199	0.136	0.866
Understand assessment	0.168	0.138	0.855
Total Eigenvalues	5.660	1.427	1.686
% of variance	47.164	11.892	14.051

Kaiser–Meyer–Olkin measure of sampling adequacy (KMO) for all items was .89, with Bartlett’s test of sphericity indicating significance at .000. Extracted commonalities between all items ranged from 0.6 to 0.9 with all four indicators cumulative explaining 73% of variations. Values in bold indicate affiliation under a given indicator

of study programme, and study mode) through students’ self-reported perceptions. The response options for items were measured on a five-point Likert scale: 1 = definitely disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = definitely agree, as well as dichotomous measurements for items relating to activities. Additionally, demographic information like age, gender, domicile of origin, and financial situation was recorded.

Constructing the dependent variable of PGR engagement

The selection of variables from the PGR StudentSurvey.ie, 2019 data was based on operationalising theories of engagement around demographic and geographic characteristics of PGRs (Bokhove & Muijs, 2019), PGRs’ perceptions of HEIs’ support in obtaining language proficiency and feeling culturally integrated (Arambewela & Maringe, 2012), and factors of behavioural, emotional, and cognitive engagement (Fredricks et al., 2004). A principal component analysis was then used to reduce the 19 initially selected items for statistical modelling. The remaining 12 items were collapsed into three engagement indicators. These three indicators measuring the construct of engagement were then mapped onto the dimensions of a PGR’s engagement with the supervisor, engagement with their department, and cognitive engagement (Table 1).

The subsequent ANOVA indicated a statistically significant difference between the indicator groups. All three indicators together show a standardised Cronbach’s alpha of 0.7, suggesting acceptable reliability of the newly created indicators when measuring the construct of PGR engagement. The average inter-item correlation of 0.44 shows that the indicators are well correlated. In a final step, an overall academic engagement score

was constructed based on the visual binning of the three indicators into one dichotomous dependent variable with a normal distribution of cases defined as either low or high engagement level.

Independent variables

Based on existing theories on engagement and an investigation of multicollinearity, eleven independent variables were selected to assess their influence on the odds for the dichotomous dependent variable. First, the relationship between the Irish and non-Irish domicile groups against the dependent variables was tested, with results warranting the construction of the subsequent logistic regression model. The model included the following independent variables: (1) gender as a dichotomous categorisation of male or female² (Bokhove & Muijs, 2019); (2) age as indicated year of birth and collapsed into four roughly equal groups ranging from 20 to 29 years, from 30 to 39 years, from 40 to 49 years, and 50 plus years (*ibid.*); (3) HEI type, encompassing universities, technological universities/ institutes of technology, or other types of institutions³; (4) the PGR cohort size of the HEI as a dichotomous categorisation of HEIs with fewer than or more than 250 PGRs; (5) study mode as a dichotomous categorisation of full or part-time; (6) whether the participant received any form of funding or fee contribution (Xiong, 2022); (7) field of study as a dichotomous grouping of arts, humanities, and social sciences (AHSS) or science, technology, engineering, and mathematics (STEM); and (8) domicile of origin collapsed into Irish (North and Republic), Africa, Europe, North America, Latin America and Caribbean, Asia, or other (Bokhove & Muijs, 2019).

In the final step of the model, the three constructed engagement indicators relating to theories of different cognitive and behavioural forms of engagement (Cho et al., 2021; Darmody et al., 2022; Fredricks et al., 2004; Harper & Quaye, 2014) were added. The associated variables of (9) participants' engagement with the supervisor; (10) participants' engagement with the department, and (11) the participants' overall cognitive engagement with the study programme were parts of the constructed dependent variable. Consequently, they are expected to be highly significant and were only added to the model to investigate the extent of their effect on the total engagement and moderation of other independent variables. The decision to dichotomy the dependent variable was further based on the prospect of simplifying analysis and aiding in detecting nonlinearity in variable relationships. However, the procedure has drawbacks, like diminished insight into individual differences, an effect size reduction, or power loss (MacCallum et al., 2002).

² Gender non-binary and prefer not to say are additional categories, but the numbers of PGRs in these categories were too small to include in the analysis. To do so would also constitute a risk to respondent anonymity.

³ A distinction is made in the higher education system in Ireland between universities and technological universities. Universities are those legislated for under the Universities Act, 1997. Technological universities are underpinned by the Technological Universities Act 2018 and focus on science and technology programmes that are vocationally and professionally oriented. Each TU was formed by the merger of at least two institutes of technology. For the purposes of PGR StudentSurvey.ie, TUs are currently grouped with the institutes of technology which have not merged to become TUs.

Semi-structured interviews

In the second phase, a total of 14 semi-structured interviews were conducted with PGRs at TCD in STEM and AHSS from different countries of domicile, including Irish (North and Republic), Africa, Europe, North America, Latin America and the Caribbean, and Asia, thereby reflecting the classification used for the quantitative model. Participants were selected based on a purposive sampling frame and contacted through the department-specific student contact databases and social media platforms. The respective communications managers sent out the invitation and followed up with a reminder exactly one month after the first invite was issued. The selection of interviewees from the PGRs who volunteered was based on selection characteristics (e.g., gender, study programme, and domicile) until a desired population demographic was reached.

The total PhD student population in TCD for 2021 was 1699, with a gender distribution of 45% male to 55% female. The average age was 32 years, and the study field distribution was around 64% AHSS to 36% STEM. The decision to include four participants from the Asian region was made for the following reasons. First, they account for 16–18% of all international students enrolled at TCD at the postgraduate level (PhD). Secondly, the results of the quantitative analysis indicated that students from the Asian region had the highest scores across most engagement categories. The selected interview participants thereby represent similar distributions to the total population of TCD's PhD students (Trinity College Dublin, 2018).

Like the quantitative variables, the interview questions were framed by the theoretical lens of cognitive and behavioural forms of engagement (Cho et al., 2021; Darmody et al., 2022; Fredricks et al., 2004; Harper & Quaye, 2014) and related concepts found in existing relevant literature with focus on students' perception of involvement in the HEI, feelings, and meaning-making processes (Harper & Quaye, 2014) that lead to engagement. The semi-structured interviews involved the utilisation of an interview question schedule. All questions were broad and open-ended in order to maximise the scope of possible responses from interviewees. The interviewer provided prompts and followed up on answers that related to the operationalised theories to gain deeper understanding of the complex mechanisms linked to engagement based on the three conceptualised forms of engagement, the study mode, and funding. A majority of the participants discussed their perceptions of the relationship with their supervisor and opportunities for engagement provided by their departments.

The study obtained ethical approval through the established ethics review boards where the researchers are based within the Faculty of Arts, Humanities and Social Sciences at TCD. All interviews were conducted according to ethical principles of voluntary informed consent, participants' rights to opt out of the process at any stage, and the complete anonymisation of all traceable information. The resulting audio files were transcribed in verbatim for an inductive qualitative block coding method to allow the emergence of detailed descriptive topics and possible identification of underlying themes. This approach followed the thematic data analysis framework outlined by Braun and Clarke (2006), with the analytical framework centring around the phases of familiarisation, coding, searching for themes, reviewing themes, defining, and naming themes and the writing up phase. Information was also collected on the participants' gender, age, and domicile of origin. These steps further followed Pratt's (2009) recommendation of a systematic approach to manually and independently coded transcripts by summarising blocks of related information given by interviewees in words or short

Table 2 Descriptive statistics of indicator and items for the total, the Irish, and non-Irish sample

Indicators & items	Total sample				Irish (<i>n</i> = 1824)		Non-Irish (<i>n</i> = 839)		Between Groups
	Min	Max	Mean	SD	Mean	SD	Mean	SD	<i>F</i> -value
Supervisor	0.87	4.36	4.3	0.87	4.23	1.05	4.31	1.03	4.03*
Support	1.00	5.00	4.2	1.09	4.19	1.09	4.27	1.09	4.03*
Contact	1.00	5.00	4.3	1.02	4.24	1.13	4.36	1.08	7.26*
Feedback	1.00	5.00	4.3	1.06	4.20	1.16	4.27	1.14	1.85
Development	1.00	5.00	3.9	1.20	3.83	1.29	4.00	1.24	10.43*
Department	0.76	3.81	3.6	0.73	3.53	1.10	3.68	1.10	10.11*
Access	1.00	5.00	3.8	1.16	3.53	1.31	3.74	1.23	15.74*
Ambience	1.00	5.00	3.6	1.17	3.40	1.30	3.56	1.27	8.18*
Discussions	1.00	5.00	3.6	1.24	3.48	1.32	3.57	1.32	2.67
Involvement	1.00	5.00	3.4	1.21	3.24	1.28	3.39	1.32	7.11*
Cognitive	0.85	4.25	3.8	0.82	3.70	1.12	3.79	1.19	3.49*
Induction	1.00	5.00	3.5	1.29	4.02	1.19	4.10	1.24	2.20
Requirements	1.00	5.00	4.0	1.05	3.88	1.25	3.92	1.32	0.84
Thesis	1.00	5.00	3.9	1.08	3.46	1.43	3.51	1.43	0.81
Assessment	1.00	5.00	3.8	1.11	2.95	1.27	3.09	1.29	7.28*

Comparing group means through an ANOVA indicated significance (*) at $p < .005$ for all indicators

descriptive sentences, which were later grouped into different themes and topics. Subsequently, these themes and topics were selected based on their links to the theoretic framework, their frequency, and their richness of description.

Results

The first section presents the descriptive findings of the quantitative analysis, the constructed engagement indicators, and a binary logistic regression model. The second section presents the analysis of the qualitative data presented under several topics linking back to the quantitative results.

Quantitative results

The descriptive statistics ($n = 2243$) of the individual indicators and items across the total sample population show that PGRs rank their engagement with their supervisor highest compared to the other indicators (see Table 2).

A visual inspection of residual plots indicated that regression assumptions of normality and heterogeneity of variance were satisfied for all three indicators included in the model. In addition, residual statistics were checked for potential outliers, and variance inflation factors (VIF) were calculated and indicated no issue with multicollinearity in the data. Table 3

Table 3 Logit regression coefficients for engagement levels

	Null			Step 1			Step 2			Step 3			Step 4		
	B	SE	OR	B	SE	OR	B	SE	OR	B	SE	OR	B	SE	OR
Constant	0.90	.05	2.461***	1.12	.12	3.049***	.87	.15	2.378***	.83	.15	2.288***	-3.94	.30	.019***
Female (ref. male)				-.02	.10	.982	-.02	.10	.976	.01	.10	1.011	.19	.15	1.215
Age 20 to 29 (ref. group)															
30 to 39				-.18	.12	.836***	-.17	.12	.847	-.19	.13	.828	.33	.19	1.392
40 to 49				-.34	.16	.712***	-.13	.17	.881	-.16	.17	.856	.11	.28	1.116
50 +				-.48	.16	.620***	-.13	.19	.879	-.14	.19	.873	.28	.30	1.321
University (ref. group)															
Technical University							-.05	.18	.954	-.10	.18	.909	-.15	.29	.864
Other Institutions							-.27	.35	.765	-.29	.35	.749	-1.00	.55	.368
Cohort size < 250 (ref. > 250)							.32	.28	1.382	.37	.28	1.452	.73	.44	2.072
Part-time study (ref. full-time)							-.74	.16	.479***	-.71	.16	.492***	-.58	.25	.561***
Funding (ref. no funding)							.30	.11	1.35***	.28	.11	1.32***	.42	.17	1.538***
AHSS (ref. STEM)							.10	.10	1.105	.13	.11	1.143	-.01	.17	.995
Domicile (ref. Irish n = 1481)															

Table 3 (continued)

	Null	Step 1	Step 2	Step 3	Step 4		
African (<i>n</i> =118)		.21	.23	1.233	-.24	.37	.784
Europe (<i>n</i> =276)		-.13	.15	.881	-.19	.23	.826
North America (<i>n</i> =79)		-.09	.26	.912	.10	.43	1.102
Latin America (<i>n</i> =42)		.12	.36	1.125	-.62	.60	.537
Asia (<i>n</i> =207)		.55	.19	1.746***	-.43	.32	.652
Other (<i>n</i> =42)		-.11	.35	.894	-.80	.54	.448
Supervisor Department					1.15	.08	3.174***
Cognitive					1.10	.07	3***
-2 Log likelihood	2.686		2.648		.95	.07	2.586***
Pseudo <i>R</i> ²	.007		.031		1.202		.695

Table 4 Interviewee classification details

PID	Gender	Age	Domicile	Field of study
1	Male	30–39	Asian	AHSS
2	Female	20–29	Asian	AHSS
3	Male	20–29	Asian	STEM
4	Male	30–39	Asian	STEM
5	Male	30–39	Latin American	AHSS
6	Female	20–29	North American	AHSS
7	Female	20–29	Europe	AHSS
8	Female	30–39	Europe	AHSS
9	Female	20–29	African	STEM
10	Female	30–39	North American	AHSS
11	Female	30–39	Irish	AHSS
12	Female	20–29	Irish	STEM
13	Male	30–39	African	STEM
14	Male	30–39	Latin America	STEM

PID was a participant identification number assigned based on the chronological order of interviews taken

Binary logistic regression model

A stepwise logistic regression was performed to assess the impact of a set of predictor variables on the odds that PGRs would be highly engaged. The Hosmer and Lemeshow test indicated significance for all steps of the model. The full model containing all predictors was statistically significant ($\chi^2(11, n=2243)=10,598, p<0.001$), indicating that the model could distinguish between PGRs with low and high engagement. The model correctly classified 71% of all cases in the first three steps and 87.6% in step four. As shown in Table 4, five independent variables made a unique statistically significant contribution to the model (study mode, funding, supervisor, department, and cognitive engagement).

As anticipated, the indicators that formed the dependent variable were the strongest predictor of PGR engagement, with supervisor engagement being the highest. Thus, controlling for all other factors in the model, PGRs who perceived their engagement with the supervisor as high were over three times more highly-engaged than those who did not perceive their engagement with their supervisor as high. Similarly, PGRs who perceived the engagement with their department to be high were three times more likely to be highly engaged than those who did not perceive their engagement with their department as high. Thirdly, the results for cognitive engagement indicated that students who perceived their cognitive engagement as high were two and a half times more likely to be highly engaged compared to those who did not indicate high cognitive engagement. PGRs who received funding were around one and a half times more likely to be highly engaged compared to those who did not receive funding. Lastly, full-time students were twice as likely to be highly engaged compared to part-time students.

Finally, it was noted that changes in significance for independent variables were observable for age between steps one and two and for domicile being Asian between steps three and four. Age appears to be less significant to engagement when funding is added to the model. This could be explained by an experience voiced in the qualitative interviews, whereby having to work to fund their study is important for PGRs and receiving funding is

Table 5 Emerging topics and themes under context, cognitive, and behaviour types of engagement

Engagement		
Context	Cognitive	Behaviour
Themes		
Support	Communication	Resources
Topics		
Mental wellbeing support	Unclear channels	Physical space
Financial support	Department internal	Financial resources
Administrative support		
Supervisor support		

not linked to being of a certain age because people of all age groups can receive types of funding for their study. Given the expected significance of the indicators added in step four, which is based on their use in constructing the dependent variable, a mediating effect was observed only on the independent variable of student domicile for the Asian group.

Qualitative results

A total of 14 students were interviewed, with an equal distribution of participants according to gender, domicile, and study field (see Table 4). Participants from the Asian domicile of origins were purposefully overrepresented, based on indicative results of step three of the quantitative model to represent the total sample population demographic distributions closely. The interview method was based on a semi-structured approach, with interviews lasting an hour on average.

The analysis of the interviews led to the emergence of nine individual topics, which were subsequently summarised under themes concerning the context of the academic environment and specific forms of cognitive and behavioural engagements (Table 5). Themes consisted of contextual factors that influenced the interviewees' perceived feeling of receiving support during their programme, cognitive elements relating to communicational challenges experienced by the PGRs, and behavioural forms of engagement that stem from the perception of available physical resources.

Contexts of HEI and supervisor interactions and their link to engagement

All PGRs indicated that peer support within their cohort was highly important for their mental health. However, on five accounts, Irish, Asian, and African participants indicated that they felt the institutional support for mental well-being was considerably lacking. These results pointed towards the increased challenge for HEIs to provide adequate mental health services for students during the COVID-19 pandemic. Interestingly, only students from non-Irish domiciles of origin indicated to have made use of HEI's provided services like psychological counselling, while Irish students indicated a lack of available services they also did not use existing services. Findings were consistent with the results of Arambewela and Maringe (2012) into the importance of student perceptions and experiences of their institution's support services for their engagement.

Furthermore, all international PGRs discussed the importance of financial support to their engagement within their HEI, while none of the Irish PGRs talked about this or

finance-related topics. International PGRs consistently commented on the lack of financial support for non-Irish students provided by their HEI. While they did not expect funding from the outset, their response suggested that, after being in contact with their HEI and other PGRs, they began to compare their situation with others in their cohort and concluded that they were not afforded the same financial support as Irish PGRs. This point indicated a framing effect triggered by cohort contact and contextualised the results of the quantitative analysis, which indicated that receiving financial support had a significant positive effect on PGRs' likelihood of being highly engaged. In addition, these participants frequently mentioned a lack of transparency in funding distribution within their institution's departments, leading students to feel excluded from their departments that, in some instances, led to an erosion of trust in the HEI and self-doubts, as indicated by the following quote:

Over the years, I'm getting the impression that things are happening behind the scenes that are beyond my control. There's an element of politics that comes into it, and I feel like I'm watching a show, but I can't see who's pulling all the strings... Maybe as hidden agenda for someone to get funding, but I don't know if that's true or just me being paranoid.

(Male African, STEM)

In discussions around administrative support, Irish, Latin American, North American, African, and Asian students mentioned a lack of guidance regarding their registration and accommodation. Again, this was not discussed by Irish PGRs, who commonly reside with their families or obtain access to the accommodation through their social network. In addition, these participants felt that there was generally a lack of administrative support from the institution, such as support with visa documents, local travel cards for public transport, or documents required to legally obtain a job, which resulted in some cases in the department or supervisor having to help with administrations. These findings related to the importance of supervisor support and induction, which were important predictors of engagement. These results indicate that international PGRs face different administrative hurdles that, when not supported appropriately by HEI structures, can lead to externalising risks leaving these up to the PGRs or their academic supervisor to resolve.

Lastly, supervisor support was mentioned by Asian, African, European, and Irish PGRs. All but three participants felt their supervisor was supportive of their work, and all indicated that they strongly believed that the relationship between a PGR and supervisor is crucial for study success. These findings aligned with the quantitative results, which showed that the supervisor indicator significantly affected PGRs' engagement. However, stark contrasts emerged between participants' understanding of supervision and support that can be linked to a student's context of cultural upbringing and preceding education regime, as exemplified in the following quote:

In Western education, the supervisor's role is to lead you to an area. They say come with me, and you see this big area where you can find answers yourself, and if you think you misunderstand, come to find me. But I think Asian people think their supervisor is super nice. He taught me a lot and wrote a lot of feedback, but I still don't know how to find my way. In the Asian education culture, the supervisor is like a godfather. He would say come with me to the second floor, to this room, and read this book. That way, you can't make any mistakes if you read this book.

(Male Asian, STEM)

Cognitive engagement and its link to (un)clear communication

Most African, European, and Latin American PGRs mentioned a lack of clarity surrounding institutional and department communication channels, which resulted in participants indicating that they did not know where to go or whom to approach with certain issues. These findings suggest a link between the cognitive and department indicators, highlighting the importance of a student's cognitive understanding of their academic environment, the department culture and ambience, and the institution's communication structures on the overall engagement. These findings were consistent with Wang and BrckaLorenz (2018) as well as Algeo (2021) who indicated the importance of the relationship between student and faculty perceptions on student engagement.

I see people want to engage through channels in these kinds of feedbacks [administrative queries and issues], but they're not completely sure where to address them or whom to address. I mean, myself, I'm a student at TCD, and I wouldn't even know where to go in terms of my complaints related to the overall structures of administrations"

(Male Latin American, AHSS)

Furthermore, issues surrounding inter- and intra-department communication were mentioned by North American, Asian, Latin American, and African PGRs, who generally felt that there was a lack of communication from the department regarding upcoming events and non-academic job openings. On two accounts, participants mentioned that existing department cultures and office politics created additional stress to adjust their own communication style to receive support. Given that no Irish PGRs discussed points surrounding department communication channels and extrapolating the indicated points of lacking department communications, it can be assumed that Irish students are more adapted to the department's communication style because their staff is more likely to be Irish, which is reflected in their communication approach. Additionally, the communication with the supervisor was mentioned by Asian, African, European, and Latin American PGRs, with mixed quality of communication evident between PGRs and their supervisor. Responses indicated this was due to differences in individual supervisor approach and the culturally shaped expectations and communication styles used by a PGR and their supervisor. Interestingly, PGRs from native English-speaking domiciles of origins like North America or Ireland did not discuss challenges and issues of supervisor communication, which leads to the assumption that linguistic differences and challenges further relate to forms of cognitive engagement.

Behavioural forms of engagement and material resources

Physical spaces like study or computer rooms as resources were discussed by North American, Asian, Latin American, and African students in relation to their departments' provision of working space. Here, perceptions of quality differed between PGRs when indicating what room size was considered too small. Similarly, the perceived quality of computer equipment that was considered too old and slow differed between the interviewees. The fact that neither European nor Irish PGRs brought these topics up warranted the interpretation that HEI in these national education regimes might provide similar or lower-quality resources, thus setting a different reference frame for these students and their expectations.

Another interpretation would be that PGRs from these two groups might be less dependent on study spaces and IT equipment provided by their HEI compared to the other groups. In addition, responses indicated expectations for material resources related to a PGR's time spent within the respective degree programme.

(...) like in my department when we ran out of space, they asked the third-year [doctoral] students to move to another facility to give space to first-year [doctoral] students. So, when I was in my third year, I was asked to leave my desk and go to another facility nearby the department to make space for first-year [Doctoral] students, and that didn't feel nice, to be honest.

(Male Latin American, AHSS)

Lastly, financials as a form of material resources were mentioned by all participants, with a lack of financial resource availability at the department level and personal financial resources both considered detrimental to efforts to engage within their HEI. In all cases, except for two Asian interviewees, participants indicated that they would have to take up additional part-time occupations, often outside the institution, to cover their costs of living and study fees. This result matched the quantitative data, which indicated that PGRs who do not receive funding are significantly more likely to be less engaged than those PGRs who do receive funding and were in accordance with other international studies around the impact of financial stressors on students' engagement (Archuleta et al., 2013; Boatman & Long, 2016; Britt et al., 2016). Interestingly, different perceptions emerged among different Asian PGRs, with Chinese interviewees not struggling with a lack of financial resources while PGRs from the Philippines did. This further aligned with studies around differences between Asian students by Ramburuth and McCormick (2001).

When reading across all topics and themes, it became apparent that PGR interviewees had different levels of awareness of their HEI's and the department's political and social structures and communication channels. These differences were framed by participants arriving at their HEI from different domiciles of origin with diverse cultural, educational, and institutional practices and traditions, which is in line with other studies around the topic of international student engagement (Finn et al., 2021). However, the uncertainty about existing structures in the new host institution was, for most participants, mediated by experiences with their supervisors. Ultimately, the interviews uncovered interconnections between a PGR's perception of the institution and the department's internal and external communication around available resources and funding, which were arbitrated by the supervisor, who operates as gatekeeper to a PGR's inclusion in their department. Interestingly, neither points of gender, age, or study mode (part-time or full-time) came up during the interviews, thus, raising further questions regarding the relationship of these attributes on PGR engagement. Further interpretation of the quantitative and qualitative results and their importance are discussed in the following section.

Discussion

Taking a mixed-methods approach, this paper explored factors impacting PGRs' engagement within their HEI, drawing on secondary data analysis of the PGR StudentSurvey.ie, 2019 data and semi-structured interviews conducted with PGRs at TCD. The results imply that a student's relationship with the academic supervisor is central to their engagement and relevant to PGRs finding their way in a new institutional environment, regardless of

country of origin. These findings build on the Irish and international literature on student engagement by highlighting the supervisor's importance. The results presented suggest that, to increase engagement, greater importance must be placed on the development of sustainable student-supervisor relationships, which will facilitate institutional and departmental integration of students. Furthermore, considering the importance of a student's cognitive engagement, exclusion and a lack of integration into the department can lead to misunderstanding of assignments, processes, and opportunities for institutional interaction, all of which are related to underperformance and negatively impacted engagement and well-being (Gatwiri, 2015). These findings support Arambewela and Maringe's (2012) conclusion that successful integration into the institutional environment remains a salient challenge for international students in the European and American contexts.

Moreover, this paper argues that PGRs' understanding of institutional and departmental structures interacts with their relationship with their supervisors. The supervisor's engagement also influences a PGR's engagement by managing funding opportunities or possible professional opportunities within the institution. Funding opportunities and lack of financial resources persist as barriers to engagement for PGRs across all domicile groups. This is in line with research which suggests that perceived and objective financial resources impact students' well-being, engagement, and study success (Archuleta et al., 2013; Boatman & Long, 2016; Britt et al., 2016; Devlin et al., 2008; Eichelberger et al., 2017). Interviewees in the study observed that their lack of financial resources forced them to take up work, often outside their institution, which could have been due in part to a lack of knowledge regarding opportunities to earn income within the institution, which would likely be more amenable to their overall career trajectory. Moreover, students who have no alternative funding options because they lack perceived connections with the department and/ or their supervisor may consider moving to part-time to be able to work in a part-time job, therefore further decreasing their odds of being highly engaged. This seems somewhat intuitive, as sharing time and attention with a job will influence how much time and attention students can put into their postgraduate studies.

The financial strain felt by the participants of the study could be explained by the high study fees for non-EU students (Faas, 2020) and high living costs in Ireland that range from €1,445 to €2,136 per month, of which typically 40% is allocated to accommodation costs (Erskine & Harmon, 2019; Eurostudent, 2019). Financial support services, like the Student Universal Support Ireland (SUSI), are available to most EU students. Over 50% of respondents to the international Eurostudent survey do not receive any public grants, scholarships, or loans (*ibid.*). These results align with previous studies investigating relations between financial resources and student's academic and non-academic activities, wellbeing, and engagement (Archuleta et al., 2013; Boatman & Long, 2016; Britt et al., 2016; Devlin et al., 2008; Eichelberger et al., 2017; Farrelly & Murphy, 2018). One relevant recent development is the new International Education Mark (QQI Amendment Act, 2019), which was aimed at providing clear information to potential students and ensuring they have realistic expectations of what it takes to support themselves during their studies without having to work part-time.

PGR's engagement with their supervisor suggests that most students across all domiciles engage with their supervisors. However, what this means seems to differ between domiciles and students. For example, when interpreting interview data, differences in the amount of feedback given by the supervisor seem important, particularly to Asian students. The qualitative data suggest that cultural differences between the international PGRs and HEIs are important. For example, interview accounts indicated that Asian students would prefer to receive more guidance from their supervisors. This is in line with the study by

Finn et al. (2021), which showed that a student's perception of cultural differences between their own culture and that of the institution and supervisor is important for the student's feeling of belonging in the academic environment.

The lack of available physical space, such as PGR desks or shared lunchrooms, was considered to be another barrier to engagement. In contrast, having a designated space for work or socialisation increased engagement by enabling more frequent high-quality peer-to-peer interactions like talking about projects and becoming friends. In a more recent study of the PGR students (StudentSurvey.ie, 2021), participants indicated that COVID-19 had impacted or disrupted access to necessary facilities, leading to frustration with IT-related services and restrictions, for example, not being able to access certain literature digitally. The current study participants, who were interviewed after COVID-19-related restriction of access to campuses, also indicated that limited access to these services leads PGRs to spend extra time spent on sourcing the necessary study materials. The importance of accessible IT-service provision is, with a few exceptions (Mello, 2016), seldom discussed in the academic literature on student engagement and warrants further research on the topic.

Limitations

There are limitations to the data generated by PGR StudentSurvey.ie, such as the lack of information about stage of study, linguistic backgrounds, academic achievement, and ethnicity, and limited measurement of financial resources (no numeric monetary value is attached to the variables in PGR StudentSurvey.ie). Furthermore, the data collection method does not mitigate against a self-selection bias. Therefore, the survey findings may be explained by a selection effect of international students, assuming that more motivated students have opted to study abroad. Topics could be added to future surveys to capture student experience and engagement more fully. Additionally, the small numbers of students from certain geographic regions necessitated creating broad country categories for statistical analysis based on the geographical regions in the OECD research report series *Education at a Glance*. However, participant numbers for certain geographic groups remained low, which weakens statistical results and generalisability of findings, which indicates a need for boosted or targeted sample approaches for future surveys.

There are also limitations to the qualitative component of the study. Of the 14 interviewees, only four participants came into the study through the snowballing method. The remaining 10 participants responded to the online call for interviewees and were selected based on their characteristics. However, the applied selection method means there may be a selection bias among the PGR students responding to the call to participate in the study. Nevertheless, balance was achieved across gender, domicile of origin group, and study field in an attempt to create a balanced group of PGRs for the interviews. The scope of this study did not allow for differentiating between full and part-time students. Future studies are needed to explore differences between these two groups, as the issues regarding engagement are likely to vary between these groups. Finally, the analysis of the qualitative data was restricted by the application of the same theoretical framework used for the quantitative data to assure better integration of the quantitative and qualitative data sets for mixing of the methods.

Furthermore, evidence from reports by organisations such as Quality and Qualifications Ireland (QQI, 2020), Union of Students in Ireland (USI, 2020), and the Association for Higher Education Access and Disability (2020) suggested that the impact of COVID-19

on the lives of students in higher education was significant and far-reaching. Therefore, the impact of the pandemic is a variable that cannot be controlled for when comparing and integrating the quantitative and qualitative data, which is particularly relevant to PGRs' wellbeing and personal outlook.

Conclusions

Internationalisation has become a characteristic of contemporary academic life in most HEIs across the world. The increasing diversity of the growing international student body holds excellent opportunities for creating international research networks leading to ground-breaking new knowledge across all scientific fields. In this context, the engagement of PGR students and their progression is increasingly important. In this study, we have demonstrated that the engagement of PGRs is influenced by a range of factors, including the relationship with their supervisors, integration and resources of the department, their cognitive engagement and funding sources. In this research, a student's relationship with the supervisor emerged as the strongest indicator for engagement, influencing the student's access to the department and greater understanding of the academic and institutional structures and funding sources, thus ultimately enabling students to dedicate time to engage with their work. It is also important to note that these needs do vary according to the domicile of origin, and international students cannot be treated as a homogeneous group.

The findings of this exploratory study show a gap in knowledge regarding differences between the Irish and international PGRs and the academic dimensions that shape their experiences. Other studies have also found that patterns of engagement between domestic and international students may be similar in some aspects but different in others (Ammigan & Jones, 2018). To accommodate this growing diversity while addressing the academic needs of both domestic and international students, HEIs must adopt practices that consider the needs of different groups of students (Croese, 2011). For this to happen, the HEIs must be aware of the factors that shape the engagement of different groups of students. PGRs are vital in national as well as international research and innovation, and related strategies and policies must reflect the need to support and empower these early career researchers.

Furthermore, PGRs are a key cohort of researchers currently undertaking valuable research and future talent who will lead projects in the coming decades. Ultimately, the goal is to ensure that the next generation of researchers is well-trained and equipped to face the challenges of tomorrow. The results presented in this research provide valuable insights into achieving this and are of potential interest to students, HEIs, policymakers, and the international research community.

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