

**An exploration of the predictive validity of the selection
criteria for nursing programmes at one university in
the United Kingdom**

Caroline Crawford

Faculty of Life and Health Sciences

School of Nursing and Paramedic Science

Thesis submitted for the degree of

DOCTOR OF PHILOSOPHY

April 2022

I confirm that the word count for this thesis is less than 40,000

Contents

Acknowledgements.....	iv
Abstract.....	v
Declaration.....	vii
List of tables.....	viii
List of figures.....	ix
List of appendices.....	x
List of publications.....	xi
Abbreviations.....	xii
1 Chapter one - Introduction.....	1
1.1 Introduction and study context.....	1
1.2 Availability of the nursing workforce.....	2
1.3 Quality of the nursing workforce.....	4
1.4 Diversity of the nursing workforce.....	6
1.5 The NMC / External regulators.....	8
1.6 Rationale/statement of issue.....	9
1.7 Defining key concepts.....	10
1.8 Thesis structure.....	13
2 Chapter two - Background literature.....	15
2.1 Introduction.....	15
2.2 Cognitive selection.....	15
2.3 Non-cognitive selection.....	19

2.4	Other predictors of outcomes	25
2.5	Published systematic review (paper 1).....	27
2.7	Theoretical concepts.....	29
2.8	Outline of research gaps.....	33
2.9	Study aims and objectives	35
2.10	Summary.....	35
3	Chapter three - Methodology	36
3.1	Introduction	36
3.2	Philosophical assumptions	36
3.3	Research design.....	38
3.4	Sample and setting	40
3.5	Analytical strategy.....	44
3.6	Ethical considerations	68
3.7	Rigour.....	69
3.8	Summary	70
4	Chapter four - Results	71
4.1	Introduction	71
4.2	Objective two - Demographic characteristics and entry routes of applicants	73
4.3	Objective three - Demographic characteristics, selection and outcomes	80
4.4	Objective four - A model to predict student outcomes	104
4.5	Results submitted for peer review - Journal of Clinical Nursing (paper 2)	105
4.7	Objective five - Students with Specific learning difficulties	140
4.8	Published results (paper 3).....	140
4.10	Summary.....	141
5	Chapter five - Discussion.....	142
5.1	Introduction	142
5.2	Objective one: A systematic review of selection methods.....	142

5.3	Objective two: Demographic characteristics and entry routes of applicants	145
5.4	Objective three: Demographic characteristics, selection and outcomes	151
5.5	Objective four: A model to predict programme outcomes.....	163
5.6	Objective five: Students with specific learning difficulties	166
5.7	Summary	169
6	Chapter Six – Conclusion	171
6.1	Contribution to knowledge.....	171
6.2	Strengths and limitations	173
6.3	Recommendations for policy and practice, and further research	176
6.4	Overall conclusion.....	180
6.5	Personal reflection.....	195
	References.....	184
	Appendices.....	205

Acknowledgements

‘I can do all things through Christ who strengthens me.’

Philippians 4:13 (New King James Version)

My sincere gratitude goes to my supervisors, Dr Vidar Melby, Dr Pauline Black, Dr Ben Fitzpatrick and my post graduate tutor Dr Donna Brown. Thank you for your guidance, wisdom, expertise, and support throughout this process.

I would also like to thank my dear friends, family, church and colleagues who have encouraged me at every stage of this PhD journey.

Abstract

This study investigated the predictive validity of the selection methods and demographic characteristics of applicants for the pre-registration undergraduate nursing programmes at one university in the United Kingdom (UK). The UK average attrition rate for pre-registration undergraduate nursing programmes is 24 percent, with the average rising to as much as 50 percent in the United States of America. Yet the number of applications received for places on these programmes far exceeds the number of positions available. People who are awarded a position on a nursing programme must have the ability to meet the minimum standards of clinical and academic work to enable them to complete the course, making them eligible to apply to register as a nurse.

The decision to admit someone onto a nursing programme rests on the selection process, which the literature tells us comprises elements of prior academic achievement, admissions tests, interviews, psychometric tests or autobiographical essays. Little is known if these methods have the ability to predict those who will complete and excel in nursing programmes, and it is not clear if a particular group of students is more or less likely to fail – i.e., not achieve their outcomes.

Using the work of Dr Alan Seidman into the retention of university students in higher education as the conceptual framework, this study sought to explore the relationships between selection scores and demographic characteristics with programme outcomes for the undergraduate nursing programmes at Ulster University. Application and demographic data pertaining to the 2012 – 2016 cohorts for the Adult and Mental Health pre-registration nursing programmes were gathered, including participants' age, gender, entry route, socio-economic status and specific learning difficulty status. The participants' selection scores (personal statements, Universities and College Admission Service (UCAS) scores and interview scores) were also gathered, and their programme outcomes which included enrolment rates, course completion rates and academic grading throughout the programme.

A range of statistical analysis were employed to determine the relationships between the variables including Pearson's correlations, cross-tabulations, analysis of variance (ANOVA) and linear regression. The demographic characteristics and selection scores were

simultaneously entered into a model using path analysis to determine the effect that these variables had on academic outcomes.

The findings showed that there is an association with increasing age and successful enrolment on the nursing courses. Applicants who had attended further education colleges undertaking programmes such as the Access Diploma or Business and Technology Education Council (BTEC) were more likely to enrol than those who were attending school and undertaking Advanced (A) -levels. There was also an association with increasing age, affluence, UCAS scores and interview scores with increasing grade averages. Students with previous degrees outperformed their peers. Nevertheless, the relationships between all variables were weak at best. Gender and personal statements did not correlate with any programme outcomes. The largest correlations could be seen between the academic grade averages in year 1, 2 and 3, which told us that first-year performance was the strongest predictor of year three outcomes. Those with specific learning difficulties performed almost on par with those who did not have specific learning difficulties.

The selection process for nursing programmes should be based on evidence and not tradition or expert opinion. The weak relationships uncovered between selection methods and programme outcomes should be considered when reviewing selection processes at universities. In the absence of clear demographic characteristics that can predict student outcomes, a system of self-referral for students who need support with learning needs should be encouraged by academic staff. This would assist students at the earliest opportunity in their educational journey to help them to achieve their educational goals, and subsequently maximise the number of nursing students transitioning into the nursing profession.

Key words: nurse, selection, undergraduate, student, predictive validity, outcomes, specific learning difficulty.

Declaration

I confirm that the content of this thesis is my own work and it has not been submitted, in part or whole, to any other university.

I declare that with effect from the date of which the thesis is deposited in Ulster University Doctoral College, I permit:

1. The Librarian of the University to allow the thesis to be copied in whole or in part without reference to me on the understanding that such authority applies to the provision of single copies made for study purposes or inclusion within the stock of another library.
2. The thesis to be made available through the Ulster Institutional Repository and or EthOS under the terms of the Ulster eTheses Deposit Agreement which I have signed.

It is a condition of use of this thesis that anyone who consults it must recognise that the copyright rests with the author, and that no quotation from the thesis and no information derived from it may be published unless the source is properly acknowledged.

List of tables

Table 1 - Thesis structure.....	13
Table 2 - Standardised admissions tests.....	18
Table 3 - Assumptions of the PhD researcher	37
Table 4 - Department of Health funded positions available on the programmes	42
Table 5 – Study part one variables included.....	47
Table 6 – Study part two variables included.....	47
Table 7 - Overview of all variables included.....	49
Table 8 - Variables renamed in path analysis	63
Table 9 - Acceptable threshold for fit indices.....	65
Table 10 - Year of entry to the programme with all applications.....	72
Table 11 - Year of entry to the programme with duplicate applicants removed	72
Table 12 – Missing data applicants being excluded for low personal statement scores.....	72
Table 13 - Missing data for entry route variables	73
Table 14 - Descriptive statistics age of applicants.....	74
Table 15 - Frequency statistics for applicants’ gender	75
Table 16 - Frequency statistics for applicants’ entry route (2013 – 2014).....	76
Table 17 - Description of categories and qualifications	76
Table 18 - Age of those who commenced the programme and those who did not.....	77
Table 19 - Cross tabulation between entry route and course commencement.....	79
Table 20 - Descriptive statistics for continuous variables	80
Table 21 - Pearson’s correlation coefficient matrix.....	88
Table 22 - Partial correlations controlling for age, gender, SES and SpLD.....	90
Table 23 - Tests of homogeneity of variances	92
Table 24 - Mean differences in scores between Entry Route with Interview Scores	93
Table 25 - Post hoc comparisons between Entry Route and Interview Scores.....	95
Table 26 - Mean differences in scores between Entry Route with GPA 1, 2 and 3	96
Table 27 - Post hoc comparisons between Entry Route and GPAs	98

List of figures

Figure 1 - Geometric model of student persistence	32
Figure 2 – Path diagram measurement model.....	66
Figure 3 - Data preparation and statistical analysis flowchart.....	67
Figure 4 - Histogram for applicants' age	75
Figure 5 - Entry route of those who commenced the programme and those who did not.....	78
Figure 6 - Histogram for students' age	81
Figure 7 - Histogram for students' SES.....	82
Figure 8 - Histogram for students' UCAS scores	83
Figure 9 - Histogram for students' personal statement scores.....	84
Figure 10 - Histogram for students' interview scores	84
Figure 11 - Histogram for students' GPA 1 scores	85
Figure 12 - Histogram for students' GPA 2 scores	86
Figure 13 - Histogram for students' GPA 3 scores	86
Figure 14 - Means plot differences in scores between entry routes with interview scores	94
Figure 15 - Means plot Entry Route and GPA 1.....	97
Figure 16 - Means plot Entry Route and GPA 2.....	97
Figure 17 - Means plot Entry Route and GPA 3.....	98

List of appendices

Appendix 1 - Personal statement scoring criteria.....	206
Appendix 2 - Interview questions at Ulster University.....	207
Appendix 3 - Code book.....	208
Appendix 4 - Recording of data entry errors.....	209
Appendix 5 - Approval letter from Head of School.....	210
Appendix 6 - Research proposal (May 2019).....	211
Appendix 7 - Ethical approval.....	224
Appendix 8 - Proof of submission paper 2.....	255

List of publications

Paper 1 (Published)

Crawford, C. Black, P. Melby, V. Fitzpatrick, B. (2021) An exploration of the predictive validity of selection criteria on progress outcomes for pre-registration nursing programmes – A systematic review. *Journal of Clinical Nursing*, 30 (17-18) pp. 2489 – 2513. Available at: <http://dx.doi.org/10.1111/jocn.15730>.

PhD researcher's contribution: First and corresponding author. Developed and conducted the search strategy. Critically appraised all studies considered for inclusion. Managed the quality assurance process. Developed themes and drafted the original manuscript. Revised the manuscript based on comments from co-authors and peer-reviewers. Managed the journal submission process.

Paper 2 (submitted to the Journal of Clinical Nursing)

PhD researcher's contribution: First and corresponding author. Developed the study design with supervision team. Collected and compiled data for analysis. Conducted analysis. Drafted the original manuscript. Revised the manuscript based on comments from co-authors. Managed the journal submission process.

Paper 3 (Published)

Crawford, C. Black, P. Melby, V. Fitzpatrick, B. (2022) The academic journey of students with specific learning difficulties undertaking pre-registration nursing programmes in the UK: A retrospective cohort study. *Nurse Education Today*, 111, pp. 1 - 7. Available at: <https://doi.org/10.1016/j.nedt.2022.105318>.

PhD researcher's contribution: First and corresponding author. Developed the study design with supervision team. Collected and compiled data for analysis. Conducted analysis. Drafted the original manuscript. Revised the manuscript based on comments from co-authors. Managed the journal submission process.

Abbreviations

Access Diploma – Access to Higher Education Diploma

ACT - American College Test

ADHD - Attention deficit hyperactivity disorder

A-level - Advanced level

AMOS - Analysis of a moment structures [software]

ANOVA - Analysis of variance

BTEC - Business and Technology Education Council

CAAP - Collegiate Assessment of Academic Proficiency

CFI - Comparative fit index

GCSE – General Certificate of Secondary Education

GPA - Grade point average (including yearly percentages)

HESI-A2 - Health Education Systems Incorporated Admissions Assessment

HNC - Higher National Certificate

HND - Higher National Diploma

HPAT – Health Professions Admission Test

HSD - Honest Significant Difference

IELTS - International English Language Testing System

ILC - Irish Leaving Certificate

NCLEX-RN - National Council Licensure Examination for Registered Nurses

NHS - National Health Service

NIMDM - Northern Ireland Multiple Deprivation Measure

NIPEC - Northern Ireland Practice Education Council

NMC - Nursing and Midwifery Council

OT – Occupational Therapist

PAX-RN - National League for Nursing Pre-Admission Examination

PhD - Doctor Of Philosophy

PS – Personal statement

RCN – Royal College of Nursing

RMSEA - Root mean square error of approximation

SALT – Speech and Language Therapist

SAT - Scholastic Assessment Test

SEM - Structural equation modelling

SES - Socio-economic status

SpLD - Specific learning difficulty

SPSS - Statistical Package for the Social Sciences [software]

TEAS - Test of Essential Academic Skills

UCAS - Universities and College Admission Service

UCAT – University Clinical Aptitude Test

UK – United Kingdom

USA – United States of America

VBR – Values based recruitment

1 Chapter one - Introduction

1.1 Introduction and study context

The healthcare service operates within a rapidly changing environment. The growing and ageing population, with their associated chronic conditions and co-morbidities, and new developments in treatments, has led to an increase in the demand for healthcare resources. To meet this demand, the role of the nurse and other healthcare professions have had to continually adapt to facilitate a response to these changes. This has rapidly expanded the skill levels of nurses, and the cognitive demands of the profession are increasing (Nursing and Midwifery Council (NMC) 2018a).

The Bologna Process sought to standardise higher education across Europe in terms of comparable and compatible higher education systems across the 47 member countries (Dante et al. 2013, Lahtinen et al. 2014). This allowed for increased movement of students within institutions and comparable minimum standards for university study credit (Collins and Hewer 2014). Recognition of professional qualifications within the European Union makes it easier for nurses educated in one member country to practise in another member country. This has helped to raise the profile of nursing as a graduate profession with opportunities for postgraduate development. Although diploma level education is also offered in some countries, the universal nursing education is now provided at Bachelor's degree level, lasting three or more years in durations with one entry point (Lahtinen et al. 2014). A graduate nursing workforce is necessary for the competent and intelligent nursing workforce that the European union requires, but the lack of degree educated nurses makes the transition to an all-graduate profession challenging (Collins and Hewer 2014).

Nurses have faced an increasing amount of pressure in their roles as advocates, coordinators, leaders, and educators. Complications arise daily in the provision of healthcare services which must be met by nurses who are caring, compassionate, intelligent and appropriate in their response and management of all situations. These professionals should have a high level of critical thinking, analytical, organisational and communication skills to enable them to complete this role at the standard required. The developing role of the nurse highlights the need for highly skilled individuals to enter the register, to develop the role in line with the ambition of the profession (Willis 2013, NMC 2018b).

1.2 Availability of the nursing workforce

Nurses represent around 50% of the global healthcare workforce. They make a major contribution to health promotion and disease prevention in delivering health and care services across primary, secondary and tertiary levels. There are an estimated 35 million nurses and midwives globally (Vierula et al. 2019). Nevertheless, there is a shortage of nurses which is of global concern, with vacant nursing posts expected to be in the region of nine million by the year 2030 (World Health Organisation 2020). This has occurred for several reasons. There is a large number of nurses expected to reach retirement age in the coming years, nurses are voluntarily leaving the profession and limited resources are being allocated to funding undergraduate nursing positions (Al-Alawi et al. 2020, Bulfone et al. 2021). Although there has been an increase in the number of positions available for undergraduate nursing study in the United States of America (USA), this supply is not expected to keep up with the global demand for graduate nurses (American Association of Colleges of Nursing 2019).

Research is ongoing to explore the retention of nurses in the profession (Ambani et al. 2020, Wray et al. 2020), but retention is not an issue unique to nurse registrants. In the United Kingdom (UK), the average attrition rate from undergraduate nursing programmes is 24%, with 12% in Northern Ireland, 21% in Wales, 22% in Scotland and 25% in England (The Health Foundation 2019). This issue reaches far beyond the UK. In the USA attrition rates from undergraduate nursing programmes are reported as being as high as 50% (Mooring 2016). These rates are comparatively high with other healthcare professions, considering that the average dropout rate from undergraduate medicine is 14% in the UK and 6% in Ireland (Anand 2018).

Attrition has been defined in different ways, making comparisons difficult, but generally it is believed to mean: the number of students enrolled at the beginning of a programme minus the number of students who do not enrol in subsequent semesters of the same programme (Seidman 2012, Wray et al. 2017). For the purpose of this PhD research, that is the definition of attrition used throughout.

The reasons for nursing student attrition are complex and multifaceted, and there is not always one solution to any given problem (Hamshire et al. 2013). It is argued that some

failure/attrition rates should be expected, otherwise the programme is not challenging enough (Rankin 2013), nevertheless, those who are selected to undertake nursing programmes should be expected to be able to achieve the minimum standards as set by their university and external regulator. Some students are simply unable to reach the standards required to pass the programme, resulting in substantial rates of attrition from undergraduate nursing programmes (Mooring 2016).

Attrition in nursing programmes does not always stem from clinical or academic failure but has been linked with student age, gender and prior academic record (Sabin et al. 2012), ethnic minority status (attributed to language and cultural barriers, poor study skills and coping mechanisms) and personal issues such as financial, social and family stressors (Mooring 2016). The general public's misconception of the role of a modern nurse can lead to applicants making ill informed choices about careers and university programmes of study (Sabin et al. 2012). Indeed, some level of attrition should be seen and expected for those who have made the wrong programme choice (Rankin 2013).

Impact of Attrition

Attrition rates from undergraduate nursing programmes impact the nursing workforce, the university resources and the student themselves.

Attrition rates from undergraduate nursing programmes will unavoidably effect the availability of the future nursing workforce and workforce planning. For every nursing student who failed to complete their programme of study, there is one fewer professional available on the register to meet the demands of the nursing profession (Dante et al. 2013, Crawford et al. 2021).

Attrition in nursing programmes is a waste of valuable resources and impacts the availability of student places. These positions were effectively refused to others in place of the individual who did not complete (Bennett et al. 2016, Al-Alawi et al. 2020). Attrition rates can also be seen as university performance indicators, in which higher attrition can reflect poorly on the university and cost them applicants in subsequent years. In spite of this, attrition should not be considered, as it often is, as a failure of the institution (Hamshire et al. 2013). Recognising that attrition is a complex concept means acknowledging that educators must appreciate that

attrition is not necessarily associated with ineffective or poor quality of programmes. It may in fact mean the opposite, that the quality of assessment is of good standard (Mooring 2016).

It is of no benefit to anyone if the student selected is unlikely to succeed. Failure from undergraduate nursing programmes involve time and financial costs for students but likely has additional detrimental effect on their confidence. Attrition can affect a student's career prospects, employment stability, income, opportunities for further study and career advancement (Seidman 2012). However, changing to a different career path can be a positive choice for some students (Hamshire et al. 2013). The commitment that students make to the university and their academic studies has an impact on retention, as do their feeling of being supported within the institution. Students require the understanding and support of academic staff at the earliest opportunity to aid them in persisting with their education. This institutional support contributes to students' personal commitment to high academic performance and is essential for the achievement of successful outcomes (Hamshire et al. 2013, Mooring 2016).

1.3 Quality of the nursing workforce

To meet the demands of a nursing degree, students must be deemed proficient in both clinical and academic outcomes as caring and intelligent individuals. Students must be able to thrive clinically and academically to cope with the rigors of the nursing profession once registered (Willis 2013). The move from the traditional apprentice-based vocation to an all-graduate profession has resulted in profound professional development opportunities for nurses and nursing education is in great demand. Running parallel with the attainment of degree level education is the increase in the number of nurses continuing their studies beyond their primary degree, embarking on masters courses, doctorates and other post graduate programmes such as nurse prescribing.

This move to a graduate profession has seen positive improvements in patient outcomes. In the largest European study to date, every 10% increase in graduate nursing staff in surgical wards resulted in a 7% reduction in patient mortality (Aiken et al. 2014). These positive patient outcomes associated with lower mortality rates are mirrored across multiple studies as seen in a meta-analysis by Liao et al. (2016) who found that a 10% increase in graduate nurses led to a 6% odds decrease in patient mortality and a 5% odds decrease in failure to

rescue in resuscitation attempts. There is also a positive association between degree educated nurses and lower levels of hospital acquired infections or health complications, such as in care of people with deep vein thrombosis (Audet et al. 2018). It is clear from the literature that the move to a graduate profession has done much to improve the outcomes for patients.

Despite these developments, there have been a number of high-profile enquiries into standards of care delivery within the last ten years, such as the Keogh Report (2011), the Hyponatremia Inquiry (2018) and the Francis Report published in 2013, which highlighted gross care failings and negligence across all levels of health care provision including nursing care. The reports spoke of staff failures to provide dignity for patients, a high mortality rate, a culture of cover-ups and failing to embrace a complaints system that would have allowed for issues to be raised and dealt with in a productive manner. Nurses are professionally bound to raise concerns in a system that is failing patients and standards of care are not being met nor maintained (NMC 2019a).

Following the Francis Report there were a number of recommendations made to improve the quality of the workforce that is employed by the National Health Service (NHS), including the introduction of Values Based Recruitment (VBR). VBR is a selection method whereby health and social care departments select candidates whose values align with the values published in the NHS Constitution (2021): working together for patients, respect and dignity, commitment to quality of care, compassion, improving lives and everyone counts. Selecting nursing students with the right 'values' to enter the nursing profession should prevent further failures in care provision (Stenhouse et al. 2016). Yet, VBR is still a relatively new selection method and there is no research reported that would indicate whether or not it has been successful in improving care standards (Groothuizen et al. 2018). Furthermore, no-one can lay claim to the 'right' values and attributes that a nurse should possess. The Northern Ireland Practice Education Council (NIPEC) (2014) suggested that the attributes valued for a career in nursing are as follows: person-centredness, commitment to personal development, accountability, integrity and trustworthiness. Yet, different stakeholders' may prioritise other values (NHS 2011).

The move to an all-graduate nursing profession has seen the responsibility for providing pre-registration nursing education fall to universities. Educators are faced with the challenge of providing a quality educational programme, ensuring the effective selection of a diverse

student cohort, reducing attrition and identifying students who need additional support to help them succeed (Seidman 2012, Whambuguh et al. 2016, Al-Alawi et al. 2020). It can take until the end of first year for a student who is struggling with programme content, or course disillusionment, to be recognised (Browne et al. 2020). The NMC published new guidelines in 2018 on how universities must select students for their pre-registration nursing programmes, and one element of this included the candidate's ability to learn behaviours in line with the values upheld by the NMC *Code of Conduct: Professional Standards of Practice and Behaviour for Nurses, Midwives and Nursing Associates* (2018c). Selecting people for their potential to learn certain behaviours, skills and traits, rather than recruiting individuals for the skills and knowledge they already possess, is a principle of higher education (Rankin 2013). The Francis Report (2013) recommended that universities should review their selection processes to consider how they could improve their methods in recruiting people who are suitable to enter a caring profession. Attrition levels from nursing programmes, examples of low standards of care, a lack of diversity in the nursing profession and a lack of evidence into commonly used selection methods have placed selection under scrutiny (Vierula et al. 2019).

Since the publication of the findings of the Francis Report (2013) there have been an increase in the number of nurses working in the NHS and an increase in the number of commissioned pre-registration nursing places available. On average, there are two applicants for every position on a pre-registration nursing programme in the UK (RCN 2018), and in 2018, there were 75000 eligible applicants rejected for nursing programmes in the USA due to the limitations on places available (American Association of Colleges of Nursing 2019). With so many applications to consider, institutions are under pressure to ensure a fair selection process that chooses the right candidates for the course, with the right values and the intellectual ability to cope with the rising demands of the profession. The Francis Report (2013) acted as a catalyst for universities providing undergraduate nursing programmes in the UK to explore the predictive validity of their selection methods (Rankin 2013, Traynor et al. 2016).

1.4 Diversity of the nursing workforce

The UK population is diverse, comprising people from multiple countries, cultures, religions, ethnicities, abilities and backgrounds. Despite this, service users are being served by a

predominantly Caucasian female nursing workforce (Crawford et al. 2021). The nursing profession is currently dominated by this group, with males and other minority ethnic groups underrepresented (Al-Alawi et al. 2020). Having a nursing profession that adequately reflects the communities they serve is beneficial to all. For example, healthcare workers from ethnic minorities have an ingrained understanding of the health concerns that disproportionately affect minority groups and thus are more likely to be able to meet the needs of these ethnic minority communities (Carter et al. 2015). In the UK a recruitment campaign launched in 2018 called '*We Are The NHS*' aimed to encourage a range of people, including men, to apply for positions to become nurses. This was successful in mainland UK (Scotland, England and Wales). The number of 18-year-old men applying for undergraduate nursing programmes has been increasing year on year for the past decade, with a 9% increase between 2018 and 2019 alone, but this campaign has had little impact in Northern Ireland (Lauder 2019). Increasing the diversity of the nursing workforce has become an important goal of nursing programmes (Hendricks and Krothe 2014, House et al. 2015). A diverse nursing workforce is essential to help address some of the health inequalities faced by some groups of people (Marcelin et al. 2019, Spencer 2020, Dawkins 2021).

As all undergraduate nursing programmes in the UK are now provided by higher education institutions, there is the added layer of merging university ethos and policies with the NMC standards and regulation, including Widening Access and Participation policies. Widening Access and Participation policies are in place at most universities as a government higher education agenda, and their aim is to increase the participation in higher education of disadvantaged and underrepresented groups such as people with disabilities, people from lower socio-economic backgrounds and people from black and minority ethnic groups, by improving access to university through initiatives such as mentorship, financial aid, advice and targeted recruitment (Ulster University 2022a). One approach that universities have employed to widen access for underrepresented groups is by embracing alternative entry routes to university (other than traditional A-level qualifications) (Irvine et al. 2021). Such approaches aim to increase diversity and social mobility to widen access to university and attract students from all socio-economic backgrounds (Ulster University 2022a). This is not only in keeping with UK legislation (Disability Discrimination Act 1995, Equality Act 2010), but widening access to university also has the added benefit of diversifying the nursing profession to include a wider pool of applicants, who are best placed to serve and address the health and care needs of the community as a whole.

Minority groups are usually described as ethnic minorities (Mitchell et al. 2021), but other students such as those with disabilities (including specific learning difficulties), or male students, can also be considered a minority group in the classroom context as there are fewer of them. Other students who are assumed to be ‘at risk’ of lower grades, failure or dropping out, are those who speak English as a second language, the first in family to attend university, those with financial challenges, people that commute, refugees and asylum seekers, those with caring responsibilities, or those working outside of their studies (Irvine et al. 2021, Mitchell et al. 2021). The selection process must include some form of commitment to selecting a wide variety of students and ensure that there are no explicit or implicit practices of discrimination that would discourage applications from minority groups (Kelly et al. 2018).

1.5 The NMC / External regulators

In the UK the nursing profession is externally regulated by the Nursing and Midwifery Council who depict the minimum standard of proficiency for registered nurses. These minimum standards include being an accountable professional, promoting health and preventing ill health, assessing needs and planning care, providing and evaluating care, leading and managing nursing care, working in teams, improving safety and quality, and coordinating care (NMC 2018a). All nurses must commit to continual professional development within their field of practice and declare through three-yearly revalidation that they are of good character and fit to practise as a nurse (NMC 2019b). Minimum standards for pre-registration education and training are also set by the NMC including entry requirements, length of programme, methods or assessments and level of award for all NMC approved nursing programmes (NMC 2018a). All candidates must have a minimum of GCSE mathematics grade C or above, proficiency in the English language, and a minimum of 12 years education before they are eligible to apply. Many universities apply their own additional criteria to these minimum standards. Until 2018, the NMC stipulated that all universities must have face-to-face contact with applicants prior to them being offered a place on the course. This has now been redacted along with the changes to values being included in the selection process.

Nursing students undertake 2300 practice hours and 2300 theory hours education before they can become a registered practitioner. This equal balance between university academic

learning and clinical placement learning facilitates a degree level education. It comprises assignments and examinations which are key aspects of all undergraduate education, including one mathematic drug calculation test in which students must achieve a pass mark of 100%. The necessity for all new nurses to possess an undergraduate degree in nursing to enable them to join the nursing register and practice as a nurse in the UK became a requirement by the NMC. This has brought the nursing and midwifery professions into line with other all graduate healthcare professions such as medicine, physiotherapy, occupational therapy, dietetics, speech and language therapy and optometry.

1.6 Rationale/statement of issue

Universities should choose applicants for undergraduate nursing programmes who are likely to succeed clinically and academically and be able to deliver the high standards of care expected (Vierula et al. 2019). Identifying applicants that can cope with the demands of an undergraduate nursing programme is one of the principal roles of a selection process (Gartrell et al. 2020). Decisions about who to admit onto a nursing programme should be based on evidence as opposed to gut instinct or the expert judgement or experience of academic or clinical staff (Cunningham et al. 2014, Browne et al. 2020). This is especially important given the limited number of places available in most programmes (Capponi and Mason Barber 2020). Considering the impact that nurses have on the global health care system, it is imperative that the selection criteria that determine the individuals who enter the nursing profession are reliable, valid, transparent and fair (Vierula et al. 2019). Selection processes should meet each of these standards to ensure that the selection methods are fit for purpose. This concept will be investigated throughout this PhD research.

1.7 Defining key concepts

Academic outcomes – the academic grades and completion rates of students enrolled on pre-registration undergraduate nursing programmes.

Age – Participant age was derived from their date of birth that they put on their application form.

Applicant – A person who submitted an application form via UCAS to apply for a position on the Adult or Mental Health programmes at Ulster University.

Application – A written application form submitted via UCAS to apply for a position on the pre-registration undergraduate Adult or Mental Health nursing programmes at Ulster University.

Attrition – the number of students enrolled at the beginning of a programme minus the number of students who do not enrol in subsequent semesters of the same programme.

Course commencement – Applicants who were successful at application for the Adult or Mental Health nursing programmes at Ulster University, accepted a position on either programme, and enrolled.

Course completion - A student who completes all three years of the nursing programme, passing all academic and clinical outcomes, within the duration allowed, which at the time of the students enrolment was five years.

Emotional intelligence – The ability to recognise and respond to one's own emotions, and the emotions of others.

Entry route – The academic career that an applicant used to obtain the necessary qualifications to apply for the nursing programmes.

Gender – Male or female, as stipulated on a participant's birth certificate.

Grade Point Average – The average grade that a student obtained in each year of the undergraduate nursing programme.

Interview score – the score awarded to an applicant by the interview panel.

Multiple Mini Interview – A face-to-face interview that involves candidates rotating around multiple stations (typically 6-7) with 1-2 interview panellists at each station.

Northern Ireland Multiple Deprivation Measure – A numeric measure of deprivation used in Northern Ireland. Scores are compiled using postal areas that are assigned a score based on income deprivation (25%), employment deprivation (25%), health deprivation and disability (15%), education, skills and training deprivation (15%), access to services (10%), living environment (5%), and crime and disorder (5%).

Nursing student – a person who is enrolled on a pre-registration undergraduate nursing degree programme.

Personal statement – an autobiographical essay written by an applicant for a university programme.

Previous degree – a person who has been awarded a degree in any subject prior to commencing a nursing programme.

Prior academic achievement – Academic study that was completed prior to commencing university. This includes examinations pending.

Prior healthcare experience – Any type of paid or voluntary experience in health care prior to commencing university.

Programme outcomes – Academic grade average for year 1, 2 and 3 of the nursing programme, and completion rates.

Programme success (success) – A student who has completed the nursing programme.

Selection methods – Methods used to select students for pre-registration undergraduate nursing programmes such as a prior academic record, interviews, personal statements and résumés.

Selection process – the process by which universities select students for pre-registration undergraduate nursing programmes.

Socio-economic status – (see multiple deprivation measure).

Specific learning difficulty – a learning difficulty such as dyslexia, dyscalculia, or attention deficit hyperactive disorder, which is diagnosed by an educational psychologist.

UCAS – The admissions system used by most UK universities to manage the admission and selection process for undergraduate courses.

1.8 Thesis structure

This study is submitted in thesis with papers format and is presented in six chapters as outlined in Table 1.

Table 1 - Thesis structure

Chapter	Content
Chapter one - Introduction	Chapter one provides an overview of the study context. The study rationale and definitions of key concepts used throughout the thesis are provided.
Chapter two - Literature review Paper 1	Chapter two begins with an overview of the literature pertaining to cognitive selection, non-cognitive selection and other predictors of outcomes. This is followed by a systematic review exploring the predictive validity of selection criteria on progress outcomes for pre-registration nursing programmes. The theoretical concept that guided the study design is presented, followed by the research gaps.
Chapter three - Methodology	Chapter three provides an outline of the methods used to conduct the study including the research design, sample and setting, analytical strategy, ethical considerations, and study rigour.
Chapter four - Results Paper 2 Paper 3	Chapter four reports the results from the study analysis. It begins by presenting the findings pertaining to part one of the study which answers objective two (the results from objective one are published in paper 1). This is followed by part two which answers objective three and four and has been written in paper format and submitted to the Journal of Clinical Nursing.

	It finishes with the results from part two which pertains to objective five which has been written in paper format and published in Nurse Education Today.
Chapter five - Discussion	Chapter five begins with a collective discussion of the results related to other relevant research, practice, policy and theory.
Chapter six - Conclusion	Chapter six presents the study's contribution to knowledge, strengths and limitations, and recommendations for policy, practice and future research. It finishes with the overall study conclusion.

2 Chapter two - Background literature

2.1 Introduction

This chapter will provide an overview of selection methods that are used to select students for undergraduate healthcare programmes. Literature pertaining to other demographic characteristics that have been investigated for predictive validity are also discussed. The predictive validity of the selection criteria for undergraduate nursing programmes is presented in a systematic review (paper 1 - An exploration of the predictive validity of selection criteria on progress outcomes for pre-registration nursing programmes—A systematic review). Relevant theoretical concepts that were considered for this study are then discussed, followed by an outline of the gaps in the literature that required further research.

This first section will be reported under the headings cognitive selection, non-cognitive selection and other predictors of outcomes.

2.2 Cognitive selection

Cognitive selection methods seek to measure an applicant's academic capabilities in an effort to determine if they have the cognitive ability to complete a programme of study and are key determining factors for application to universities (Robinson and Salvestrini 2020). Patterson et al. (2018), as part of their review into the selection of applicants for medical schools in the UK, found that assessing an applicant's prior academic record formed part of the selection process for undergraduate medical programmes. Taylor et al. (2014) found academic achievement to feature in the application process of nursing students, in their review of selection methods for undergraduate nursing programmes in Scotland. Cognitive selection is administered in several ways, either through scrutiny of an applicant's prior academic record or through an admissions test (Crawford et al. 2021).

Prior academic record

Prior academic qualifications are designed to afford credit for prior study (Patterson et al. 2018) and high school grade point averages are consistently shown to be a predictor of undergraduate attainment in the USA (Seidman 2012). In the USA, an applicant's prior grade point average (GPA) is used to measure their academic record as part of the application

process. A systematic review by Al-Alawi et al. (2020) investigated the predictive validity of selection methods used to admit students onto pre-registration baccalaureate nursing programmes in the USA. From the 12 studies included in the narrative synthesis, which included a total of 3946 students, they reported that students' prior GPA and GPA in science were valid predictors of student success as measured by academic grades and programme completion rates. Students that commenced the programmes with higher GPAs were more likely to obtain higher grades and complete the four-year baccalaureate degree within the legal duration of the course. Although this review provided evidence into the predictive validity of prior GPA in USA institutions, it did not investigate the predictive validity of prior academic achievement in other countries, nor did it investigate the relationship between prior GPA and clinical outcomes. The relationship between prior academic achievement and clinical outcomes remains unclear, although a student's completion of the programme also implies successful clinical assessment.

Most universities in the UK use the Universities and College Application System (UCAS) tariff points system to admit students onto their programmes of study. Points are awarded for level three qualifications such as Advanced Level (A-levels), The Access to Higher Education Diploma (Access Diploma) and Business and Technology Education Council (BTEC). A smaller number of points are also allocated to other non-academic qualifications, such as accredited examinations in music, drama and dance (Trinity College 2022).

Barmby et al. (2012) investigated the correlations between A-level grades, and final year degree classification and placement grades for one cohort of students enrolled on an undergraduate primary school teaching degree in the UK (n=71). The results suggested a correlation between A-level grades on entry and degree classifications at the end of year three, but no correlation between A-level grades and placement grades. The types of A-level subjects are not reported in the paper, and although the study provides evidence of a link between academic achievement in A-level examinations and academic performance at university, the validity of the results is limited by the small sample size. Nevertheless, the results are mirrored in a study by Cheng and Catline (2015) who reported a small but significant positive correlation between UCAS scores and the first-year academic performance of one cohort of undergraduate psychology students at one university in the UK (n=162). Using UCAS scores to identify students who are at risk of low achievement in year one has clear value. However, the authors missed the opportunity to consider the relationship

between UCAS scores and year two and three academic outcomes, which would have given a more comprehensive overview of the predictive power of UCAS. Kale et al. (2020) investigated the predictive validity of UCAS scores with year one and two academic and clinical placement outcomes for undergraduate students enrolled on an Occupational Therapy (OT), Physiotherapy or Speech and Language therapy (SALT) programmes at one university in the UK (n=169). They report that the UCAS scores were a significant predictor of year one and year two academic achievement for the SALT cohort, but the rest of the findings were non-significant. Again, the relationship between UCAS scores and year three outcomes has not been considered. The authors gave no explanation as to why they considered only year one and two outcomes.

These studies show that UCAS is a valid predictor of some academic outcomes, but the relationships are weak. The studies are limited by their small sample sizes and design as they consider only the UCAS relationship with year one or two of the degree programmes, rather than considering all three yearly outcomes or degree completion rates. Brimble (2013) conducted a study to compare the entry routes (A-levels, Access Diploma and BTEC) of undergraduate nursing students with their final year degree classification in one university in the UK (n=308). Students with a BTEC were more likely to obtain a 1st class honours degree than those entering with A-levels or the Access Diploma. A higher number of students with the Access Diploma did not complete the programme, in comparison to the students that entered with the BTEC and A-levels, who had no difference in completion rates. The study aimed to compare 'like for like' qualifications, therefore all students who had achieved UCAS scores in excess of, or below 240 were excluded. This limits the findings of the study as investigating the full range of UCAS scores would have led to a more comprehensive understanding of their predictive validity.

In summary, the relationship between UCAS scores and academic achievement is weak at best, with moderate predictive validity reported in one cohort of SALT students. No studies have reported on the predictive relationship of the full range of UCAS scores with clinical or academic outcomes for undergraduate nursing degrees in all three years of the programme.

Admissions tests

Admissions examinations are an alternative to assess applicants' readiness to study at university, often used in combination with applicants' evidence of prior academic achievement (Crawford et al. 2021). Standardised admissions tests are generally based around programme content and have various weightings into how much they contribute to the overall selection decision at each university (Bala et al. 2021). Twidwell and Records (2017) conducted an integrative review of standardised admissions tests used in the USA/Canada. They aimed to identify which admissions tests were most predictive of undergraduate nursing programme outcomes and National Council Licensure Examination for Registered Nurses (NCLEX-RN) pass rates (an examination offered in the USA and Canada for all newly graduated nurses to gain entry to the nursing register). Fifteen studies met the criteria for inclusion and the tests that were reported on are displayed in Table 2.

Table 2 - Standardised admissions tests

Standardised test	Components
Health Education Systems Incorporated Admissions Assessment (HESI-A2)	Academic exams in mathematics, reading, grammar, vocabulary, general knowledge, biology, chemistry, and anatomy/physiology, plus a personality exam.
Scholastic Assessment Test (SAT)	Critical reading, writing and mathematics.
Test of Essential Academic Skills (TEAS)	Mathematics, science, reading, English and language use.
American College Test (ACT)	English, mathematics, science, reading, with an optional writing test.
National League for Nursing Pre-Admission Examination (PAX-RN)	Verbal, maths and science.
Collegiate Assessment of Academic Proficiency (CAAP)	Reading, writing skills, essay writing, mathematics, science and critical thinking.

The majority of studies were conducted in the USA, and a total of 13852 students were included in the studies which spanned from 2005 to 2016. Thirteen of the studies found that

the standardised admission tests could predict programme success and first-time pass rates on NCLEX-RN, with higher admissions scores leading to better outcomes. The HESI-A2 was the most widely used and most predictive test and was reported to be a better predictor of programme outcomes than prior GPA. The PAX-RN and CAAP tests were not predictive of any student outcomes. This review has several limitations. Firstly, it included Bachelor's and Associate Degree programmes which limits its generalisability to degree programmes only. Secondly, it considered standardised admissions tests only and did not include tests that are designed in-house by universities. Thirdly, it used NCLEX-RN pass rates as a measure of success, yet this exam is not a programme outcome as it is taken after graduation. Therefore, the results are less relevant to programmes of study that have no affiliation to NCLEX-RN, namely, those outside the USA and Canada.

Standardised admissions tests are not typically used in the UK for selection to undergraduate nursing programmes (Taylor et al. 2014). Nevertheless, they are widely used in the selection process of other undergraduate healthcare programmes of study like medicine and dentistry. Two such tests that have been developed to aid selection for these high demand courses are the Health Professions Admission Test (HPAT) and University Clinical Aptitude Test (UCAT) (Medentry 2022). Prior research suggests that they have varying predictive power over programme outcomes, with some studies citing weak to moderate correlations and others reporting no significant correlations with any programme outcomes (Halpenny et al. 2010, Bala et al. 2021). The content of these selection tests is relevant to medically associated programme content (Kelly et al. 2018). Any UK based selection test for nursing programmes would have to be designed with UK nursing curriculum in mind. As the HPAT and UCAT are not designed for or used in the selection of undergraduate nursing programmes, they are not explored any further in this thesis.

2.3 Non-cognitive selection

Undergraduate healthcare professional courses such as nursing often apply additional admission criteria as well as evidence of prior academic achievement (Rodgers et al. 2013, Taylor et al. 2014, Patterson et al. 2018). This is frequently referred to as non-cognitive screening and is thought to increase the likelihood of selecting individuals who are suitable to enter their chosen profession with the right attributes to excel in their field (Talman et al. 2018). Non-cognitive selection can be conducted in several ways including

personal statements, interviews, psychometric tests and prior healthcare experience (Crawford et al. 2021).

Personal statements

Personal statements are autobiographical essays and are submitted to universities as part of the UCAS application process in the UK. They allow applicants to provide information which is not available in other parts of the application form, such as their desire to study a particular subject or relevant personal experience. Murphy et al. (2009) conducted a meta-analysis to determine the predictive power of personal statements with student outcomes at multiple university sites with two outcomes, overall GPA and academic staff performance rating. The results showed small correlations between personal statement scores and GPA ($r=.13$ $n=4161$) and between personal statement scores and school performance rating ($r=.09$ $n=850$). The paper does not allude to the countries in which the studies were conducted, how many papers were retrieved, or what subjects the students were studying, leaving gaps in what we can understand from this study. In spite of this, it does indicate that the relationship between personal statements and student outcomes is weak. The authors also indicate that the small amount of research investigating the efficiency of personal statements as an indicator of student performance is not proportionate to their popular use. In Northern Ireland, personal statements were used to standardise the admissions process for nursing programmes and were screened for content relating to an applicant's values (NIPEC 2014). One study considered the relationship between personal statements and the first-year module outcomes for one cohort of undergraduate nursing students in the UK ($n=110$) (Traynor et al. 2016). They reported that personal statement scores had weak to moderate correlations with module outcomes, with those awarded higher personal statement scores obtaining higher module grades ($r= .22-.31$, $p<.05$). The convenience sample used in this study was small and only one cohort was tested. As such more research is needed to verify the value of using personal statements in selection for undergraduate nursing courses.

Interviews

It is generally considered that interviews have the ability to select applicants who possess (or are capable of developing) the attributes desired in a nurse. Yet, evidence to support their use as a predictive and reliable method of selection is scant (Crawford et al. 2021). Interviews

have been accused of lacking the psychometric precision to evaluate a person's suitability for a nursing programme (Timer and Clauson 2011). Interviews typically form part of the selection process of undergraduate nursing students in the UK (Taylor et al. 2014) and selection processes in the USA typically rely on prior academic achievement and admissions tests to select students for their programmes (Al-Alawi et al. 2020).

House et al. (2015) introduced group interviews to the selection process for their undergraduate nursing programme in the USA. Each candidate was interviewed in a group of 4-5 fellow applicants and scored (given their responses to predetermined questions) by one academic member of staff and one community nurse. Each interviewee (n=73) who participated then completed an anonymous five-item opened-ended survey evaluating their experience. The responses established that some applicants felt that the interviews gave them the opportunity to present themselves as more than just their 'prior academic achievement'. Through interaction with the interviewers, they felt that they had the opportunity to present their personal qualities and social skills, with one applicant stating: 'it gave me the opportunity to show that I have the attributes of a nurse that cannot be seen on paper' (p.59). Some applicants had anticipated the types of questions that would be asked, and one had participated in a prior mock interview, but others had conducted no preparatory work. Feelings of anxiety were disclosed by some who stated they would have preferred an individual interview to a group interview. The interviewers (n=16) also participated in the survey and shared that the interview process allowed them to assess applicants' communication skills and desire to be a nurse. Yet some interviewers felt that any applicant has the potential to 'be nice and look appropriate for 20 minutes' (p. 59). They also felt that interviews could negatively affect the fairness of the process by introducing bias and inconsistent scoring by different interviewers. The study concluded that group interviews were considered valuable and a good addition to the selection process. The authors claimed that the interviews also had the added benefit of diversifying the enrolled student population, as the number of students that were not Caucasian increased from 2.5% to 7.5% in comparison to the previous year's cohort. This study provides valuable insight of the group interview process, yet there was no indication as to the questions asked or how the scores were arrived at, or if faculty staff or community nurses had received any training before the process was instigated to help ensure consistency and fairness across scoring.

Hendricks and Krothe (2014) investigated the impact that introducing interviews to the selection process had at one university in the USA, in an attempt to encourage diversity in their student cohorts in relation to gender, ethnicity and life experience. The research was conducted over two years at two campuses and included nine admissions cycles. A total of 4007 participants were included in the study, which included applicants who were admitted and those who were not. Each interview was individual and structured, and applicants were ranked by numeric scores based on the answers they gave to predetermined questions. The interview process was time consuming due to the volume of applications received, and the individual interviews were subsequently changed to group interviews of 2-3 applicants. Interview scores were weighted between 30 and 40% (depending on the cohort) and used with the applicants prior GPA to aid the selection of students for the programme of study.

The new selection process was compared with the old (prior GPA only) and the researchers state that 15% of those who were successful at application would not have been afforded a position on the programme under the previous selection process. The introduction of interviews did not increase ethnicity or gender diversity in the cohorts and the retention rates did not improve (the authors undertook no correlational analysis between interview scores and students' clinical or academic outcomes, rather the researcher watched for an overall increase in retention). There was also dissatisfaction at the subjectivity of the interview process from staff, applicants and applicants' parents. Subsequently, the interview component of the selection process was discontinued, and the authors concluded by recommending the use of prior GPAs in selection only. Both studies missed the opportunity to conduct a correlational analysis between the interview scores and students' clinical or academic outcomes. This would have moved beyond the 'user-friendliness' and 'perceived value' of the interview process.

Traditional interview panels have been accused of bias and candidates have been noted to rote learn answers to anticipated questions and present them at interview, without possessing the underpinning knowledge or attributes they appear to demonstrate. To address these concerns the Multiple Mini Interview (MMI) method was developed and introduced (Eva et al. 2004). MMIs are increasingly used for selection to healthcare programmes and involve candidates rotating around a set of interview stations, typically 6-7 (although they have been reported as low as five or as high as 12). Each station has 1-2 interviewers (academic staff) that ask 1-2 predetermined questions and score candidates according to the answers given.

The questions are often based on hypothetical scenarios with applicants answering how they would respond to the scenario given (Rees et al. 2016). They are considered the most structured form of interview (Patterson et al. 2018) and have been praised for their ability to irradicate gender, cultural, socio-economic and pre-coaching bias (Pau et al. 2013).

The feasibility, acceptability, validity and reliability of MMIs were evaluated in a systematic review by Rees et al. (2016). Of the 41 studies selected for inclusion in the review, 32 were for medical schools and one was for a nursing programme (Perkins et al. 2013). The review reported that MMIs were as resource intensive as traditional panel interviews in terms of staff resources, finance, and time, but that applicants preferred the MMIs to traditional interviews. Only four of the studies considered the correlations between MMI scores and future performance. The results showed weak to moderate correlations with clinical and academic outcomes, and the authors concluded that more research was required to validate the predictive validity of MMIs as a selection method.

In addition to this review, Traynor et al. (2016) investigated the correlations between the MMI scores of nursing students (n=110) and academic modules at the end of year one in one university in the UK. The results showed that there was no correlation between MMI scores and academic outcomes. The participants in this study were students who had already been awarded a position on the programme and were currently undertaking their first semester in year one. As the analysis was not conducted on real time applicants, the participants knowledge of the nursing profession is likely to have been higher than it was at the initial application. This may have influenced the results as the answers may have been scored higher than usual.

Psychometric tests

Other types of non-cognitive selection methods that are currently being considered or developed for nursing student selection are the Nurse-match selection tool by McNeill et al. (2018) and emotional intelligence tests (Crawford et al. 2021). These are grouped together under the umbrella term 'psychometric tests' for the purpose of this literature review.

The Nurse-match selection tool is a values-based self-reporting assessment instrument and is a form of VBR. It aims to assign an overall suitability score to candidates against socially and

culturally associated nursing values which align with the NHS Constitution (2021). The full details of the design and development of the instrument have been reported for use on applicants to undergraduate nursing programmes (Ellis et al. 2015). A pilot study has been undertaken with an early version of this instrument and it has demonstrated its ability to recognise the value orientation of first year undergraduate nursing students (n=63) and assign an appropriate score that can be used in the selection of applicants for nursing programmes. The predictive validity of the instrument has not been tested (Colin McNeill, personal communication, 20/03/2022).

Emotional intelligence (EI) is our ability to recognise and respond to our own emotions and to the emotions of others (Stenhouse et al. 2016) and is a requirement of nurses in the UK (NMC 2018a). Jones-Schenk and Harper (2014) investigated the correlations between EI scores and completion rates of a convenience sample of undergraduate nursing students in the USA (n=116). They used the Emotional Quotient Inventory Self-reporting test which was administered online and correlated the total and sub-scores with three categories of programme completion: completion on time, non-completion and completion with modifications. No statistically significant differences were found between outcomes for the total score, but differences were noted between sub-scores with students who dropped out scoring lower than those who progressed. The authors argued that EI tests could be used to complement selection processes rather than using prior academic grades alone. Stenhouse et al. (2016) argued that EI tests are a more measurable form of selection than VBR.

Prior healthcare experience

Prior healthcare experience can lead to a well-informed career choice of nursing (Sabin et al. 2012). The Francis Report (2013) recommended that applicants for nursing programmes should have one year prior experience working in healthcare. Mooring (2016) suggested that increasing entry requirements in maths and science grades, as well as expecting all nursing students to have completed some form of prior healthcare work experience, may equip students with the skills needed to succeed in an undergraduate nursing degree. Little evidence exists to support these statements (Crawford et al. 2021). Whambuguh et al. (2016) conducted an investigation to determine if prior healthcare experience would predict students who graduate with a GPA of 3.25 or above (the maximum score available is 4.0) but reported no significant correlation. In their study, Snowden et al. (2018) stated that they found no

correlation between prior healthcare experience and programme completion rates in an undergraduate degree for nurses and midwives in the UK.

2.4 Other predictors of outcomes

Other predictors of outcome have been considered in research, including demographic characteristics. Although the selection of nursing students could never be based upon applicants' demographics, studying this topic does allow researchers to identify common traits that successful or struggling students may possess.

Demographic characteristics

Bulfone et al. (2021) investigated the socio-demographic characteristics of nursing students who experienced academic failure (which was defined as non-completion of programme within three years and one semester). A questionnaire was used to collect demographic information (age, gender, working status, children, and academic background including educational level) from a convenience sample of undergraduate nursing students in one Italian university (n=753). The results indicated that students who experienced academic failure had lower secondary school grades, lower pre-admission test scores, were female, worked alongside studying, and were older. Although, the mean age of 22 for those who experienced failure was only six months above those who did not (21.5). A student's family income, having a child and marital status did not significantly correlate with academic failure. This is the only study that found female students to have lower grades than male students.

Pryjmachuk et al. (2009) investigated the associations between age, gender and ethnic origin with programme completion rates in an undergraduate nursing programme in the UK (n=1173). They reported that the median age of those who completed and those who did not was 24 and 21 respectively. This means that there is an association with increasing age and programme completion. The difference was significant, but the association was small ($r=.16$). They also reported that male students and non-white students were less likely to complete, in comparison to female students and those who were white. Wray et al. (2017) investigated the demographic characteristics of students and their associations with completion rates in their undergraduate nursing programme in the UK (n=725). The results from the five-year cohort study indicated that students who lived locally during term-time, and had dependents, were

more likely to complete the programme than those who did not live locally and had no dependents. Again, there was an association with increasing age and programme completion as the mean age of students who completed was 26, and the mean age of students who did not complete was 24. Gender, disability and ethnicity did not have a significant relationship with progression rates. Further information about these variables were not provided in the paper, such as what constituted living locally, what the authors considered to be a ‘disability’ or how many dependents the successful students had. One characteristic with the potential to impact programme completion, which does not appear to be investigated in any of the nursing literature, is that of students with specific learning difficulties.

A specific learning difficulty (SpLD) is an umbrella term covering a range of neurological conditions that affect the way that information is processed and learned (British Dyslexia Association, 2020). SpLDs are considered ‘disabilities’ and include dyslexia, dyspraxia, dyscalculia and attention deficit hyperactivity disorder (ADHD). It is thought that approximately 10% of the population in the UK have dyslexia which is the most common form (British Dyslexia Association, 2019), and while every presentation is unique, some common traits include issues with reading, writing, concentration, organisation and/or short-term memory (Wray et al. 2013, Crouch 2019). SpLDs are not associated with intelligence and have lifelong presentations. Yet early and intensive interventions can positively mitigate the effects that SpLDs have on everyday functioning (Evans 2015). However, the number of students with SpLDs in pre-registration nursing education is currently unknown. Wray et al. (2012) found an incidence of 12% SpLDs in their nursing programme and advocate that more rigorous methods of recording the number of students with SpLDs are required, but there is consensus that the incidence of SpLDs in nursing education has been increasing (Olofsson et al. 2015, Harris 2018, L'Ecuyer 2019, Clouder et al. 2020).

In non-nursing literature, Richardson (2015) investigated the academic attainment (completion rates, pass rates and academic grades) of distance learners with SpLDs in higher education. This study was conducted at one university in the UK (the Open University) with a sample of 175,924, which was the entire number of students who had registered for one or more modules in that year. At enrolment, 4961 students stated that they had dyslexia or another type of SpLD. This was self-reported by the student and no evidence was required of diagnosis, although each student was contacted following disclosure to identify what additional learning support they would require with their studies. The results indicate that

students with SpLDs were just as likely as students without SpLDs to complete their programme of study. Nevertheless, they had a higher rate of module failure and were less likely to obtain a first or upper-second degree classification compared with the total population, and the difference was statistically significant. However, this study is difficult to generalise to other higher education institutions as it focused on distance learning only, and the 50% clinical and 50% academic structure of nursing programmes makes comparisons to non-nursing programmes difficult also.

In summary, these studies demonstrate the inconsistencies being reported in the literature in relation to the performance of male and female students, the impact that students age has on outcomes, and a dearth of literature pertaining to the programme outcomes of pre-registration nursing students with SpLDs. None of these studies considered any variation in academic performance throughout the programme, opting only to measure the associations between completion or non-completion. Furthermore, it was unclear what selection methods were being used across different schools of nursing and if any single or multiple selection methods were predictive of applicants who were successful in the programme (Vierula et al. 2019). A thorough and comprehensive review of selection methods used globally for undergraduate nursing programmes has not been conducted. Identifying the predictive validity of selection methods would help inform selection practices that are evidence based.

The predictive validity of selection methods for undergraduate nursing programmes is explored in the systematic review (paper 1) which is presented in the next section.





2.5 Published systematic review (paper 1)

The review identified, appraised and synthesised evidence from studies reporting on the predictive validity of selection methods used to admit candidates into baccalaureate pre-registration nursing programmes. The three-stage systematic search of the literature revealed 25 studies that were suitable for inclusion. Two overarching categories emerged from the data which were cognitive (academic) and non-cognitive (non-academic) screening. Cognitive screening was further subdivided to include prior academic achievement, prior academic achievement in science and admissions tests. Non-cognitive screening was further subdivided to include interviews, emotional intelligence tests, psychometric tests, personal statements and previous healthcare experience. A third theme emerged that included combined screening

methods. Key findings suggested that cognitive selection methods were valid predictors of clinical and academic achievement during the undergraduate nursing programmes. More evidence was required to verify if non-cognitive selection methods were predictive of outcomes as results were conflicting. Combined selection methods appeared to be the most predictive of student outcomes.

REVIEW

An exploration of the predictive validity of selection criteria on progress outcomes for pre-registration nursing programmes—A systematic review

Caroline Crawford BSc Hons, RN, Researcher¹  | Pauline Black BSc Hons, PGCE, PhD, RN, Lecturer²  | Vidar Melby DPhil, MPhil, BSc Hons, RN, PGCTHE, Senior Lecturer²  | Ben Fitzpatrick PhD, Head of School of Sport³ 

¹Faculty of Life and Health Sciences, School of Nursing, University of Ulster, Derry, UK

²School of Nursing, University of Ulster, Derry, UK

³School of Sport, University of Ulster, Derry, UK

Correspondence

Caroline Crawford, Faculty of Life and Health Sciences, School of Nursing, Room MG050, University of Ulster, Northland Road, Derry BT48 7JL, UK.
Email: Crawford-CJ@ulster.ac.uk

Abstract

Aim: To identify the selection methods currently being used for pre-registration nursing programmes and to assess the predictive power that these methods have on students' success.

Background: Research into selection methods in nursing education is beginning to emerge, yet it is unclear which methods are most predictive of students' success.

Design: A systematic review of the literature.

Methods: A systematic search of ten electronic databases: CINAHL, MEDLINE Ovid, EMBASE, PROQUEST Health and Medical, PROQUEST Education, COCHRANE Library, Web of Science, ASSIA, SCOPUS and PROSPERO was conducted. The results were expanded by the handsearching of journals, reference lists and grey literature. The PRISMA statement guided the review. Studies published in English between January 2008–March 2020 were eligible for inclusion, and quality assessment was undertaken using the CASP Checklist for Cohort Studies.

Results: Twenty-five studies met the criteria for inclusion. A range of selection methods was identified including prior academic achievement, admissions tests, interviews, emotional intelligence tests, personal statements and previous healthcare experience. Prior academic achievement and admissions tests appear to be the selection methods most predictive of student success. The evidence surrounding other selection methods such as interviews and personal statements is less conclusive.

Conclusion: Selecting individuals with the appropriate knowledge, interpersonal skills and personal qualities needed to complete an undergraduate nursing programme is an important part of the role of nurse educators. This review shows that a wide variety of selection methods are used across different institutions, some of which are more effective than others in predicting student outcomes.

Relevance to clinical practice: Further research is required to justify the continued use of some commonly used selection methods for undergraduate nursing programmes. Selection models that combine various types of selection criteria with predictive power appear to increase the probability of selecting students that will have successful outcomes.

KEYWORDS

academic success, baccalaureate, clinical competence, education, nursing, nursing education research, progress outcomes, selection criteria, students, systematic review

What does this paper contribute to the wider global clinical community?

- The findings of this paper suggest that prior academic achievement and admissions tests are the best indicators of nursing student success in pre-registration nursing programmes. More evidence is required to justify the continued use of non-cognitive screening methods such as interviews, psychometric tests and personal statements.
- Continued efforts should be made by nursing educators to encourage applications from a wide variety of people including those from underrepresented groups.

1 | INTRODUCTION

In the modern health service, nurses must be caring, compassionate and intelligent (Willis, 2013). Nurses teach, motivate, co-ordinate care between multiple professionals and work under immense pressure, whilst maintaining a high level of accountability to their employers and to the general public (Nursing and Midwifery Council, 2018). It is a challenging but rewarding role. In the move to an all-graduate nursing profession, the responsibility to select people for entry to this profession falls largely to universities providing pre-registration nursing programmes.

The numbers of applications to nursing programmes are increasing (Talman et al., 2018; Timer & Clauson, 2011), and there are frequently more applicants than universities can accommodate (Underwood et al., 2013). Universities use a variety of methods to select candidates for these sought-after courses, including academic selection, admissions tests, interviews, personal statements, letters of recommendation and previous healthcare experience (Schmidt and MacWilliams, 2011, Capponi & Mason-Barber, 2020).

Educating nurses at graduate level has had a positive impact on patient outcomes, with fewer hospital deaths and lower levels of clinical complications reported on units with a higher ratio of graduate nurses (Aiken et al., 2014; Liao et al., 2016). Despite such positive outcomes, the past decade has seen a number of high-profile investigations into gross failings of the most fundamental aspects of care including patient safety, compassion and dignity (Keogh, 2013). One high-profile enquiry was the Francis Report (2013), which recommended that universities should review how they select pre-registration nursing students to undertake their programmes.

The quality of the graduate workforce is directly linked to the quality of the nursing students recruited to pre-registration nursing programmes (Talman et al., 2018). Offering places to individuals who are likely to meet the clinical and academic standards required by their university and professional regulatory body furnishes the healthcare system with professionals who are likely

to deliver the high levels of care required. The Francis Report (2013) recommendation to review selection procedures acted as a catalyst for universities to explore the reliability and validity of their selection policies, to determine whether their selection methods had the power to predict those likely to succeed in the programme (Gale et al., 2016; Mazhindu et al., 2016; Traynor et al., 2016).

The failure of nursing students to succeed can have a negative impact on university resources and the global availability of future nursing graduates (Elkins, 2015; Underwood et al., 2013). It can also have a detrimental effect on the well-being of the student resulting in a decrease in confidence, a loss of personal finances and limitations to future employment opportunities (Seidman, 2012). While some attrition can be expected due to circumstances beyond a student's control (Rankin, 2013), it would clearly be valuable to identify the common attributes that lead to a student's success and consider these at the point of selection.

Although research into selection methods in nursing education is beginning to emerge, there is still a lack of clarity of the methods that are most effective. It is necessary to gather and synthesise best current evidence of the selection methods that are currently being used and what their predictive power is in selecting students who are likely to succeed. For the purpose of this review, success is defined as a student who has achieved the clinical and academic programme outcomes within the allotted time frame, as set by the university and professional regulatory body.

1.1 | Aim

The aim of this paper is to report on a systematic review that identified, appraised and synthesised evidence from studies reporting on the predictive validity of selection methods used to admit candidates into baccalaureate pre-registration nursing programmes.

2 | METHODS

2.1 | Design

A systematic review of the literature.

2.2 | Search strategy

The PICO Framework (Schardt et al., 2007) was used to help inform the study focus and search strategy (see Figure 1). Search terms were developed in collaboration with an experienced subject librarian and are presented in Figure 2. Preferred subject headings were used when this option was available within the database.

The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) Statement and Checklist (Moher et al., 2009) were used to guide the search and facilitate the reporting of the results (see Appendix S1).

A three-stage systematic search of ten electronic databases (CINAHL Complete, MEDLINE Ovid, EMBASE, PROQUEST Health and Medical, PROQUEST Education, COCHRANE Library, Web of Science, ASSIA, SCOPUS and PROSPERO) was undertaken. Additional literature was scoped through Google Scholar, the hand searching of nurse education journals and by manually checking the reference lists of relevant papers. The initial search took place between December 2018–January 2019 and was updated on 30 December 2019. Database alerts were set up to identify any relevant articles published after the search dates up to and including the date that the data extraction was completed, which occurred on 26 March 2020. The results were limited to peer-reviewed articles that were written in English. A 10-year limit was applied from the date that the initial search took place, which meant that only studies that were published after January 2008 could be included. This was to help ensure that the most up-to-date evidence concerning selection criteria and programme outcomes could be included in the review.

An application was made to prospectively register the review on the PROSPERO database. This application was rejected as the outcome relates to nursing education rather than health care.

2.3 | Eligibility criteria

2.3.1 | Inclusion

Any primary research using quantitative or qualitative designs that focussed on the selection, progress and outcome measures of nursing students who were selected to study a baccalaureate pre-registration nursing programme. Progress could be assessed at any time point from the beginning to completion of their course. Studies could include retrospective data or data that had been collected for cross-sectional, observational or longitudinal research.

2.3.2 | Exclusion

Studies that were published before January 2008, studies with no English translation available and studies that were not peer-reviewed in an academic journal were not eligible for inclusion. In addition, studies were only eligible to be included if they reported on students completing the bachelor's programme thus studies that investigated nursing students completing associate, diploma or post-graduate courses were excluded. Studies that focussed on the validity of selection methods without considering student outcomes, or studies that measured student outcomes and not the selection methods, were also excluded.

The National Council Examination (NCLEX) is a licencing examination taken by nurses after graduation in Canada and the USA (Hinderer et al., 2014). It is not a programme outcome so studies that focussed on this as their only outcome were not eligible for inclusion. See Table 1 for a summary of the eligibility criteria and limits that were applied during the search.

2.4 | Screening

The search identified 3,980 publications, 2,512 after duplicates were removed. The title and abstract were screened which excluded 2,505 publications, leaving 77 full-text articles to be

Population

Applicants for and students selected for an undergraduate (pre-registration) degree in nursing, regardless of age, gender, ethnicity or location.

Intervention

Selection methods used to determine admission onto nursing degree programmes including prior academic achievement, admissions examinations, psychometric profiling, interviews and previous healthcare experience.

Comparison

Student outcomes measured at any point of the degree programme including academic assessment, clinical assessment and course completion rates.

Outcome

Selection methods that have the predictive power to determine which students will be successful throughout the nursing programme.

FIGURE 1 PICO framework

nurs* student* or nurs* pupil* or nurs* education or nurs* undergrad* or preregistr* AND undergrad* or degree* or baccalaureate or BSc or bachelors or 'higher education' AND (select* or admission or admitted or entr*) AND (philisoph* or polic* or criteria or process*)

FIGURE 2 Search terms

TABLE 1 Summary of eligibility criteria and limits applied during search

Study design
Primary research that used a quantitative design.
Primary research that used a qualitative design.
Population
Applicants for and students selected for an undergraduate (pre-registration) baccalaureate degree in nursing. This includes adult (or general), mental health, child and learning disability fields or branches of nursing.
Intervention
Studies that investigated the predictive validity of any selection method including (but not limited to) interviews, previous healthcare experience, prior academic achievement, references, psychometric tests, personal statements and entrance examinations.
Comparison
Studies that investigated undergraduate nursing programme outcomes including (but not limited to) progress from year to year, grade point averages, class tests, exit examinations, degree classification, attrition and completing on time.
Outcome
Papers must include a correlational analysis or comparison between selection and outcome measures so that the predictive power of the selection method can be determined.
Location
No restrictions on location.
Year
Studies that were published between January 2008–March 2020.
Language
Studies with an English translation available.
All studies must be published in a peer-reviewed journal.

considered for inclusion. The full-text articles were retrieved and reviewed and identified 25 primary research studies that were eligible for inclusion. This process is illustrated in the PRISMA Flow Diagram which includes reasons for excluding full-text articles (see Figure 3).

All full-text studies considered for inclusion were examined independently by two reviewers to verify that they met the inclusion criteria and none of the exclusion criteria. Where disagreement occurred, this was discussed by all reviewers until agreement was reached. In one instance, the author of a paper was contacted for clarification of information before it was decided that their study should be included (Donaldson et al., 2010). The clarification of information was in relation to the study sample which included nursing students enrolled on the Diploma and the Bachelor of Science (BSc) Common Foundation Programme (CFP). Following the completion of the CFP at the end of year one, the students have the opportunity to transfer to the BSc programme in second year to complete their studies. All students in this sample had been accepted into the programme using the same admissions criteria and were completing the same CFP (which was the final data collection point for this study). It was decided that this study should be included in the review.

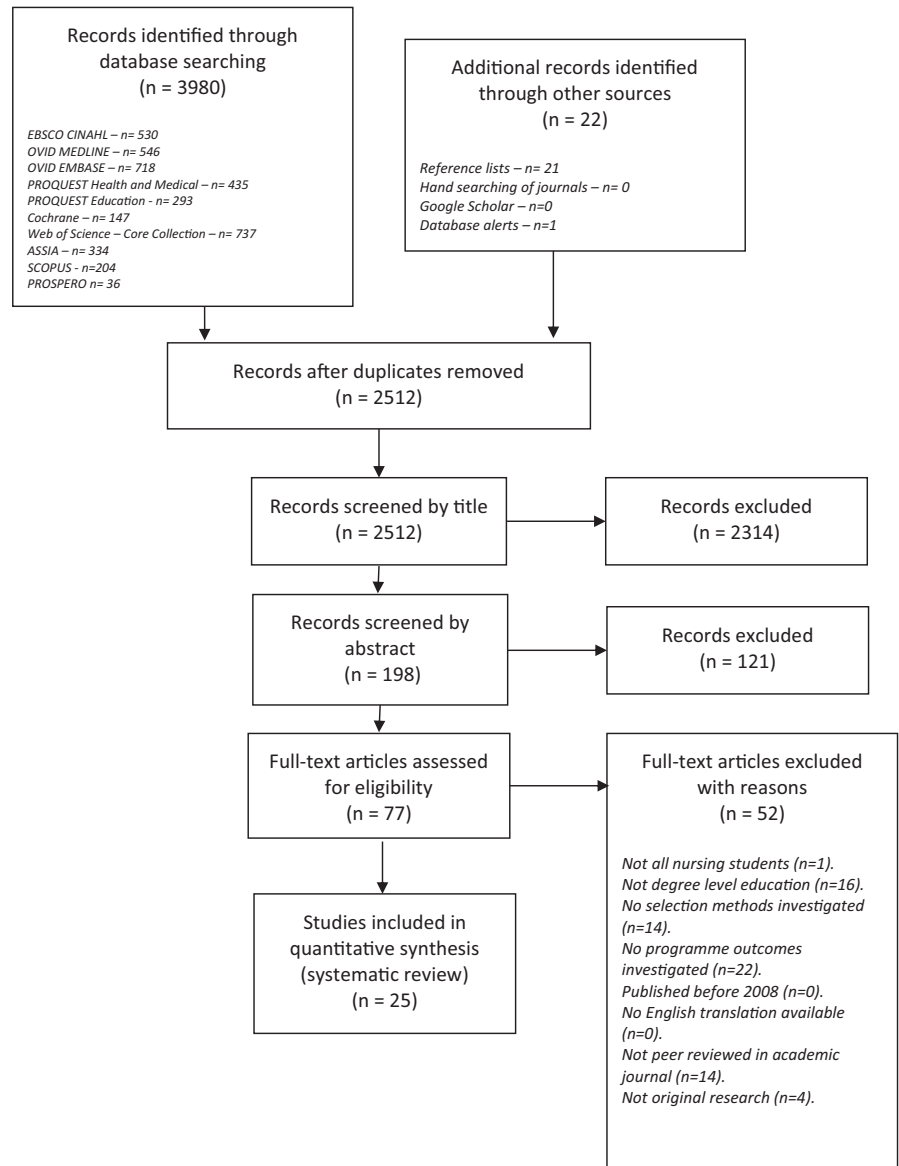
2.5 | Quality appraisal

Quality appraisal was carried out using the Critical Appraisal Skills Programme (CASP) Checklist for Cohort Studies (2018).

Cohort studies are characterised by a group of participants in a cohort who are followed over a period of time to observe the associations that different exposures, events, circumstances or characteristics have on measurable outcomes. They can include longitudinal, correlational and observational studies that are either prospective or retrospective in nature. In this review, the initial exposure is the selection methods, the outcomes are the participants' clinical and academic assessments, and the correlations are the relationships between the two. Therefore, it was appropriate to conclude that every study included in this systematic review was a type of cohort study. Cohort studies sit at level five in the hierarchy of evidence, below randomised controlled trials at level four and above case studies at level six (Ingham-Broomfield, 2016). The CASP Cohort Checklist was considered the appropriate appraisal tool for all studies identified in the search (see Table 2).

The CASP Checklist provides a 'yes or no' response to twelve questions which are designed to encourage the reviewer to consider each question systematically, rather than giving a score. Every study

FIGURE 3 PRISMA flow diagram



was critically appraised by the two reviewers. Inter-rater reliability between reviewers was high and any discrepancies were discussed until agreement was reached. No eligible studies were excluded from the review due to quality. The sample sizes ranged from 55–3253 participants and included between 1–5 cohorts. Most studies were carried out in one institution and two were conducted in multiple institutions (Wolkowitz & Kelley, 2010: 64 institutions; Lui et al., 2018: 204 institutions). Sample sizes varied across institutions and appeared to be large enough to answer the aims and objectives of each individual study, with the exception of Traynor et al., (2016) who struggled to get enough volunteers to achieve their target sample. All statistical tests that were used in the methodology were considered appropriate. The risk of bias in most cases was deemed to be low as the majority of studies were undertaken using pre-existing databases with all student profiles being included except for participants with missing data. If volunteers were required, for example in convenience samples, confounding factors were considered by the researchers.

2.6 | Data extraction

Data were extracted using a table which was developed in Microsoft Word pertaining to authors, year, country, study aim and design, data collection tools, year of data collection, statistical analysis, selection methods, outcome measures, sample characteristics, results and key findings (see Table 3). Only data that related to nursing students on baccalaureate programmes were extracted, which excluded participants in the samples who were from other healthcare programmes such as midwifery. Where nursing students could not be identified from the sample, or where data from nursing students were otherwise incalculable, the study was excluded which happened in one case. Many studies reported findings into correlations between student demographics and course outcomes such as age and gender. Demographic characteristics are not used in student selection so the data pertaining to these results were not included in the review.

TABLE 2 CASP checklist for cohort studies

Selected studies	Did the study address a clearly focussed issue?	Was the cohort recruited in an acceptable way?	Was the exposure accurately measured to minimise bias?	Was the outcome accurately measured to minimise bias?	Have the authors identified all important confounding factors?
Ahmad & Safadi, 2009	Yes	Yes	Yes	Yes	Yes
Callwood et al., 2018	Yes	Yes	Yes	Yes	Yes
Callwood et al., 2020	Yes	Yes	Yes	Yes	Yes
Cheshire et al., 2015	Yes	Yes	Yes	Yes	Yes
Cunningham et al., 2014	Yes	Yes	Yes	Yes	Yes
Díaz et al., 2012	Yes	Yes	Yes	Yes	Yes
Donaldson et al., 2010	Yes	Yes	Yes	Yes	Yes
Elkins, 2015	Yes	Yes	Yes	Yes	Yes
Gale et al., 2016	Yes	Yes	Yes	Yes	Yes
Hinderer et al., 2014	Yes	Yes	Yes	Yes	Yes
Lancia et al., 2013	Yes	Yes	Yes	Yes	Yes
Lui et al., 2018	Yes	Yes	Yes	Yes	Yes
Newton & Moore, 2009	Yes	Yes	Yes	Yes	Yes
Pitt et al., 2015	Yes	Yes	Yes	Yes	Yes
Rankin, 2013	Yes	Yes	Yes	Yes	Yes
Sharon & Grinberg, 2018	Yes	Yes	Yes	Yes	Yes
Shulruf et al., 2011	Yes	Yes	Yes	Yes	Yes
Strickland & Cheshire, 2017	Yes	Yes	Yes	Yes	Yes
Tartavouille et al., 2018	Yes	Yes	Yes	Yes	Yes
Timer & Clauson, 2011	Yes	Yes	Yes	Yes	Yes
Traynor et al., 2016	Yes	Yes—but struggled to get volunteers and did not achieve power sample.	Yes	Yes	Yes
Underwood et al., 2013	Yes	Yes	Yes	Yes	Yes
Van Hofwegen et al., 2019	Yes	Yes	Yes	Yes	Yes
Wambuguh et al., 2016	Yes	Yes	Yes	Yes	Yes
Wolkowitz & Kelley, 2010	Yes	Yes	Yes	Yes	Yes

Note: The questions pertaining to results, fit with other available evidence, and implications for practice are discussed throughout the paper.

2.6.1 | Selection methods

From the review of selection methods, two overarching categories became apparent following the data extraction: cognitive (academic) and non-cognitive (non-academic) screening. Cognitive screening

was further divided into sub-categories such as prior academic achievement, prior academic achievement in science and admissions tests. Non-cognitive screening was sub-divided into interviews, emotional intelligence, psychometric tests, personal statements and previous healthcare experience. A third category then emerged from

Have they taken account of the confounding factors in the design and/or analysis?	Was the follow-up of subjects complete enough?	Was the follow-up of subjects long enough?	How precise are the results?	Do you believe the results?	Can the results be applied to the local population?
Yes	Yes	Yes	Clearly displayed	Yes	Yes
Yes	Yes	Yes	Clearly displayed	Yes	Yes
Yes	Yes	Yes	Clearly displayed	Yes	Yes
Yes	Yes	Yes	Clearly displayed	Yes	Yes
Yes	Yes	Yes	Clearly displayed	Yes	Yes
Yes	Yes	Yes	Clearly displayed	Yes	Yes
Yes	Yes	Yes	Clearly displayed	Yes	Yes
Yes	Yes	Yes	Significance score clearly displayed without <i>r</i> value.	Yes	Yes
Yes	Yes	Yes	Stipulated by the authors throughout the text.	Yes	Yes
Yes	Yes	Yes	Clearly displayed	Yes	Yes
Yes	Yes	Yes	Clearly displayed	Yes	Yes
Yes	Yes	Yes	Clearly displayed	Yes	Yes
Yes	Yes	Yes	Clearly displayed	Yes	Yes
Yes	Yes	Yes	Clearly displayed	Yes	Yes
Yes	Yes	Yes	Clearly displayed	Yes	Yes
Yes	Yes	Yes	Clearly displayed	Yes	Yes
Yes	Yes	Yes	Displayed with some details not included.	Yes	Yes
Yes	Yes	Yes	Clearly displayed	Yes	Yes
Yes	Yes	Yes	Clearly displayed	Yes	Yes
Yes	Yes	Yes	Clearly displayed. Some details of the non-significant results not included.	Yes	Yes
Yes	Yes	Yes	Clearly displayed	Yes	Yes
Yes	Yes	Yes	Clearly displayed	Yes	Yes
Yes	Yes	Yes	Clearly displayed	Yes	Yes
Yes	Yes	Yes	Clearly displayed	Yes	Yes
Yes	Yes	Yes	Clearly displayed	Yes	No—veteran students only.
Yes	Yes	Yes	Clearly displayed	Yes	Yes
Yes	Yes	Yes	Clearly displayed	Yes	Yes

the data. This was a hybrid model comprising a combination of selection formula, often based on prior statistical testing conducted by the authors, with a view to identify the most predictive methods before combining them. These will be reported separately as 'combined screening.' The selection methods were categorised as shown in Figure 4.

2.6.2 | Outcome measures

The studies used a variety of outcome measures including grade point average (GPA), examination results, clinical assessments and mentor grading. Due to the variety of data collection time points from the beginning to the completion of the course, it was difficult

TABLE 3 Data extraction

Authors, year and location	Study	Variables	Population and sample	Results
Ahmad & Safadi, 2009 (Jordan)	<p>Aim: To examine whether admission criteria can predict chances of success</p> <p>Design: Cross-sectional design</p> <p>Data collection tools: Student records</p> <p>Data collection period: Not reported</p> <p>Data analysis methods: Regression analysis</p>	<p>Independent variables: High school grade</p> <p>Outcome variables: Grade point average (GPA)</p>	<p>Nursing degree students in fourth year of study one cohort ($n = 224$)</p> <p>Convenience sample</p> <p>Age: mean 21.37</p> <p>Gender: female 41.5%, male 58.5%</p> <p>Ethnicity: not reported</p>	<p>Results: Prediction of high school grade on GPA ($B = 0.3$, $Beta = 0.54$, $t = 9.51$, $p < .001$)</p> <p>Key findings: Student high school grades were a significant predictor of final year GPA.</p>
Callwood et al., 2018 (UK)	<p>Aim: To examine the reliability and predictive validity of Multiple Mini Interviews (MMI) using the year one practice outcomes of undergraduate nursing students</p> <p>Design: Cross discipline cohort study</p> <p>Data collection tools: Six MMI stations and student assessment scores</p> <p>Data collection period: 2015</p> <p>Data analysis methods: Pearson's correlation</p>	<p>Independent variables: MMI cumulative score</p> <p>Outcome variables: Year one clinical performance (mentor grading)</p>	<p>Undergraduate pre-registration nursing students one cohort ($n = 247$)</p> <p>Non-probability consecutive sampling</p> <p>Age: mean 23</p> <p>Gender: not reported</p> <p>Ethnicity: 71% of adult, 75% of child, 55% of mental health nursing students were Caucasian British</p>	<p>Results: Correlations between MMI scores and clinical performance: adult ($r = .266$, $p = .053$), mental health ($r = .301$, $p = .119$), child ($r = .083$, $p = .693$)</p> <p>Key findings: There were no significant associations between MMI scores and end of year one clinical practice outcomes.</p>
Callwood et al., 2020 (UK)	<p>Aim: To examine the predictive validity of MMIs using the end of programme and practice outcomes of undergraduate nursing students</p> <p>Design: Cross-sectional cohort study</p> <p>Data collection tools: Six MMI stations, student assessment scores</p> <p>Data collection period: 2015</p> <p>Data analysis methods: Pearson's correlation</p>	<p>Independent variables: MMI cumulative score</p> <p>Outcome variables: Year three clinical performance (mentor grading)</p> <p>Year three academic performance (dissertation grade)</p>	<p>Undergraduate pre-registration nursing students one cohort ($n = 182$)</p> <p>Non-probability consecutive sampling</p> <p>Age: median 20</p> <p>Gender: not reported</p> <p>Ethnicity: 71% of adult, 75% of child, 55% of mental health nursing students were Caucasian British</p>	<p>Results: Correlations between MMI scores and clinical performance: adult ($r = .27$, $p = .003$), mental health ($r = .43$, $p = .01$) and child ($r = .14$, $p = .441$)</p> <p>Correlations between MMI scores and academic attainment: adult ($r = .18$, $p = .055$), mental health ($r = -.11$, $p = .578$) and child ($r = -.10$, $p = .595$)</p> <p>Key findings: There were significant correlations between MMI scores and clinical practice outcomes in the adult and mental health branches, but not with children's nursing. There were no significant associations between MMI scores and academic outcomes.</p>

(Continues)

TABLE 3 (Continued)

Authors, year and location	Study	Variables	Population and sample	Results
Cheshire et al., 2015 (USA)	<p>Aim: To compare emotional intelligence (EI) test scores to nursing degree outcomes</p> <p>Design: Descriptive causal comparative design</p> <p>Data collection tools: MSCEIT scores, student examination and clinical evaluation scores</p> <p>Data analysis methods: Multi variate analysis of variance</p>	<p>Independent variables: EI score</p> <p>El branch scores;</p> <ul style="list-style-type: none"> • Perception of emotion • Facilitation of emotion • Understanding emotion • Management of emotion(scores were graded as low, middle or high) <p>Outcome variables: Final grades for Fundamentals of Professional Nursing Practice</p> <p>Final grades in Pharmacology for Nursing Practice</p>	<p>Second semester upper division BSN students one cohort (n = 85)</p> <p>Convenience sample</p> <p>Age: mean 21.46</p> <p>Gender: female: 83.5%, male 13.5%, missing data: 3.5%</p> <p>Ethnicity:</p> <p>Caucasian: 88%</p> <p>African American: 5%</p> <p>Hispanic or Latino: 1%</p> <p>Not reported: 6%</p>	<p>Results: El score and Fundamentals of Professional Nursing Practice (F (2, 82) = 0.683, p = .508) and Pharmacology for Nursing Practice (F (2, 82) = 1.171, p = .315)</p> <p>Perception of Emotions score and Fundamentals of Professional Nursing Practice (F (2, 82) = 0.093, p = .911) and Pharmacology for Nursing Practice (F (2, 82) = 0.544, p = .584)</p> <p>Facilitation of Emotion score and Fundamentals of Professional Nursing Practice (F (2, 82) = 5.628, p = .007) and Pharmacology for Nursing Practice (F (2, 82) = 4.1097, p = .023)</p> <p>Understanding Emotion score and Fundamentals of Professional Nursing Practice (F (2, 82) = 1.381, p = .262) and Pharmacology for Nursing Practice (F (2, 82) = 1.777, p = .181)</p> <p>Management of Emotion score and Fundamentals of Professional Nursing Practice (F (2, 82) = 2.915, p = .065) and Pharmacology for Nursing Practice (F (2, 82) = 1.704, p = .194)</p> <p>Key findings: The only EI score to achieve statistical significance was the branch score Facilitation of Emotion. The rest were non-predictive of student outcomes.</p>
Cunningham et al., 2014 (USA)	<p>Aim: Compare the predictive validity of a rational vs. empirically derived admission formula</p> <p>Design: Not reported</p> <p>Data collection tools: Pre-existing school of nursing data</p> <p>Data collection period: 2005–2013</p> <p>Data analysis methods: Pearson's correlation and regression analysis</p>	<p>Independent variables: GPA at entry</p> <p>Science GPA at entry</p> <p>ATI-TEAS score</p> <p>Number of completed pre-requisites</p> <p>Outcome variables: Overall ATI composite score</p> <p>ATI-RN predictor score</p> <p>ATI Fundamentals score</p> <p>Second semester GPA</p> <p>Overall GPA</p>	<p>Baccalaureate nursing students eight cohorts (n = 90–283)</p> <p>Age: not reported</p> <p>Gender: female: 90.4%, male 9.6%</p> <p>Ethnicity:</p> <p>White: 93.6%</p> <p>Black: 3.5%</p> <p>Asian: 1.8%</p> <p>American Indian: 0.7%</p> <p>Arab/middle eastern: 0.7%</p> <p>Pacific Islander: 0.7%</p>	<p>Results: GPA at entry and ATI composite scores (r = .14, p = <.05) and overall GPA (r = .22, p = <.01)</p> <p>Science GPA with overall GPA (r = .31, p = <.01) and second semester GPA (r = .19, p = <.01)</p> <p>ATI-TEAS score with overall ATI composite score (r = .32, p = <.01), ATI Fundamentals score (r = .24, p = <.01), with second semester GPA (r = .16, p = <.05) and overall GPA (r = .18, p = <.01)</p> <p>Key findings: GPA at entry was significantly associated with overall ATI composite score. Science GPA was predictive of second semester GPA and overall GPA. ATI-TEAS score was significantly associated with ATI composite score, ATI Fundamentals, second semester GPA and overall GPA. There were no other significant correlations between independent and outcome variables.</p> <p>All selection criteria were combined using regression-based methods to identify a formula for admission. The empirical admission formula was more successful in predicting outcomes than the traditional rational points-based system and explained a higher proportion of the variance across many programme outcomes.</p>

(Continues)

TABLE 3 (Continued)

Authors, year and location	Study	Variables	Population and sample	Results
Diaz et al., 2012 (USA)	<p>Aim: Assess the predictive value of TEAS scores and pre-requisite GPA on the success of students in their first semester</p> <p>Design: Exploratory study</p> <p>Data collection tools: Student records</p> <p>Data collection period: 2008–2009</p> <p>Data analysis methods: Binary logistic regression</p>	<p>Independent variables: Pre-requisite GPA ATI-Critical Thinking (CT) score ATI-TEAS composite score ATI-TEAS sub-scores;</p> <ul style="list-style-type: none"> • Reading • English • Mathematics • Science <p>Dependent variable: RN-Fundamentals course</p>	<p>BSN nursing students two cohorts ($n = 174$) Age: 68.4% under 25 Gender: female: 77%, male: 23% Ethnicity: 100% Hispanic</p>	<p>Results: ATI-TEAS composite score with RN-Fundamentals (22.931, $p = .000$ [B] = 1.188) Key findings: The only independent variable to show any predictive validity was the ATI-TEAS composite score. The rest of the results were non-significant.</p>
Donaldson et al., 2010 (UK)	<p>Aim: To explore patterns of retention and attrition for nursing students on the DipHE BSc. on completion of the common foundation programme (CFP)</p> <p>Design: Not named, researchers used a quantitative approach used using descriptive/interpretive analysis</p> <p>Data collection tools: Interview score sheet, student data collected from interview until end of year one</p> <p>Data collection period: Not reported</p> <p>Data analysis methods: t test, Pearson chi-square</p>	<p>Independent variables: Interview score sheet sub-scores;</p> <ul style="list-style-type: none"> • arithmetic score • subject knowledge • role of the nurse • communication (assessed at interview) • reference • standard of written work • content of written work • application statement • educational qualifications • healthcare work experience <p>Outcome variables: Passing all year one modules completing the CFP</p>	<p>Nursing BSc/DipHE students five cohorts ($n = 638$) Age: mean 24.89 for successful students, 22.23 for unsuccessful students Gender: not reported Ethnicity: not reported</p>	<p>Results: Arithmetic score ($p = .585$), subject knowledge ($p = .012$), role of the nurse ($p = .056$), communication ($p = .026$), reference ($p = .039$), standard of written work ($p = .01$), content of written work ($p = .001$), application statement ($p = .320$), educational qualifications ($p = .906$) and healthcare work experience ($p = .278$) Key findings: Scores for standards of written work, content of written work, subject knowledge, communication (assessed at interview) and references were significantly higher for students who passed all modules in year one and completed CFP. The rest were non-significant.</p>
Elkins, 2015 (USA)	<p>Aim: To investigate the predictors of success to completing the baccalaureate programme</p> <p>Design: Retrospective correlation study</p> <p>Data collection tools: Archived data taken from student records</p> <p>Data collection period: 2007–2011</p> <p>Data analysis methods: Pearson's correlation</p>	<p>Independent variables: Pre-programme GPA American College Test (ACT) scores</p> <p>Outcome variables: Completion of BSN programme</p>	<p>BSN nursing students two cohorts ($n = 187$) Convenience sample Age: most students were <23 Gender: female; 84.5%, male: 15.5% Ethnicity: 96.3% were Caucasian, the minorities were 1.6%</p>	<p>Results: Detailed results not reported. Key findings: There is a significant correlation ($p = <.05$) between pre-programme GPA and completing the programme. There is a significant relationship between ACT results and completing the programme.</p>

(Continues)

TABLE 3 (Continued)

Authors, year and location	Study	Variables	Population and sample	Results
Gale et al., 2016 (UK)	<p>Aim: To determine the extent to which the MMI is predictive of academic success in nursing</p> <p>Design: Longitudinal retrospective analysis</p> <p>Data collection tools: Existing school of nursing records</p> <p>Data collection period: 2011–2014</p> <p>Data analysis methods: Bayesian multilevel modelling</p>	<p>Independent variables: MMI data (numeracy examination, literacy examination and interview score)</p> <p>Outcome variables: Academic and clinical scores year 1, 2 and 3</p>	<p>Nursing degree students (n = 204)</p> <p>Age: median 25</p> <p>Gender: female 89%, male 11%.</p> <p>Ethnicity: UK nationality made up 66% of sample</p>	<p>Key findings: MMI interview and MMI numeracy significantly predict academic success, and MMI literacy does not. These findings were stipulated by the authors after being tested in the following regression equation: Predicted mark = $36.7 + (0.4 \times \text{interview}) + (0.3 \times \text{numeracy}) + (0.04 \times \text{essay}) + (2.1 \times \text{attempt}) + \text{ability score} + \text{difficulty score}$</p>
Hinderer et al., 2014 (USA)	<p>Aim: To examine the extent to which standardised HESI-A2 examination scores and pre-admission cumulative GPA predict timely progression in the nursing programme</p> <p>Design: Exploratory retrospective descriptive design</p> <p>Data collection tools: Existing student database</p> <p>Data collection period: 2008–2010</p> <p>Data analysis methods: Logistic regression analysis</p>	<p>Independent variables: Pre-admission GPA</p> <p>Pre-admission science GPA</p> <p>HESI-A2 examination score</p> <p>Outcome variables: Timely progression (completion within four semesters without stopping/dropping out)</p> <p>Nursing GPA</p>	<p>Undergraduate baccalaureate nursing students three cohorts (n = 89)</p> <p>Gender: female 93.3%, male 6.7%</p> <p>Age: not reported</p> <p>Ethnicity: not reported</p>	<p>Results: Pre-admission GPA as a predictor of timely progression (B = 3.341, df = 1, p = .006)</p> <p>Pre-admission science GPA as a significant predictor of timely progression (B = 2.438, df = 1, p = .009)</p> <p>HESI-A2 examination scores had moderate significant correlations with nursing GPA (r = .31, p = .007). HESI-A2 examination score was not a significant predictor of timely progression.</p> <p>Combined HESI-A2 and pre-admission GPA as predictors of timely progression: A test of the full model was significant ($\chi^2 = 11.450$, p = .003, df = 2). R2 showed that the model explained 20.2% of the variance and accurately predicted 83.1% of cases.</p> <p>Combined HESI-A2 scores and pre-admission science GPA as predictors of timely progression: A test of the full model was significant ($\chi^2 = 10.526$, p = .005, df = 2). R2 revealed that the model explained 18.7% of the variance. The model accurately predicted 84.3% of cases.</p> <p>Key findings: Students with a higher pre-admission GPA and pre-admission GPA in science were more likely to have timely progression. Those with higher HESI-A2 scores were no more likely to have timely progression but were more likely to have higher nursing GPA.</p>

(Continues)

TABLE 3 (Continued)

Authors, year and location	Study	Variables	Population and sample	Results
Lancia et al., 2013 (Italy)	<p>Aim: To investigate the role in predicting nursing student academic success</p> <p>Design: Retrospective observation study</p> <p>Data collection tools: Existing student records</p> <p>Data collection period: 2004–2008</p> <p>Data analysis methods: Pearson's correlation, t test, ANOVA and chi-square test</p>	<p>Independent variables: Upper secondary diploma grades</p> <p>Admissions test score</p> <p>Outcome variables: Ability to graduate on time (within 3 years)</p> <p>Final degree grade</p> <p>Average value of examination scores</p>	<p>Nursing degree students five cohorts ($n = 1,006$)</p> <p>Age: mean 23.36</p> <p>Gender: female 64.9%</p> <p>Ethnicity: not reported</p>	<p>Results: Upper secondary diploma grades were significantly higher for those who graduated on time ($p = .000$) and correlated positively with final degree grade ($r = .338$) and average value of examination scores ($r = .385$)</p> <p>Admission test score did not correlate significantly with final degree grade ($r = -.094$) or average value of examination scores ($r = -.072$)</p> <p>Key findings: Those who graduated on time had higher upper secondary diploma grades. There was a moderate correlation between upper secondary diploma grades with both final degree grade and average value of examinations. There was no relationship between the admissions test score and any outcomes.</p>
Lui et al., 2018 (USA)	<p>Aim: To identify incremental validity in improving the accuracy of predicting early school success by adding other content areas in addition to science in the admission criteria</p> <p>Design: Predictive design</p> <p>Data collection type: Student data collected from 204 institutions</p> <p>Data collection period: 2013–2016</p> <p>Data analysis methods: Pairwise correlation co-efficient and hierarchical regression</p>	<p>Independent variables: TEAS V sub-score;</p> <ul style="list-style-type: none"> • Science • Reading • Mathematics • English <p>Outcome variables: RN-Fundamentals examination score taken in semester one</p>	<p>Baccalaureate nursing students ($n = 3,253$).</p> <p>Age: mean 29</p> <p>Gender and ethnicity not reported</p>	<p>Results: Science and RN-Fundamentals ($r = .403, p < .01$) Reading and RN-Fundamentals ($r = 0.352, p < .01$) Mathematics and RN-Fundamentals ($r = .294, p < .01$) English and RN-Fundamentals ($r = .347, p < .01$)</p> <p>Key findings: All correlations between all subsections of the TEAS test and the RN-Fundamentals examination were significant.</p>
Newton & Moore, 2009 (USA)	<p>Aim: To describe relationships among scholastic aptitude, nursing aptitude and BSN student attrition</p> <p>Design: Exploratory descriptive</p> <p>Data collection tools: Existing faculty records and ATI website for TEAS scores</p> <p>Data collection period: 2004</p> <p>Data analysis methods: Logistic regression</p>	<p>Independent variables: Scholastic aptitude (GPA)</p> <p>TEAS composite score</p> <p>Outcome variables: Attrition late in the programme because of one or more academic failures</p>	<p>Nursing students enrolled on the baccalaureate programme, one cohort ($n = 107$)</p> <p>Age, gender and ethnicity not reported</p>	<p>Key findings: Neither scholastic aptitude (GPA) or TEAS composite score were predictive of attrition.</p>

(Continues)

TABLE 3 (Continued)

Authors, year and location	Study	Variables	Population and sample	Results
Pitt et al., 2015 (Australia)	<p>Aim: Explore CT scores relationship with students' academic performance, clinical performance and progression</p> <p>Design: Longitudinal correlational study</p> <p>Data collection tools: Faculty records and the Health Sciences Reasoning Test (HSRT)</p> <p>Data collection period: 2009–2011</p> <p>Data analysis methods: Correlation analysis, logistic and multinomial regression</p>	<p>Independent variable: HSRT CT score</p> <p>HSRT CT sub-scores;</p> <ul style="list-style-type: none"> • Analysis • Inference • Evaluation • Inductive reasoning • Deductive reasoning <p>Outcome variables: Academic performance (measured by GPA in years 1, 2 and 3)</p> <p>Clinical performance (measured by structured observation and assessment of practice by a university employed assessor in the clinical area)</p> <p>Progress (completion of the programme in three years)</p>	<p>Nursing students enrolled on Bachelor of Nursing programme one cohort (n = 51–134)</p> <p>Convenience sample</p> <p>Age: mean 27</p> <p>Gender: female 86%</p> <p>Ethnicity: not reported</p>	<p>Results and key findings: There were positive correlations between HSRT scores and all academic performance scores which were significant.</p> <p>There was no statistical difference between HSRT scores of students who took and passed or failed their clinical assessment (n = 51).</p> <p>HSRT CT score, analysis score and deductive reasoning score predicted programme completion.</p> <p>As the analysis score increased by 1 the chance of completion increased by 42% (p = .001, odds ratio = 0.582).</p> <p>As the deductive reasoning score increased by 1 the chance of completion increased by 27% (p = .003, odds ratio = 0.726).</p> <p>As the total CT score increased by 1 the likelihood of completion increased by 11% (p = .011, odds ratio = 0.888).</p>
Rankin, 2013 (UK)	<p>Aim: To examine the predictive relationship between EI and clinical practice performance, academic performance and retention</p> <p>Design: Longitudinal survey</p> <p>Data collection tools: Self-reporting Assessing Emotions Scale (AES), data collected at prior to interview and at end of year one of the programme</p> <p>Data collection period: 2007–2009</p> <p>Data analysis methods: Pearson's correlation and multiple regression</p>	<p>Independent variables: Prior academic attainment</p> <p>El scores</p> <p>Outcome variables: Clinical performance in year one</p> <p>Academic attainment in year one</p> <p>Registering for year two of the programme (progression)</p>	<p>Nursing degree students one cohort (n = 178)</p> <p>Age: mean 22.8</p> <p>Gender: female 95%, male 5%</p> <p>Ethnicity: Caucasian 99.4% (95.5% were British)</p>	<p>Results: Prior academic attainment and academic performance (r = .14 p = .03), progression (r = -.01, p = .454), clinical performance (r = .03, p = .39)</p> <p>Mature students with higher EI scores were more likely to progress into second year (r = .30, p = .00)</p> <p>EI score is a powerful predictor of clinical practice with an R square of 0.68 (p = .00) and is significantly correlated with academic performance (r = .16, p < .05)</p> <p>Key findings: Prior academic achievement predicted academic performance but not clinical performance or progression. A significant predictive relationship was found between EI and all outcomes.</p>
Sharon & Grinberg, 2018 (Israel)	<p>Aim: To examine the relationship between nursing students' level of EI and their degree of academic success</p> <p>Design: Cross-sectional prospective study</p> <p>Data collection tools: Schutte Self-report Inventory, psychometric entrance test (PET) scores and grade transcripts</p> <p>Data collection period: Not reported</p> <p>Data analysis methods: Pearson's correlation</p>	<p>Independent variables: EI score</p> <p>PET score</p> <p>Outcome variables: Academic success measured by annual grade average</p>	<p>Nursing degree students two cohorts (n = 110, first year = 64, second year = 46)</p> <p>Convenience sample</p> <p>Age: mean 21.2</p> <p>Gender: female 64%, male 36%</p> <p>Ethnicity: not reported</p>	<p>Results: Correlation found between EI score and annual grade average in first year (r = .305, p < .05) and second year (r = .401, p = < .05)</p> <p>Key findings: Annual grade average was related to EI rather than PET score.</p>

(Continues)

TABLE 3 (Continued)

Authors, year and location	Study	Variables	Population and sample	Results
Shukuruf et al., 2011 (New Zealand)	<p>Aim: To measure the predictability of undergraduate GPA in the nursing programme with a range of measures based on student NCEA results</p> <p>Design: Not reported</p> <p>Data collection tools: Faculty database</p> <p>Data collection period: Not reported</p> <p>Data analysis methods: Pearson's correlation</p>	<p>Independent variables: NCEA credits attempted</p> <p>NCEA credits gained</p> <p>NCEA GPA</p> <p>NCEA success rate</p> <p>NCEA university ranking</p> <p>Outcome variable: GPA in first year</p>	<p>Nursing degree students (school leavers) one cohort ($n = 134$)</p> <p>Age: not reported</p> <p>Gender: female 93%</p> <p>Ethnicity:</p> <p>Pakeha: 35%</p> <p>Asian: 28%</p> <p>Pacific: 6%</p> <p>Maori: 4%</p> <p>Missing data: 27%</p>	<p>Results: NCEA credits attempted and GPA in first year ($r = -.64$, $p = >0.05$)</p> <p>NEAC credits gained and GPA in first year ($r = 0.175$, $p = <.05$)</p> <p>NCEA GPA and GPA in first year ($r = .477$, $p = <.05$)</p> <p>NCEA success rate and GPA in first year ($r = .262$, $p = <.05$)</p> <p>NCEA university rank GPA in first year ($r = 0.313$, $p = <.05$)</p> <p>Key findings: All independent variables were predictive of GPA in first year aside from NCEA credits attempted, which was the only independent variable that did not achieve statistical significance. The best predictor of GPA was NCEA GPA, followed by NCEA university rank.</p>
Strickland & Cheshire, 2017 (USA)	<p>Aim: To identify whether a correlation exists between admission criteria GPA with the potential criteria EI or CT scores to predict student outcomes</p> <p>Design: Quantitative longitudinal</p> <p>Data collection tools: MSCET score, retrospective student records</p> <p>Data collection period: Not reported</p> <p>Data analysis methods: Pearson's correlation</p>	<p>Independent variables: Admission GPA</p> <p>Science GPA</p> <p>HESI CT score</p> <p>EI score</p> <p>Outcome variables: HESI Pathophysiology score (end of semester one)</p> <p>Pathophysiology final grade (end of semester one)</p> <p>HESI Fundamentals score (end semester two)</p> <p>Fundamentals final grade (end semester two)</p>	<p>Undergraduate nursing students one cohort ($n = 112$)</p> <p>Convenience sample</p> <p>Age, gender and ethnicity not reported</p>	<p>Results: Admission GPA and Fundamentals final grade ($r = .40$, $p = <.01$)</p> <p>Science GPA and Fundamentals final grade ($r = .41$, $p = <.01$)</p> <p>Admission GPA and Pathophysiology final grade ($r = .51$, $p = <.01$)</p> <p>Science GPA and Pathophysiology final grade ($r = .56$, $p = <.01$)</p> <p>Admission GPA and HESI Pathophysiology ($r = .24$, $p = <.05$)</p> <p>Science GPA and HESI Pathophysiology ($r = .29$, $p = <.05$)</p> <p>Neither admission ($r = .06$) or science GPA ($r = .11$) significantly correlated with HESI Fundamentals score.</p> <p>Key findings: Admission GPA and science GPA were significantly correlated with Fundamentals final grade, Pathophysiology final grade and HESI Pathophysiology. Neither admission nor science GPA significantly correlated with HESI Fundamentals score. EI score and HESI CT scores did not significantly correlate with any outcomes.</p>
Tartavouille et al., 2018 (USA)	<p>Aim: To determine the predictors of success in a traditional baccalaureate programme</p> <p>Design: Retrospective, predictive, correlational design</p> <p>Data collection tools: Retrospective review of student records</p> <p>Data collection period: 2016</p> <p>Data analysis methods: Spearman's correlation</p>	<p>Independent variables: HESI-A2 cumulative score</p> <p>Overall pre-requisite GPA</p> <p>Pre-requisite science GPA</p> <p>Interview score</p> <p>Essay score</p> <p>Outcome variables: On-time graduation (within six semesters)</p>	<p>Nursing degree students one cohort ($n = 149$)</p> <p>Age: 19–21 = 28.9%, 22+ = 71.1%</p> <p>Gender: female 87.9%, male 12.1%</p> <p>Ethnicity:</p> <p>White: 82.6%</p> <p>Other: 17.4%</p> <p>Asian: 4%</p> <p>Black/African American: 9.4%</p> <p>American Indian: 0.7%</p>	<p>Results: HESI-A2 cumulative examination result had a negative correlation with on-time graduation which was significant ($r_s (147) = -.284$, $p = .000$)</p> <p>Overall pre-requisite GPA had a strong negative correlation with on-time graduation which was significant ($r_s (147) = -.418$, $p = .000$)</p> <p>Pre-requisite science GPA had a negative correlation with on-time graduation which was significant ($r_s (147) = -.309$, $p = .000$)</p> <p>No results reported for interview or essay scores with on-time graduation. First author verified through personal contact that the correlations were non-significant.</p> <p>Key findings: Students with a low HESI-A2 score took longer to graduate. Students with a higher overall pre-requisite GPA and higher science pre-requisite GPA graduated on time. Interviews and essay scores were not predictive of on-time graduation.</p>

(Continues)

TABLE 3 (Continued)

Authors, year and location	Study	Variables	Population and sample	Results
Timer and Clauson, 2011 (Canada)	<p>Aim: To investigate whether supplemental application and interview scores add to the prediction of student's success</p> <p>Design: Retrospective correlational study</p> <p>Data collection tools: Student data from faculty records</p> <p>Data collection period: 2002–2006</p> <p>Data analysis methods: Chi-square, ANOVA, logistic regression</p>	<p>Independent variables: Admission GPA</p> <p>Interview score</p> <p>Supplemental application score (overall sum of grades assigned to personal statement score and structured resume)</p> <p>Outcome variables: Course grade average</p>	<p>Advanced standing baccalaureate nursing students ($n = 249$)</p> <p>Age: mean 27, range 20–51</p> <p>Gender: female 86.3%, male 13.7%</p> <p>Ethnic minority status: Yes 24.1%</p> <p>No 75.9%</p>	<p>Results: Admission GPA was associated with course grade average ($F = 18.21$ ($df = 3, 243$), $p < .001$)</p> <p>Interview score ($F = 0.83$ ($df = 3, 245$), $p = .48$) and supplemental application score ($F = 0.16$ ($df = 3, 244$), $p = .93$) were not significantly correlated with course grade average</p> <p>Key findings: Those with the highest course grades had significantly higher pre-admission GPA. The interview scores and supplemental application scores did not predict course grade average.</p>
Traynor et al., 2016 (UK)	<p>Aim: To complement existing evidence on the suitability of MMIs as a tool for the selection of nursing candidates onto a BSc nursing programme</p> <p>Design: Cross-sectional validation study</p> <p>Data collection tools: Seven MMI stations, retrospective data from original interview scores and end of first year academic results</p> <p>Data collection period: 2015</p> <p>Data analysis methods: Pearson's correlation coefficients</p>	<p>Independent variables:</p> <p>Personal statement (PS) score</p> <p>Original interview score</p> <p>MMI score</p> <p>Outcome variables: Academic scores at the end of year one in the following modules:</p> <ol style="list-style-type: none"> 1. Health and Well-being 2. Evidence-Based Nursing 3. Professional Nursing Values 4. Practice Module 	<p>First year undergraduate nursing students one cohort ($n = 110$)</p> <p>Convenience sample</p> <p>Age: mean 24, range 19–48</p> <p>Gender: female 92%, male 8%</p> <p>Ethnicity: not reported</p>	<p>PS score and health and well-being ($r = .22$, $p = .029$)</p> <p>PS score and evidence-based nursing ($r = 0.31$, $p = .002$)</p> <p>PS score and professional nursing values ($r = .24$, $p = .019$)</p> <p>PS score and practice module ($r = .14$, $p = .175$)</p> <p>Interview score and health and well-being ($r = -.02$, $p = .824$)</p> <p>Interview score and evidence-based nursing ($r = .11$, $p = .296$)</p> <p>Interview score and professional nursing values ($r = .04$, $p = .705$)</p> <p>Interview score and practice module ($r = -.06$, $p = .558$)</p> <p>MMI score and health and well-being ($r = .07$, $p = .492$)</p> <p>MMI score and evidence-based nursing ($r = .03$, $p = .757$)</p> <p>MMI score and professional nursing values ($r = .06$, $p = .588$)</p> <p>MMI score and practice module ($r = .03$, $p = .753$)</p> <p>Key findings: PS scores were associated with all modules aside from the practice module. Interview scores and MMI scores were not associated with any module outcomes.</p>
Underwood et al., 2013 (USA)	<p>Aim: To investigate the predictive value of HESI-A2 components with nursing student success</p> <p>Design: Correlational Design</p> <p>Data collection tools: Student data from faculty records</p> <p>Data collection period: 2008–2010</p> <p>Data analysis methods: Correlations</p>	<p>Independent variables: HESI-A2 composite scores</p> <p>HESI-A2 sub-scores;</p> <ul style="list-style-type: none"> • Anatomy and Physiology • Mathematics • English <p>Outcome variables: Final course grades in first semester nursing courses;</p> <p>NU301—Fundamentals of Nursing (inc. skills, clinical practice and drug calculations).</p> <p>NU302—Community Health Nursing (inc. skills and clinical practice).</p> <p>NU305—Health and Physical Assessment (inc. skills).</p>	<p>BSN students ($n = 184$)</p> <p>Age, gender and ethnicity not reported</p>	<p>Results: Composite scores and NU301 ($r = .564$, $p = <.01$)</p> <p>Composite scores and NU302 ($r = .609$, $p = <.01$)</p> <p>Composite scores and NU305 ($r = .518$, $p = <.01$)</p> <p>Anatomy & Physiology and NU301 ($r = .350$, $p = <.01$)</p> <p>Anatomy & Physiology and NU302 ($r = .402$, $p = <.01$)</p> <p>Anatomy & Physiology and NU305 ($r = .404$, $p = <.01$)</p> <p>Mathematics and NU301 ($r = .297$, $p = <.01$)</p> <p>Mathematics and NU302 ($r = .239$, $p = <.01$)</p> <p>Mathematics and NU305 ($r = .253$, $p = <.01$)</p> <p>English and NU301 ($r = .503$, $p = <.01$)</p> <p>English and NU302 ($r = .581$, $p = <.01$)</p> <p>English and NU305 ($r = .414$, $p = <.01$)</p> <p>Key findings: All HESI-A2 composite and sub-scores were positively and significantly correlated with grades in all modules.</p>

(Continues)

TABLE 3 (Continued)

Authors, year and location	Study	Variables	Population and sample	Results
Van Hofwegen et al., 2019 (USA)	<p>Aim: To examine how admission data of veteran nursing students predicted quantitative measures of success at the completion of programme</p> <p>Design: Not reported</p> <p>Data collection tools: Student data from faculty records</p> <p>Data collection period: 2009–2013</p> <p>Data analysis methods: Chi-square, logistic regression modelling</p>	<p>Independent variables: TEAS cumulative score</p> <p>Pre-admission science GPA</p> <p>Outcome variables: Graduating GPA</p> <p>Graduating</p>	<p>Student (veterans) enrolled on the nursing programme five cohorts (n = 55)</p> <p>Age: range 22–62</p> <p><25 = 24%</p> <p>26–30 = 46%</p> <p>31–40 = 19%</p> <p>>40 = 11%</p> <p>Gender: female: 43%, male: 57%</p> <p>Ethnicity:</p> <p>Caucasian: 39%</p> <p>African American: 5%</p> <p>Latino: 20%</p> <p>Filipino: 19%</p> <p>Asian: 13%</p> <p>Other: 4%</p>	<p>Results: TEAS and pre-admission science GPA had a non-significant relationship with graduating (chi-square = 1.04; $df = 2$, $p = .6$). TEAS score of 79 or higher or pre-admission science GPA of 3.43 or higher had no better odds of graduating than those with scores below these values.</p> <p>Pre-admission science GPA was a significant predictor of a graduation GPA of at least 3.13 (chi-square = 9.93; $df = 2$, $p = .007$).</p> <p>Students with a pre-admission science GPA of 3.43 or higher increased their odds of graduating with a GPA of 3.13 by a factor of 3.73.</p> <p>Key findings: Higher pre-admission science GPA was predictive of graduating with a score of 3.13. The rest of the results were non-significant.</p>
Wambugh et al., 2016 (USA)	<p>Aim: To examine which admission criteria are useful as predictors of nursing programme success</p> <p>Design: Not reported</p> <p>Data collection tools: Student data from the nursing programme</p> <p>Data collection period: 2009–2014</p> <p>Data analysis methods: Logistic regression modelling</p>	<p>Independent variables: TEAS cumulative score</p> <p>Pre-admission science GPA</p> <p>Healthcare experience</p> <p>Previous baccalaureate degree</p> <p>Outcome variables: Graduating Overall nursing programme GPA</p>	<p>Nursing degree students four cohorts (n = 513)</p> <p>Age, gender and ethnicity not reported</p>	<p>Results: TEAS score was statistically significant ($p = .01$) in predicting graduation rates. The rest were not; pre-admission science GPA ($p = .75$), healthcare experience ($p = .77$), previous baccalaureate degree ($p = .11$).</p> <p>TEAS and pre-admission science GPA were statistically significant predictors of obtaining an overall nursing programme graduation GPA of 3.25 or above ($p = .00$).</p> <p>Key findings: Students with higher pre-admission science GPA were more likely to obtain a score of 3.25 or above, and those with higher TEAS were more likely to graduate and obtain a score of 3.25 or above.</p>
Wolkowitz & Kelley, 2010 (Canada)	<p>Aim: To apply multiple regression model to student test scores to determine the relative strength of science, math, English and reading content areas in predicting early nursing student success</p> <p>Design: Not reported</p> <p>Data collection tools: Existing nursing school records collected from 64 institutions via survey</p> <p>Data collection period: 2005–2008</p> <p>Data analysis methods: Multiple regression analysis</p>	<p>Independent variables: TEAS cumulative score</p> <p>TEAS sub-score;</p> <ul style="list-style-type: none"> • Reading • Mathematics • Science • English <p>Outcome variables: RN-Fundamentals score (taken within first year of course)</p>	<p>BSN students from multiple cohorts (n = 2,000)</p> <p>Age, gender and ethnicity not reported</p>	<p>Results: Reading and RN-Fundamentals ($r = .3$, $p = .01$) Mathematics and RN-Fundamentals ($r = .3$, $p = .01$) Science and RN-Fundamentals ($r = .35$, $p = .01$) English and RN-Fundamentals ($r = .27$, $p = .01$)</p> <p>Relationship between TEAS cumulative sub-scores and RN-Fundamentals score was statistically significant, ($R^2 = .20$, $F(4, 4100) = 256.467$, $p < .01$) explaining 20% of the variance.</p> <p>Key findings: The TEAS sub-scores were all predictive of success with science being the most predictive. The cumulative score is a better indicator of success than the sub-scores.</p>

to compare the selection methods to individual outcome measures; thus, three time point categories were created:

- Early success—any clinical or academic assessment administered in the first year of the programme.
- Continued success—any clinical or academic assessment administered between the second and final years of the programme.
- On-time completion—course completion within the approved duration of study of the programme, without stopping or dropping out.

2.7 | Data synthesis

All studies that met the eligibility for inclusion used a quantitative design. Due to the variety of study designs, analysis and reporting of findings, a meta-synthesis of results was not considered appropriate and the results are thus reported in narrative synthesis format.

3 | RESULTS

3.1 | Total included in review

Twenty-five studies met the eligibility criteria for inclusion.

3.2 | Study characteristics

3.2.1 | Country of origin

Twelve studies were carried out in the USA (Newton & Moore, 2009, Díaz et al., 2012, Underwood et al., 2013, Cunningham et al., 2014, Hinderer et al., 2014, Elkins, 2015, Cheshire et al., 2015, Wambugh et al., 2016, Strickland & Cheshire, 2017, Lui et al., 2018, Tartavouille et al., 2018, Van Hofwegen et al., 2019). Six were undertaken in the UK (Callwood et al., 2018, 2020; Donaldson et al., 2010; Gale et al., 2016; Rankin, 2013; Traynor et al., 2016). Two were carried out in Canada (Timer & Clauson, 2011; Wolkowitz & Kelley, 2010). Only one study was selected from these countries: Jordan (Ahmad & Safadi, 2009), New Zealand (Shulruf et al., 2011), Italy (Lancia et al., 2013), Australia (Pitt et al., 2015) and Israel (Sharon & Grinberg, 2018). The English language limiter may have created a bias for studies conducted in countries where English is the primary language.

3.2.2 | Participants

All participants were undergraduate nursing students enrolled on a pre-registration BSc Nursing Programme with the exception of Donaldson et al., (2010). A total of 10,370 unique participants were included, with 5,323 participants contained within two multicentre studies (Lui et al., 2018; Wolkowitz & Kelley, 2010).

3.2.3 | Demographic information

The demographic details of participants were not fully or consistently reported in all studies.

Age was reported in 16 of the studies and participants' ages ranged from 19–62 (Van Hofwegen et al., 2019; Traynor et al., 2016). The mean age was documented in most studies and ranged from 21.2–29 (Lui et al., 2018; Sharon & Grinberg, 2018).

Gender was cited in 16 studies, with males and females present in all samples (Ahmad & Safadi, 2009; Cheshire et al., 2015; Cunningham et al., 2014; Díaz et al., 2012; Elkins, 2015; Gale et al., 2016; Hinderer et al., 2014; Van Hofwegen et al., 2019; Lancia et al., 2013; Pitt et al., 2015; Rankin, 2013; Sharon & Grinberg, 2018; Shulruf et al., 2011; Tartavouille et al., 2018; Timer & Clauson, 2011; Traynor et al., 2016). Females formed the largest group in most studies apart from Ahmad and Safadi (2009) (58.5% male) and Lancia et al., (2013) (57% male). The rest of the studies reported that the female participants accounted for 64% (Sharon & Grinberg, 2018) to 95% (Rankin, 2013) of the samples.

Caucasian students made up the largest percentage in each cohort and ranged from 39% (Van Hofwegen et al., 2019)–99.4% (Rankin, 2013). Other ethnic groups of students reported in the samples were Pakeha (35%) (Shulruf et al., 2011), Asian ranging from 1.8% (Cunningham et al., 2014)–28% (Shulruf et al., 2011) and African American students ranging from 5% (Cheshire et al., 2015)–9.4% (Tartavouille et al., 2018). A detailed report of the ethnicity of all participants is presented in Table 3.

Most studies revealed a homogeneous sample of Caucasian females in their early twenties. Two studies were conducted with a more divergent group of students. Shulruf et al., (2011) investigated a cohort of school leavers and Van Hofwegen et al., (2019) focussed on military veterans who had received priority admission into their nursing course. This limits the transferability of these results to other student cohorts, considering the wide variety of pathways into nursing education (Donaldson et al., 2010).

3.3 | Research designs

All studies were quantitative and reported a range of designs including correlational studies (Elkins, 2015; Timer & Clauson, 2011; Underwood et al., 2013), correlational studies with predictive design (Lui et al., 2018; Tartavouille et al., 2018), cross-sectional studies (Ahmad & Safadi, 2009; Sharon & Grinberg, 2018; Traynor et al., 2016), longitudinal studies (Gale et al., 2016; Pitt et al., 2015; Rankin, 2013; Strickland & Cheshire, 2017), an observation study (Lancia et al., 2013), retrospective exploratory descriptive designs (Hinderer et al., 2014; Newton & Moore, 2009), cohort studies (Callwood et al., 2018, 2020), an exploratory design (Díaz et al., 2012) and a descriptive causal comparative design (Cheshire et al., 2015). Six studies did not specify a design (Cunningham et al., 2014; Donaldson et al., 2010; Van Hofwegen et al., 2019; Shulruf et al., 2011; Wambugh et al., 2016; Wolkowitz & Kelley, 2010) but all included a correlational

analysis between the independent and dependent variables and were carried out on at least one or more student cohorts.

3.3.1 | Data collection period

Nineteen studies provided their data collection period which ranged from 2002–2018 (Callwood et al., 2018, 2020; Cunningham et al., 2014; Díaz et al., 2012; Elkins, 2015; Gale et al., 2016; Hinderer et al., 2014; Van Hofwegen et al., 2019; Lancia et al., 2013; Lui et al., 2018; Newton & Moore, 2009; Pitt et al., 2015; Rankin, 2013; Tartavouille et al., 2018; Timer & Clauson, 2011; Traynor et al., 2016; Underwood et al., 2013; Wambuguh et al., 2016; Wolkowitz & Kelley, 2010).

3.3.2 | Cognitive screening

Prior academic achievement

Prior academic achievement is defined as any single or combination of academic assessments, such as examinations or assignments, that are taken prior to entering the nursing programme. Fourteen studies reported results on prior academic achievement. There is a significant relationship between pre-programme GPA and continued success in the nursing programme. Participants with a higher GPA on admission were more likely to complete the course, graduate on time (Elkins, 2015; Hinderer et al., 2014; Tartavouille et al., 2018) and have continued academic success throughout the programme (Strickland & Cheshire, 2017). Prior academic grades have a direct impact upon final year GPA with those with a higher pre-admission GPA attaining a higher final GPA (Ahmad & Safadi, 2009; Cunningham et al., 2014; Lancia et al., 2013; Timer & Clauson, 2011). In contrast, two studies reported a non-significant correlation between prior academic achievement and graduation rates. Wambuguh et al. (2016) found that prior study at degree level had no bearing on the likelihood of a participant graduating from the nursing programme, and Newton and Moore (2009) reported that a participant's pre-nursing GPA was not predictive of attrition that was attributed to academic failure.

Shulruf et al., (2011) found that prior academic achievement also predicts early success in the nursing programme, specifically GPA at the end of year one of the programme of study. The same is reported by Rankin (2013), whose findings support the use of pre-admission academic grades as a predictor for academic success in first year, but not for clinical success or programme progression into second year. This is disputed by Strickland and Cheshire (2017) who reported that pre-admission GPA did not correlate with examinations administered before the end of semester one and two of the nursing programme, and these results were corroborated by Díaz et al., (2012) who found no correlation between prior GPA and early academic success.

Prior academic achievement in science

Prior academic achievement in science is defined as any single or combination of scientific academic assessments in topics such as anatomy, physiology, biology, chemistry or physics that are taken

prior to entering the nursing programme. Six studies reported results on prior academic achievement in science. The results suggest that prior academic achievement in science has the power to predict continued academic success (Strickland & Cheshire, 2017) and on-time graduation (Hinderer et al., 2014; Tartavouille et al., 2018), with one study claiming that prior academic achievement in science had greater power to predict academic outcomes than the cumulative pre-admission GPA (Cunningham et al., 2014). Wambuguh et al. (2016) and Van Hofwegen et al., (2019) found that, although prior academic achievement in science GPA did not have the power to predict the probability of graduating, it did predict those who would graduate with a GPA of 3.25 and 3.13 or above, respectively. The highest GPA attainable is 4.0 and the lowest is 0.0. A grade of 2.0 is required to pass the degree programme (Wambuguh et al., 2016).

Admissions tests

Admission tests are defined as examinations or assignments that are administered to every candidate for the nursing programme as part of the application process. These can be standardised, for example the Test of Essential Academic Skills (TEAS) or designed in-house by faculty staff. Seventeen studies reported results on admissions tests. Wolkowitz and Kelley (2010) and Lui et al., (2018) found a significant relationship between the TEAS sub-scores and early nursing school success in the RN-Fundamentals examination. The Science component had the largest correlation followed by Reading, English and Mathematics. Wolkowitz and Kelly (2010) add that the TEAS cumulative score was even more predictive than individual sub-scores. Díaz et al., (2012) found that the TEAS cumulative score was predictive of the RN-Fundamentals examination, but that the sub-scores and the TEAS Critical Thinking scores were not. Wambuguh et al. (2016) add that the TEAS score was a significant predictor of successful completion and obtaining a graduating GPA of ≥ 3.25 . Cunningham et al., (2014) found it to be a particularly strong predictor of a higher GPA in the second semester of year one and in the final year. Newton and Moore (2009) found that the TEAS cumulative score was not predictive of attrition due to academic failure late in the programme, and Van Hofwegen et al., (2019) found that the TEAS scores did not correlate with completion of the nursing programme.

Underwood et al., (2013) investigated the impact of the cumulative and subsection scores of the Health Education Systems Incorporated (HESI)-A2 test. They report that all scores had a positive significant correlation with the end of semester one module outcomes, which comprised elements of academic and clinical practice assessment. The composite score and English sub-score had large correlations, Anatomy and Physiology had moderate and Mathematics had a small correlation. Hinderer et al., (2014) found a moderate correlation between HESI-A2 cumulative examination scores and final nursing graduation GPA, but not with timely progression. Contrary to this, Tartavouille et al., (2018) found that participants with lower HESI-A2 cumulative examination results took longer to complete the course than participants with higher results. Strickland and Cheshire (2017) evaluated the Critical Thinking

Prior Academic Achievement:

High school grade (Ahmad and Safadi 2009)
 Admission GPA (Timer and Clauson 2011, Hinderer et al. 2014, Strickland and Cheshire 2017, Tartavouille et al. 2018)
 Nursing admission GPA (Newton and Moore 2009)
 Prerequisite GPA (Díaz et al. 2012)
 Pre-programme GPA (Elkins et al. 2015)
 GPA at entry (Cunningham et al. 2014)
 Upper secondary diploma grades (Lancia et al. 2013)
 Total NCEA credits attempted (Shulruf et al. 2011)
 Total number of NCEA gained (Shulruf et al. 2011)
 NCEA GPA used for admission (Shulruf et al. 2011)
 Total credits gained from credits attempted (Shulruf et al. 2011)
 NCEA university ranking (Shulruf et al. 2011)
 Overall pre-requisite GPA (Tartavouille et al. 2018)
 Prior academic attainment (Rankin 2013)
 Previous degree qualification (Whambuguh et al. 2016)

Prior Academic Achievement in Science:

Science GPA (Cunningham et al. 2014, Hinderer et al. 2014, Strickland and Cheshire 2017)
 Pre-admission cumulative science GPA (Wambuguh et al. 2016, Van Hofwegan et al. 2019)
 Pre-requisite science GPA (Tartavouille et al. 2018)

Admissions Tests:

ATI-TEAS score (Díaz et al. 2012, Cunningham et al. 2014)
 ATI-TEAS sub-scores in English, mathematics, science and reading (Díaz et al. 2012)
 ATI Critical Thinking (Díaz et al. 2012)
 ACT scores (Elkins 2015)
 HESI-A2 examination score (Hinderer et al. 2014)
 HESI-A2 composite score (Underwood et al. 2013, Tartavouille et al. 2018)
 HESI-A2 Anatomy and Physiology score (Underwood et al. 2013)
 HESI-A2 Mathematics score (Underwood et al. 2013)
 HESI-A2 English score (Underwood et al. 2013)
 TEAS V sub scores in reading, mathematics, science and English (Wolkowitz and Kelley 2010, Lui et al. 2018)
 TEAS cumulative score (Newton and Moore 2009, Wolkowitz and Kelley 2010, Wambuguh et al. 2016, Van Hofwegan et al. 2019)
 HESI Critical Thinking (CT) total score (Strickland and Cheshire 2017)
 HSRT CT and sub scores (Analysis, Inference, Evaluation, Inductive Reasoning, Deductive Reasoning) (Pitt et al. 2015)
 Nursing Degree Programme Admission test score (Lancia et al. 2013)
 Essay score (Tartavouille et al. 2018)
 Admissions test elements of the Interview Score Sheet (arithmetic score, subject knowledge, understanding the role of the nurse, standard of written work and content of written work) (Donaldson et al. 2010)
 Admissions test elements of the overall MMI score (Literacy and Mathematics) (Gale et al. 2016)

Individual Face-to-face Interviews:

Interview score (Donaldson et al. 2010, Timer and Clauson 2011, Traynor et al. 2016, Tartavouille et al. 2018)

Multiple Mini Interviews:

MMI Cumulative score (Traynor et al. 2016, Callwood et al. 2018, Callwood et al. 2020)
 MMI data (numeracy exam, literacy exam and interview score) (Gale et al. 2016)

Emotional Intelligence Tests:

Mayer-Salovey-Caruso EI Test (MSCEIT) branch scores (Cheshire et al. 2015)
 Mayer-Salovey-Caruso EI Test cumulative score (MSCEIT) (Cheshire et al. 2015, Strickland and Cheshire 2017)
 Assessing Emotions Scale (AES) (Rankin 2013)
 Schutte Self-Report Emotional Intelligence Test (SSEIT) (Sharon and Grinberg 2018)

Psychometric Tests:

Psychometric Entry Test score (Sharon and Grinberg 2018)

Personal Statements, Résumés and References:

Sum of personal statement and resume scores (Timer and Clauson 2011)
 Applicant statement and work/school reference (Donaldson et al. 2010)
 Personal statement score Traynor et al. (2016)

Previous Healthcare Experience:

Health care experience (Wambuguh et al. 2016)
 Previous healthcare work experience (Donaldson et al. 2010)

Combined Screening:

HESI-A2 examination scores and prior GPA/science GPA (Hinderer et al. 2014)
 GPA and ATI-TEAS (Cunningham et al. 2014)

FIGURE 4 Selection method categories

subsection of the HESI-A2 test and found that it did not correlate with any examination results in semester one or two of a five-semester programme. This is the only sub-score of the HESI-A2 that did not achieve statistical significance.

Pitt et al., (2015) reported significant correlations between the Health Sciences Reasoning Test (HSRT) Critical Thinking cumulative and sub-scores, academic performance and completing the course on time. They found no correlation between Critical Thinking scores and clinical practice performance. Elkins (2015) investigated The American College Test (ACT) and found a significant correlation between the ACT scores and on-time completion of the nursing programme, although the exact results are not reported within the paper. Lancia et al., (2013) found that a cumulative score on the Nursing Degree Programme Admission Test did not correlate significantly with final degree grade or average value of examinations score throughout the programme.

Gale et al., (2016) carried out a study to discern the predictive validity of in-house selection tests in numeracy and literacy. The results show that there is a statistically significant correlation between numeracy testing and academic outcomes in years 1, 2 and 3. There is a small correlation between literacy and the same outcomes, but it is not statistically significant. Donaldson et al., (2010) designed an interview score sheet that included admissions tests in arithmetic, subject knowledge, role of the nurse, standard of written work and content of written work. The results indicate that participants who were successful in passing all year one modules and completing the CFP had significantly higher scores in standard of written work, content of written work and subject knowledge than those who were unsuccessful.

Essay scores were listed as a variable to predict on-time graduation by Tartavouille et al., (2018) but no findings on this variable were reported in the paper. Personal communication with the authors confirmed that this was because no statistically significant relationship was found.

3.3.3 | Non-cognitive screening

Individual face-to-face interviews

Individual face-to-face interviews are defined as traditional panel interviews comprising 2–3 interviewers and one applicant who is answering a series of predetermined questions and being scored according to the answers they give. Four studies reported results on interviews. Traynor et al., (2016) reported that interview scores did not correlate with first year academic module results. Timer and Clauson (2011) found that interview scores were not significantly correlated with participants' final GPA at course completion. Donaldson et al., (2010) found a small significant correlation between interview score and participants who successfully completed the CFP, but only reported the score awarded for the communication aspect of the interview, rather than the overall interview score. Interview scores were listed as a variable to predict on-time graduation by Tartavouille et al., (2018) but no findings on

this variable were reported in their paper. Personal communication with the authors confirmed that this was because no statistically significant result was found between scores and on-time graduation. No studies support the use of interviews as a valid predictor of early or continued success in either academic or clinical outcomes.

Multiple mini interviews

Multiple Mini Interviews (MMI) are defined as interviews where candidates rotate around multiple interview stations, typically 6–7, each with a different examiner testing one specific attribute or competency through scenario or situational judgement-based questions (Traynor et al., 2016). Four studies reported correlations between MMI scores and course outcomes. Traynor et al., (2016) and Callwood et al., (2018) investigated the relationship between MMI scores and participants' early academic success and clinical outcomes at the end of first year. Neither study found any correlation. Callwood et al., (2020) followed the same group of participants into final year and reported a statistically significant positive correlation between MMI scores and participants' clinical outcomes, but no correlation was found with academic outcomes. Gale et al., (2016) found in favour of using MMIs, stating a significant correlation between MMI scores in both early and continued academic outcomes in years 1, 2 and 3. This MMI score was a cumulative score comprising a combination of skills stations which included a numeracy and a literacy skills station.

Emotional intelligence tests

Emotional intelligence (EI) tests are defined as any test or self-reporting scale that measures participants' ability to recognise and manage their own emotions and the emotions of others (Rankin, 2013). There is no indication in the literature that EI tests are currently being used as a selection method for baccalaureate nursing programmes. As a potentially emerging selection method with a growing body of evidence into their ability to predict nursing programme outcomes, the results are included in this review.

Four studies reported results on EI tests. Sharon and Grinberg (2018) found a positive correlation between EI scores and the grade average of first-year and second-year participants using the Schutte Self-Report Emotional Intelligence Test (SSEIT), administered at the beginning of each academic year. Rankin (2013) also found a significant relationship between EI scores and academic attainment, clinical performance and retention at the end of year one as measured by the Assessing Emotions Scale (AES) (this is the same scale as the SSEIT) adding that EI is a powerful predictor of clinical practice performance.

Cheshire et al., (2015) found no statistical difference between groups of participants whose cumulative scores ranked low, medium or high in the Mayer-Salovey-Caruso EI Test (MSCEIT) on final academic grades. When the four sub-scales were examined, Facilitation of Emotion was the only sub-scale to achieve statistical significance for those with higher scores on final academic grades. Strickland and Cheshire (2017) found that EI scores on the MSCEIT did not

correlate with any early success on examinations in semester one or continued success in the participants' final examinations.

Psychometric tests

The Psychometric Entrance Test (PET) is a psychometric selection test administered to students in Israel and is thought to have the ability to predict participants' academic performance at university. As part of their investigation into EI scores, Sharon and Grinberg (2018) compared the effect that PET scores would have on participants' academic grades. They concluded that high PET scores had less predictive power on participants' grades than EI scores, although the exact figures were not presented within their paper. This was the only study to report on psychometric tests.

Personal statements, résumés and references

Three studies reported on personal statements (which are autobiographical essays), résumés or references from school or work placements. Traynor et al., (2016) found a positive correlation between personal statement scores and early academic outcomes in first year in 3 out of 4 modules taken by the participants. The only correlation that did not achieve statistical significance was with the practice module. Timer and Clauson (2011) combined the participants' personal statement and résumé scores and stated that the total score was not predictive of final GPA at graduation. They add that inter-rater reliability between scorers in both segments was poor and that they had used graduate nursing students to screen these as opposed to admissions staff or nursing faculty staff. Donaldson et al., (2010) found no statistically significant correlation between participants' supporting application statements and completion of the CFP. They found a significant correlation between the reference scores of those who completed and those who did not. Participants with higher scores were more likely to complete.

Previous healthcare experience

Previous healthcare experience is defined as any prior experience working or volunteering in healthcare environments prior to commencing the nursing programme. Two studies considered the predictive validity of previous healthcare experience. Wambuguh et al. (2016) concluded that previous healthcare experience did not increase the likelihood of a student graduating, nor did it correlate to final GPA scores. Donaldson et al., (2010) tested previous healthcare work experience for participant success on the CFP but found no statistically significant correlation.

Combined screening

Two studies reported on the combined selection scores of participants. Hinderer et al., (2014) looked at HESI-A2 examination scores and pre-programme science GPA in combination as a predictor of timely progression through the nursing programme. They stated that the combined selection method was significant and that the full model was able to predict 84% of successful cases. They also combined HESI-A2 scores and prior GPA and found that the full model was able to predict timely progression in 83% of cases.

Cunningham et al., (2014) combined their four most predictive variables (overall GPA at entry, science GPA at entry, TEAS score and number of completed pre-requisite courses) from their analysis. This combination was able to explain a statistically significant proportion of the variance in each of the outcome variables, all of which were examinations. This was in comparison with their points-based system which allocated each participant an admission score from a combination of criteria that was weighted by the expert opinion of the educators at the university. Both models were measured against participant performance outcomes and the statistically derived model explained more of the variance than the points-based system.

4 | DISCUSSION

The aim of this review was to gather and synthesise evidence from published studies that have reported on the predictive validity of selection methods used to admit candidates into pre-registration nursing programmes. The lack of standardisation of entry requirements across nursing programmes, with different universities employing a wide variety of selection methods, made comparison between studies difficult. Once the independent variables were categorised, distinct themes emerged.

Cognitive screening methods such as prior academic achievement, prior academic achievement in science and admission tests were the most consistently cited methods that had the ability to predict continued success in nursing programmes. These methods were shown to be predictive of academic achievement throughout the course as well as predictive of successful programme completion. There was insufficient evidence to conclude that non-cognitive screening methods such as interviews, psychometric tests, personal statements or previous healthcare experience were predictive of clinical or academic success. The exception to this was MMI and EI scores, which were the only non-cognitive screening methods to correlate with clinical competence and academic achievements, but the results were conflicting. Using regression analysis, Cunningham et al., (2014) and Hinderer et al., (2014) combined several selection methods into an overall selection model, which appeared to demonstrate high levels of reliability in selecting students who were most likely to succeed.

The merits of academic selection through prior academic achievement or admissions tests are well established as a reliable indicator of future academic achievement in healthcare programmes in higher education (Patterson et al., 2018; Schmidt & MacWilliams, 2011). Our systematic review further corroborates this. Achieving a certain level of academic achievement prior to commencing university education is seen as a necessary criterion, but insufficient on its own (Jones-Schenk & Harper, 2014; Lancia et al., 2013; McNelis et al., 2010). The temptation for university selectors could be to simply raise the academic entry requirements so that only those most likely to succeed, based on evidence from prior academic achievement, would be accepted onto nursing programmes. This is replete with difficulties such as grade inflation (Timer & Clauson, 2011;

Underwood et al., 2013) and can be seen as a barrier to admission by some applicants from minority groups (Kelly et al., 2018).

Interviews are often seen as a way of diversifying and enhancing applications and allow candidates to explain and expand on their written application form. This method can be popular with applicants as they believe it gives them the opportunity to portray their non-academic attributes such as communication skills or their 'desire' to be a nurse (House et al., 2015). The evidence identified in our review indicates that traditional face-to-face interviews do not correlate with nursing students' academic or clinical practice outcomes and are therefore not predictive of student success (Tartavouille et al., 2018; Timer & Clauson, 2011; Traynor et al., 2016). Similar non-significant results were reported for psychometric tests, personal statements, résumés and previous healthcare experience (Timer & Clauson, 2011, Traynor et al., 2016, Whambugh et al., 2016, Sharon & Grinberg, 2018). However, the body of evidence available from investigating these methods is small and few certain conclusions can be reached about their effectiveness at predicting academic or clinical outcomes at present. More research is required to validate their continued use as selection methods.

Multiple Mini Interviews are seen as an alternative to traditional face-to-face interviews. This method of interview is common in healthcare selection (Callwood et al., 2018). Although resource intensive, this method has been shown to be predictive of some student outcomes and has the added benefit of reducing interviewer bias which is sometimes encountered by applicants on face-to-face interview panels (Pau et al., 2013). MMIs were one of only two non-cognitive screening methods to report any positive and significant correlations between selection scores and clinical and academic outcomes (Gale et al., 2016, Callwood et al. 2020), although not in every case (Traynor et al., 2016, Callwood et al. 2018). The differences in findings could be explained by any number of factors including differences in station design, interviewer skill or experience and course content or structure. It must also be factored in that some participants had already been given a place on the course and that their voluntary participation in the study happened after the initial interview process (Traynor et al., 2016). This may have influenced the results as the participants had already embarked on the nursing programme, and there may have been less preparation undertaken prior to the interviews as the scores did not count towards any outcomes.

There was a positive correlation between EI scores and student outcomes found in two of the studies using the AES score and the SSEIT scale (which is essentially the same 5-point Likert self-reporting scale). It is a valid measurement tool with a high internal consistency and a Cronbach's alpha of 0.90 (Schutte et al., 2007). Rankin (2013) acknowledges the limitation of using self-reporting scales as selection methods as these may discourage applicants from providing honest responses in fear of being penalised by giving unfavourable answers. Rankin (2013) suggested that rather than it being used as a selection tool by a university, it could be used by applicants as a self-assessment tool to evaluate their own emotional readiness to undertake a pre-registration nursing course. Caution must be used when selecting the type of EI scale as the MSCEIT (which is not

considered a self-reporting scale) showed no correlations with student outcomes (Cheshire et al., 2015; Strickland & Cheshire, 2017).

When several selection methods are combined into a selection model, the ability to predict successful students appears to increase, and this has been cited as a more effective method of predicting nursing student success (Schmidt & MacWilliams, 2011, Al-Alawi et al., 2020). Selection formulas comprising the most predictive selection methods, based on statistical tests that assign the comparative weight of each method, is more successful than using experience or expertise to judge which selection criteria should be allocated more weight (Cunningham et al., 2014). However, these models were tested on retrospective student cohorts and were not verified for use with real-time participants.

There were clear limitations in the designs of the studies reviewed, notably that several failed to follow the participants through to completion of the programme. Had a complete follow-up been undertaken this would have allowed for greater exploration of how the selection variables influenced students' long-term outcomes. This is observed in the studies of Callwood et al., (2018) and Callwood et al., (2020), where significant findings were reported in the second study but not the first. The shorter follow-up times were justified by the authors due to the large percentage of attrition seen within the first year of study in nursing programmes. These results, however, are useful in identifying students at risk of failure early in the programme and will help educators plan and implement strategies that support students as they progress through the course (Donaldson et al., 2010; Hofwegen et al., 2019; Tartavouille et al., 2018).

Wolkowitz and Kelley (2010) and Lui et al., (2018) were the only studies to use a multicentre design across 204 and 64 sites, respectively, adding to the rigour, validity and transferability of their results. The remaining studies were carried out using a single cohort or institution. Investigating multiple cohorts and institutions would have led to greater reliability of the results and could have demonstrated greater consistencies across cohorts.

The last limitation of note was that many studies did not report non-significant findings, and this was verified by the authors who responded to our personal communications. To enable a full comprehension of findings, it is well recognised in research that non-significant results as well as significant results should be reported as this helps to inform future practice and research.

5 | RECOMMENDATIONS

This review has shown that universities have a valuable resource of student data on admission and progression. This can be used to identify and report on selection methods that are more effective in predicting students who are likely to be successful in programme outcomes. Future research could track students from the beginning to the end of the course to determine a more accurate picture of the undergraduate journey, and how the selection methods predict a range of academic and clinical outcomes. There was little information contained in these studies to indicate why students were

failing or dropping out in the early stages of study (e.g. academic, clinical, social or economic reasons). This could be a focus for future research.

More evidence is needed to justify the continued use of non-cognitive screening methods such as face-to-face interviews, psychometric tests, personal statements and previous healthcare experience. These methods may add value in combined selection models or have merit in other ways, but their use as predictive methods of selection is not warranted on the basis of existing evidence. There is also a need for more evidence into selection methods that predict students' clinical outcomes, considering that the clinical element accounts for a large proportion of their course. Any research into this topic would have to consider the well-known difficulties associated with clinical practice grading, such as a lack of grading consistency and bias on behalf of the clinical assessor (Bradshaw et al., 2013; Callwood et al., 2018).

6 | RELEVANCE TO CLINICAL PRACTICE

Identifying selection methods that are predictive of student success is clearly valuable in promoting high standards of patient care. Selecting students who are likely to complete the programme and have successful clinical and academic outcomes increases the availability of the graduate nursing work force and enhances the quality of care provided to patients.

Combined selection models that comprise multiple selection methods appear to increase the probability of selecting students that will have successful outcomes. Due to differences in assessments, course structures and school ethos, it would be difficult to identify one model that would fit all institutions. It may be more appropriate for institutions to design their own combined selection models with the weighting of each criterion based on statistical testing as opposed to expert judgement.

Identifying selection methods that can predict successful students does not remove the responsibility of universities to champion applications from diverse populations of people from different backgrounds and ethnic groups. University selection scores can also be used in a commitment to identify and support students who are at risk of failure as well as success. This reduces the temptation for universities to simply raise the minimum academic entry requirements so that only those more likely to succeed, based on these methods, are encouraged to apply (Seidman, 2012).

7 | LIMITATIONS

This systematic review was limited to studies published in peer-reviewed journals, within a specific timeframe potentially excluding other relevant literature. Every effort was made to ensure that all relevant literature was identified and included in this review, but it is possible that some may have been missed, such as studies published in non-English languages. Although a stringent checking method

was used to ensure the accuracy of the data extraction and reporting, it is possible that errors were made during manual transfer of information.

Due to the differences in population and location of the samples, caution should be used when considering the transferability of the results between schools of nursing.

8 | CONCLUSION

Undertaking the selection of individuals with the appropriate knowledge, interpersonal skills and personal qualities needed to complete an undergraduate nursing programme is an important part of the role of nurse educators. This review shows that a wide variety of selection methods are used across different institutions, some of which are more effective than others in predicting student outcomes. The evidence suggests that prior academic achievement and admissions tests are the most predictive methods of student success when compared with other selection methods such as interviews, psychometric testing, personal statements and previous healthcare experience. Further research into selection methods using larger sample sizes across multiple institutions will add to the body of evidence on how higher education institutions can best select the individuals that will successfully complete the nursing programme.

ACKNOWLEDGEMENTS

We would like to acknowledge the contribution of the Life and Health Sciences subject librarian Ms Geraldine Delaney for her assistance in helping to develop the search terms.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

All four authors have made a substantial contribution to the conception and design, or acquisition of data, or data synthesis and interpretation of data. They have all been involved in drafting the manuscript or revising it critically for important intellectual content. They have all given final approval for this version to be published and have agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

ORCID

Caroline Crawford  <https://orcid.org/0000-0002-7464-0727>

Pauline Black  <https://orcid.org/0000-0002-2220-2143>

Vidar Melby  <https://orcid.org/0000-0002-4813-1144>

Ben Fitzpatrick  <https://orcid.org/0000-0001-6355-9272>

REFERENCES

Ahmad, M. M., & Safadi, R. R. (2009). Entry criteria and nursing students' success. *Jordan Medical Journal*, 43(3), 189–196.

- Aiken, L. H., Sloane, D. M., Bruyneel, L., Van dan Heede, K., Griffiths, P., Busse, R., Diomidous, M., Kinnunen, J., Kózka, M., Lessaffre, E., McHugh, M. D., Moreno-Casbas, M. T., Rafferty, A., Schwendimann, R., Scott, A., Tishelman, C., Van Achterberg, T., & Sermeus, W. (2014). Nurse staffing and education and hospital mortality in nine European countries: A retrospective observational study. *The Lancet*, *383*(9931), 1824–1830.
- Al-Alawi, R., Oliver, G., & Donaldson, J. F. (2020). Systematic review: Predictors of students' success in baccalaureate nursing programs. *Nurse Education in Practice*, *48*, 102865. <https://doi.org/10.1016/j.nepr.2020.102865>
- Bradshaw, C., O'Connor, M., Egan, G., Tierney, K., Butler, M., Fahy, A., Tuohy, D., Cassidy, I., Quillinan, B., & McNamara, M. (2013). Nursing students' views of clinical competence assessment. *British Journal of Nursing*, *21*(15), 923–927.
- Callwood, A., Cooke, D., Bolger, S., Lemanska, A., & Allan, H. (2018). The reliability and validity of multiple mini interviews (MMIs) in values based recruitment to nursing, midwifery and paramedic practice programmes: Findings from an evaluation study. *International Journal of Nursing Studies*, *77*, 138–144.
- Callwood, A., Groothuizen, J., Lemanska, A., & Allan, H. (2020). The predictive validity of multiple mini interviews (MMIs) in nursing and midwifery programmes: Three year findings from a cross-discipline cohort study. *Nurse Education Today*, *88*, 104320. <https://doi.org/10.1016/j.nedt.2019.104320>
- Capponi, N., & Mason Barber, L. A. (2020). Undergraduate nursing program admission criteria: A scoping review of the literature. *Nurse Education Today*, *92*, 1–14.
- Cheshire, M. H., Strickland, H. P., & Carter, M. R. (2015). Comparing traditional measures of academic success with emotional intelligence scores in nursing students. *Asia-Pacific Journal of Oncology Nursing*, *2*(2), 99–106.
- Critical Appraisal Skills Programme Checklist (2018). *Checklist for Cohort Studies*. Retrieved from https://casp-uk.net/wp-content/uploads/2018/03/CASP-Systematic-Review-Checklist-2018_fillable-form.pdf
- Cunningham, C. J. L., Manier, A., Anderson, A., & Sarnosky, K. (2014). Rational versus empirical prediction of nursing student success. *Journal of Professional Nursing*, *30*(6), 486–492.
- Díaz, M. I., Sánchez, A., & Tanguma, J. (2012). Predictors of success for Hispanic nursing students in the first BSN course. *Hispanic Healthcare International*, *10*(2), 84–92.
- Donaldson, J., McCallum, J., & Lafferty, P. (2010). Can we predict successful completion of the common foundation programme at interview?. *Nurse Education Today*, *30*, 649–656.
- Elkins, N. (2015). Predictors of retention and passing the national council licensure examination for registered nurses. *Open Journal of Nursing*, *5*(3), 218–225.
- Francis, R. (2013). *The Mid Staffordshire HNS Foundation Trust Public Enquiry*. The Stationary Office.
- Gale, J., Ooms, A., Grant, R., Paget, K., & Marks-Maran, D. (2016). Student nurse selection and predictability of academic success: The multiple mini interview project. *Nurse Education Today*, *40*, 123–127.
- Hinderer, K. A., DiBartolo, M. C., & Walsh, C. M. (2014). HESI Admission Assessment (A2) examination scores, programme progression and NCLEX-RN success in baccalaureate nursing: An exploratory study of dependable academic indicators of success. *Journal of Professional Nursing*, *30*(5), 436–442.
- House, S. L., Sturgeon, L., Garrett-Wright, D., & Blackburn, D. (2015). BSN admission group interviews: Perceptions of students, faculty, and community nurses. *Nursing Education Perspectives*, *36*(1), 58–59.
- Ingham-Broomfield, R. (2016). A nurses' guide to the hierarchy of research designs and evidence. *Australian Journal of Advanced Nursing*, *33*(3), 38–43.
- Jones-Schenk, J., & Harper, M. G. (2014). Emotional Intelligence: An admission criterion alternative to cumulative grade point average for prelicensure students. *Nurse Education Today*, *34*, 413–420.
- Kelly, M. E., Patterson, F., O'Flynn, S., Mulligan, J., & Murphy, A. W. (2018). A systematic review of stakeholder views of selection methods for medical school admission. *BMC Medical Education*, *18*(139), 1–26.
- Keogh, B. (2013). *Review into the quality of care and treatment provided by 14 hospital trusts in England: Overview report*. London: NHS England.
- Lancia, L., Petrucci, C., Giorgi, F., Dante, A., & Cifone, M. G. (2013). Academic success or failure in nursing students: Results of a retrospective observational study. *Nurse Education Today*, *33*, 1501–1505.
- Liao, L., Sun, X., Yu, H., & Li, J. (2016). The association of nurse educational preparation and patient outcomes: Systematic review and meta-analysis. *Nurse Education Today*, *42*, 9–16.
- Lui, X., Codd, C., & Mills, C. (2018). Incremental effect of academic predictors on nursing admission assessment. *Nurse Educator*, *43*(6), 292–296.
- Mazhindu, D. M., Griffiths, L., Pooke, C., Erskine, A., Ellis, R., & Smith, F. (2016). The nurse match instrument: Exploring professional nursing identity and professional values for future nurse recruitment. *Nurse Education in Practice*, *18*, 36–45.
- McNelis, A. M., Wellman, D. S., Krothe, J., Hrisomalos, D. D., McElveen, J. L., & South, R. J. (2010). Revision and evaluation of the Indiana University School of nursing baccalaureate admission process. *Journal of Professional Nursing*, *26*(3), 188–195.
- Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & PRISMA Group (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA Statement. *Annals of Internal Medicine*, *151*(4), 264–269.
- Newton, S. E., & Moore, G. (2009). Use of aptitude to understand Bachelor of Science in nursing student attrition and readiness for the national council licensure examination-registered nurse. *Nurse Education Today*, *25*(5), 273–278.
- Nursing and Midwifery Council (2018). *Future Nurse: Standards of Proficiency for Registered Nurses*. NMC.
- Patterson, F., Roberts, C., Hanson, M. D., Hampe, W., Eva, K., Ponnampuruma, G., Magzoub, M., Tekian, A., & Cleland, J. (2018). Ottawa consensus statement: Selection and recruitment to the health care professions. *Medical Teacher*, *40*(11), 1091–1101.
- Pau, A., Jeeveratnam, K., Chen, Y., Fal, A., Khoo, C., & Nadarajah, D. (2013). The multiple mini interview (MMI) for student selection in health professions training – A systematic review. *Medical Teacher*, *35*(12), 1027–1041.
- Pitt, V., Powis, D., Levette-Jones, T., & Hunter, S. (2015). The influence of critical thinking skills on performance and progression in a pre-registration nursing programme. *Nurse Education Today*, *35*(1), 125–131.
- Rankin, B. (2013). Emotional intelligence: enhancing values-based practice and compassionate care in nursing. *Journal of Advanced Nursing*, *69*(12), 2717–2725.
- Schardt, C., Adams, M. B., Owens, T., Keitz, S., & Fontelo, P. (2007). Utilization of the PICO framework to improve searching PubMed for clinical questions. *BMC Medical Informatics and Decision Making*, *7*(16), 1–6.
- Schmidt, B., & MacWilliams, B. (2011). Admission criteria for undergraduate nursing programs: A systematic review. *Nurse Educator*, *36*(4), 171–174.
- Schutte, N. S., Malouff, J. M., Thorsteinsson, E. B., Bhullar, N., & Rooke, S. E. (2007). A meta-analytic investigation of the relationship emotional intelligence and health. *Personality and Individual Differences*, *42*, 921–933.
- Seidman, A. (2012). *College Student Retention* (2nd ed.). Rowman and Littlefield Publishers.

- Sharon, D., & Grinberg, K. (2018). Does the level of emotional intelligence affect the degree of success in nursing studies?. *Nurse Education Today*, 64, 21–26.
- Shulruf, B., Wang, Y. G., Zhao, Y. J., & Baker, H. (2011). Rethinking the admission criteria to nursing school. *Nurse Education Today*, 31(8), 727–732.
- Strickland, H., & Cheshire, M. (2017). Exploring the correlation between non-traditional variables and student success: A longitudinal Study. *Journal of Nursing Education*, 56(6), 351–355.
- Talman, K., Hupli, M., Puukka, P., Leino-Kilpi, H., & Haavisto, E. (2018). The predictive value of two on-site selection methods of undergraduate nursing students: A cohort study. *Journal of Nursing Education and Practice*, 8(7), 12–21.
- Tartavouille, T., Adorno, M., Garbee, D., Kensler, P., Manning, J., & Pierce, S. (2018). Predictors of success in BSN students. *International Journal of Nursing Education Scholarship*, 15(1), 1–8.
- Timer, J. E., & Clauson, M. I. (2011). The use of selective admissions tools to predict students' success in advanced standing baccalaureate nursing program. *Nurse Education Today*, 31(6), 601–606.
- Traynor, M., Galanouli, D., Roberts, M., Leonard, L., & Gale, T. (2016). Identifying applicants suitable to a career in nursing: a value-based approach to undergraduate selection. *Journal of Advanced Nursing*, 73(6), 1443–1454.
- Underwood, L. M., Williams, L. L., Lee, M. B., & Brunnert, K. A. (2013). Predicting baccalaureate nursing students' first semester outcomes: HESI admission assessment. *Journal of Professional Nursing*, 29(25), 38–42.
- Van Hofwegen, L., Eckfield, M., & Wambuguh, O. (2019). Predicting nursing program success for Veterans: Examining the importance of TEAS and pre-admit science GPA. *Journal of Professional Nursing*, 35(3), 209–215.
- Wambuguh, O., Eckfield, M., & Van Hofwegen, L. (2016). Examining the importance of admissions criteria in predicting nursing program success. *International Journal of Nursing Education Scholarship*, 13(1), 87–96.
- Willis, P. (2013). *Quality with Compassion: The Future of Nursing Education*. London Royal College of Nursing. <https://www.macmillan.org.uk/documents/newsletter/willis-commission-report-macmail-dec2012.pdf>
- Wolkowitz, A. A., & Kelley, J. A. (2010). Academic predictors of success in a nursing program. *Journal of Nursing Education*, 29(9), 498–503.

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

How to cite this article: Crawford C, Black P, Melby V, Fitzpatrick B. An exploration of the predictive validity of selection criteria on progress outcomes for pre-registration nursing programmes—A systematic review. *J Clin Nurs*. 2021;30:2489–2513. <https://doi.org/10.1111/jocn.15730>

2.7 Theoretical concepts

This section reports on the theoretical frameworks and concepts that were considered for this study. Theoretical concepts can help to explain the phenomenon under investigation and provide a structure to aid with the design of the methodology and interpretation of results (Parahoo 2014). The theoretical concepts that were considered for this study were the Formula for Student Success (Seidman 2012), the Geometric Model of Student Persistence (Swail 2004) and the Theory of Individual Departure (Tinto 1987). These models were selected for consideration as they focus primarily on undergraduate students and the factors that influence their success at university. The Formula for Student Success by Dr Alan Seidman was ultimately chosen to guide the methodology for this study, and the rationale for this is provided below.

Seidman's model: Formula for Student Success

Seidman (2012) argues that retaining students in higher education to complete their academic and personal goals is in the best interests of the student and the university. The skills that are developed in higher level education, such as critical thinking, healthy debate, a catalyst for change, an increase in knowledge and the development of the skills required to be a lifelong learner, are crucial to modern day living. The education that a student receives at university aims to prepare them for this. Higher education usually leads to better paid graduate jobs, career advancement and increased job stability, while leaving early due to academic failure has financial implications for both the student and the university.

A concept widely studied by Seidman is the idea that students can be identified as 'at risk' of failure or dropping out through their prior academic record and demographic characteristics. Students deemed 'at risk' should be offered immediate, additional and intensive support at the earliest opportunity before the programme of study has even commenced: a pre-enrolment academic 'physical' examination. There are groups of individuals that may require additional assistance to aid them to develop the necessary skills required to complete the course successfully, such as underrepresented minorities, older adults re-entering education, carers, those from a low-income household or those with any other type of social disadvantage. The background literature and systematic review demonstrated that there were multiple factors being reported, with varying predictive validity, that may influence the academic outcomes of

nursing students in undergraduate degree programmes. These are not solely limited to selection methods, but include demographic characteristics also. While non-modifiable demographic characteristics could never form part of a selection process, they could be used to identify students who are ‘at risk’ of attrition and who require additional supports at an early opportunity to help them succeed. While investigation into effective selection is warranted, so too is the need to identify students at risk of attrition, to help increase the numbers of students completing university and subsequently being eligible to apply to join the NMC register.

Literature has evidenced that there are some demographic and academic characteristics that can help to identify students who are at risk of failure in nursing programmes, including prior academic achievement, admissions test scores, age, gender and ethnic origin (Prymachuk et al. 2009, Wray et al. 2017, Bulfone et al. 2021, Crawford et al. 2021). To aid individualism, a university can use data from previous cohorts to identify students who struggle with the clinical or academic aspects of the nursing programme. This implies that demographic characteristics and selection scores can be used for more than just allocating a position on a programme of study. By determining some of these characteristics using previous student data, it may be possible to identify students who are at risk of attrition or failure at Ulster University and offer early and intensive intervention to help them succeed. This would benefit students, staff, and the healthcare system, as it helps to reduce the students’ distress associated with failures, reduces the assessment workload associated with repeating assessments, and maximises the transition of nursing students into the nursing profession.

Seidman’s retention formula is as follows:

Retention = early identification + (early + intensive + continuous) intervention

This formula can be adapted to suit any type of educational institution whether it is delivered face-to-face or online at undergraduate or postgraduate level of study. It is suitable for all types of students regardless of cultural background, availability of social support, dependents, financial situation, prior academic achievement, religion, age, or any other type of characteristic.

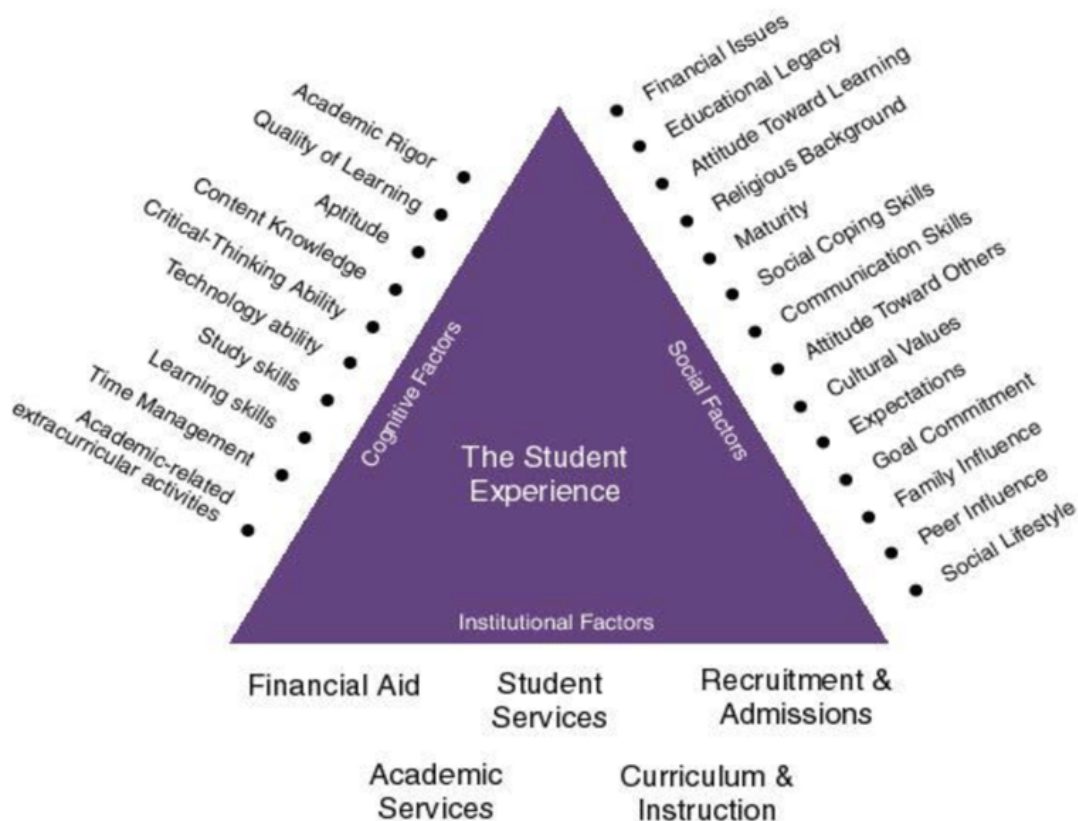
Seidman (2012) defines a university retention rate as the number of students enrolling at the beginning of a programme of study, minus the number of students who do not enrol on subsequent semesters of the same programme. The early identification aspect of the formula seeks to assess a student's skills (at application and prior to enrolment), to consider the student's prior academic record, or other characteristics such as demographic characteristics or personal issues that may hinder successful completion. Early intervention is implemented as soon as possible after the identification of 'at risk' students, even before enrolment, for example in a summer school. Interventions should be individualised and not create a greater workload for students than necessary. For example, expecting students to attend study skills classes in mathematics and English when they have already been deemed proficient in their English skills and only require additional support with mathematics and drug calculations, is unnecessary. Intensive intervention continues until the student has demonstrated that the deficiency has been overcome, and that it is no longer affecting their academic attainment or educational goals. Intensive intervention must be strong enough to initiate change and short-duration courses may be insufficient in aiding students to acquire the skills necessary to succeed. Therefore, interventions must be continuous across the course, guided by students' learning needs, as addressing attrition in first year only may push attrition rates into subsequent years (Seidman 2012). Continuous intervention implies that intervention should continue for the full duration that is required, as opposed to a pre-determined length of time which may either be unnecessary or insufficient. Intervention can continue throughout the duration of the programme and beyond (if necessary) through to postgraduate programmes of study and the workplace. This should equip students with the skills and integration required to help them achieve their academic goals and become a lifelong learner.

Seidman's work provided the theoretical framework used to develop the methodology in a study by Elkins (2015) which was identified for inclusion and reported in paper 1, the systematic review. Elkins (2015) sought to determine if prior academic achievement and standardised admission test scores could predict nursing programme completion rates and supports the suitability of this framework for this PhD study as the study designs are similar. Although the concepts under investigation are similar, this is the first time that Seidman's model is investigated in relation to a UK university and its selection methods. Other theoretical concepts that were considered are presented below.

Geometric Model of Student Persistence

The Geometric model of student persistence was developed by Swail (2004). Positioning the student in the centre of a triangle (Figure 1), cognitive attributes, student social/behavioural characteristics and institutional support are located at each side of the triangle. Swail (2004) claims that the cognitive attributes that students bring to university, as measured by prior academic achievement, directly relate to students' ability to understand the academic component of university study and complete the programme. He argues that strength in one area, such as cognitive ability, can help students to persist in their academic endeavours and subsequently overcome other areas of academic deficiency, for example social behaviours. Although aspects of this theory support the phenomenon under investigation in this study, it failed to address the demographic characteristics that may influence student outcomes in addition to cognitive, social and institutional variables. It shares the same value though as Seidman's theory, by putting the student at the centre of the model.

Figure 1 - Geometric model of student persistence



(Swail 2004, pg. 13)

Theory of Individual Departure

Tinto (1987) states that a student's integration into a social and academic community at university is linked to student retention. He argues that students must progress through three stages of integration to university life. These include separation from past communities that devalue the purpose of higher education, transition between the past communities and university communities, and integration into university academic and social communities with peers and academic staff. The vast majority of Tinto's work is linked to full-time baccalaureate degrees, nevertheless, a study of this design would involve a substantial amount of investigation into nursing students' community relations. This would include social support, caring responsibilities, school and faculty programmes of integration, and the transition period between school/further education to become a full-time nursing student at university. A qualitative design may have helped to address these questions but would have excluded exploring the impact that selection scores and demographic characteristics may have on student outcomes. Furthermore, it does not consider the 'clinical cultural' aspect of higher education experienced in undergraduate healthcare programmes. Seidman's theory builds on the foundation of this work, but integration into university life is less important, if a student is unprepared for degree level of study and requires further intervention to help them succeed on their programme of study in the first instance.

2.8 Outline of research gaps

The gaps identified in the background literature and systematic review have been summarised and are presented below.

1. The systematic review demonstrated that more research into the predictive validity of UCAS scores, personal statement scores and interview scores was needed, considering that these form the basis for many nursing school admission processes in the UK. We have been unable to locate any study that investigates all of these factors.

2. While work is ongoing exploring the demographic profile of students who are successful or unsuccessful in their studies as identified in the background literature (section 2.4) (Prymachuk et al. 2009, Wray et al. 2017, Bulfone et al. 2021), less evidence was available exploring the profile of students who were successful or unsuccessful at application (Hendricks and Krothe 2014). Few studies have considered the differences in the

demographic profile of applicants who are offered a position on a nursing programme and those who are not. Selection methods should be assessed against demographics for the presence of bias, or favour of one group over another.

3. The systematic review highlighted the need to identify if interview scores (which are considered a reliable and transparent type of interview scoring system) have the power to predict student outcomes, along with UCAS scores and personal statement scores. These are largely unexplored for predictive validity for nursing applicants, yet so frequently used in nursing student selection in the UK. Their predictive power must be validated for use against a wider range of student outcomes, from year one to final year.

4. The literature also revealed that much research in the UK focuses on developing new types of selection methods (e.g., Nurse-match and emotional intelligence tests) and less research has been conducted into selection methods that are currently being used (e.g., UCAS, interviews and personal statements). Rather than develop a new method to select individuals, current methods will be explored in this study. The identification of a model that includes student demographics and selection scores, with the ability to predict those who will be successful or be at risk of failure, has not been explored. Investigating the role of non-modifiable demographic characteristics in identifying students at risk of failure may be beneficial and is deserving of further exploration.

5. Finally, the background literature offered no evidence that reports on the programme outcomes of nursing students with specific learning difficulties. Considering the widening access and participation policies that aim to encourage students from less traditional backgrounds to embark on higher education study, there is clear merit in investigating the selection methods and outcomes associated with this cohort of students.

These gaps led to the development of the study aims and objectives which are presented in the next section.

2.9 Study aims and objectives

Aim:

The aim of the study is to investigate the predictive validity of demographic characteristics and selection methods for pre-registration nursing programmes and to review the selection and progress data of undergraduate nursing students at Ulster University.

Objectives:

1. To conduct a systematic review focusing on the predictive validity of selection methods on progress outcomes for undergraduate nursing programmes.
2. To review the demographic characteristics and entry routes of those who apply for a position on the pre-registration nursing programmes at Ulster University.
3. To identify any correlations between demographic characteristics, university selection criteria and student outcomes for the undergraduate pre-registration nursing programmes at Ulster University.
4. To design a selection model with the ability to predict programme outcomes.
5. To track students with specific learning difficulties and compare their academic outcomes to students without specific learning difficulties.

2.10 Summary

This chapter has provided key background literature into the selection methods that are currently being used to admit candidates onto pre-registration undergraduate nursing programmes. The relationships between selection methods and programme outcomes are reported in paper 1. Relevant theoretical concepts were presented and discussed and the theoretical concept which guided this study was identified. It concluded by outlining the research gaps that were identified in the literature and a presentation of the study aim and objectives.

3 Chapter three - Methodology

3.1 Introduction

This chapter will report the PhD researchers philosophical assumptions and outline the methods that were used to conduct the study including the research design, sample and setting, statistical analysis, ethical considerations, and rigor.

3.2 Philosophical assumptions

Different views of the world drive research forward and without them, research would not exist (Palagolla 2016). Yet, what people consider to be knowledge and how they discover it is subjective (Scotland 2012). Prior to conducting research, it is important for researchers to consider their own philosophical assumptions (Castellen 2010, Mesel 2012, Creswell 2018). Transparency of the philosophy of a researcher adds to the internal validity of a study as philosophical assumptions can influence how a person conducts their research. For example, it can influence how the study is designed, how data is gathered, and the interpretation or reporting of results (Mesel 2012, Scotland 2012).

Philosophical assumptions are developed through lived experience. Ontology is concerned with the definition of reality for the researcher. Researchers must have an understanding of what they perceive to be real and true. Epistemology relates to how knowledge is constructed, gathered and communicated, and the relationship between the researcher and what can be known. Research is defined by the methodologies we choose. Methodology relates to the why, what, from where, when and how data is collected and interpreted. It considers how the researcher uncovers what they believe to be known and essentially it is the 'research process' (Scotland 2012, Creswell 2018).

The PhD researcher had been through the application process for the preregistration undergraduate nursing programme in Adult Nursing at Ulster University and had worked fulltime as a registered nurse for six years prior to commencing this PhD study. Considering this lived experience, it was necessary to consider how this could influence the study design. In the first instance it was necessary to keep an account of the PhD researcher's assumptions about the selection process at Ulster University at the beginning of this PhD journey (Table 3). Coates (2012) and Gioacchion (2012) state that such reflective action would help self-

correction and willingness to seek out alternatives to the research process if viable. This aided with the separation between researcher and the concept under investigation. It also helped to ensure that it did not influence or create a bias in the collection and analysis of data, the reporting of results, or the presentation of the discussion chapter (Mesel 2012).

The research paradigm concerned with quantitative research relates to positivism which is the decontextualised, observable and measurable methods in quantitative research (Goduka 2012). The PhD researcher identifies with the concept of reductionism to reduce complex phenomena into simple laws of science to predict human outcomes (in this case, programme performance). This is based on mathematics and the understanding that statistically based research can explain real life (Parahoo 2014). The aim was embedded in the need to take an objective look at the constructs under investigation through quantitative research. While correlation can be established, causation cannot, but can be implied. As such, it was necessary to ensure that pre-conceived ideas were reflected upon throughout the process of undertaking this PhD.

Table 3 - Assumptions of the PhD researcher

1. Prior academic grades predict nursing student academic outcomes.
2. Interview scores predict nursing student clinical outcomes.
3. Interviews act as a safety net to ensure that those who are selected for nursing programmes are suitable to nurse.
4. Applicants at interviews will be honest when giving answers to the panel.
5. Interview panel members are good judges of character.
6. Interview panels know what type of person will make a good nurse and can recognise those qualities at an interview, although they sometimes get it wrong.
7. A structured points-based interview system has no room for bias.
8. Personal statements predict nursing student clinical outcomes.
9. Personal statements can show who is interested in nursing and caring for people by their content.
10. The following students may have lower grades: mature students, students with specific learning difficulties, students from low socio-economic status backgrounds, male students.
11. A student's entry route to university may influence academic grades, with students undertaking school qualifications (A-levels) more likely to excel academically.
12. A standard 'pass' at university level should be the benchmark for student attainment.

3.3 Research design

The methodology used to conduct research should be based on the nature of the research problem under investigation (Creswell 2018). The study aims and objectives clearly indicate a quantitative aspect to this investigation (with the exception of the systematic review addressing objective one - section 2.5). As such, a quantitative design was considered the most appropriate method to address the research aim of this study and statistical methods producing measurable outcomes will therefore answer objectives 2 – 5. Nevertheless, a mixed methods design to encompass both a qualitative and quantitative part to the study was initially considered.

Qualitative research aims to investigate the why of a phenomenon to deepen understanding of a particular issue which cannot be ‘reduced to the operationalisation of variables’ (Queiros et al. 2015 p. 370). In addition to the quantitative aspect of the study, this additional part was a qualitative approach designed to explore the lived experiences of nursing students with SpLDs at Ulster University, and to investigate the impact that support and resources make to their journey in academia (objective five). The gap in the literature would clearly warrant this investigation, and the insight it could generate into how educators can support students with SpLDs would be valuable, nevertheless the decision was made not to include it. Firstly because of resource constraints, as it was unlikely that the PhD researcher would have been able to complete this additional aspect of the study within the allotted time. Secondly, because it was decided that it was more appropriate to investigate the differences in academic outcomes of this sub-group prior to any qualitative analysis taking place. Conducting the statistical analysis aspect of the study first will help to ascertain if any differences in academic outcome do occur between students with and without SpLDs. This would increase our knowledge of the academic outcomes of students with SpLDs and help to guide some of the interview questions that form part of a quantitative analysis. As this study was conducted in retrospect, cohorts 2012 – 2016 had already graduated and were no longer part of, or contactable by the university.

There are benefits to using a solely quantitative design. As it is less time consuming than qualitative research, it allows for large samples to be used. Indeed in this case, it permits for a total population sample to be included in the study. It also allows for the study design to be duplicated at other sites which further generates knowledge and adds to the evidence base.

However, there are also limitations to employing a purely quantitative design. Namely, that while a quantitative approach will identify any correlation that exists between variables, it will not explore causation. However, the quantitative design will provide the ground work on which to conduct further post-doctoral research using qualitative methods (which is identified as a recommendation for further research in section 6.3).

The study design was a retrospective cohort study which was conducted in two parts.

Cohort studies allow for the following of participants over a period of time to observe for outcomes which are related to initial differences (Ingham-Broomfield 2016). Cohorts of people typically share a common characteristic (in this case they are all nursing students) (Barrett and Nobel 2019). Randomised controlled trials are considered the gold standard of research where participants are randomly assigned one group or treatment arm and then followed for a specified time frame to compare the effect of the intervention given to one group in comparison to the other (Del Mar et al. 2013). This would not be suitable in this study as there is no intervention being tested. Cohort studies are just as effective and have the added benefit of allowing for the exploration of a purely natural progression of events or phenomena (Motheral et al. 2003). Cohort studies are robust when investigating cause and effect (Barret and Nobel 2019) and was the most appropriate design for this study. All studies included in the systematic review were types of cohort studies (Crawford et al. 2021). Cohort studies can be prospective or retrospective in design.

Retrospective databases are an important source of information for outcome related research. The benefits to using retrospective data are vast and include the ability to examine a phenomenon as it naturally occurs without any external changes or influence. They can also include large sample sizes and follow individuals for long periods of time and allow researchers to examine sub-populations within the dataset (Motheral et al. 2003). While the author did not specify what they meant by a large sample, Pallant (2020) suggests that a large sample in quantitative research is > 200 . Many retrospective data sets are not initially collected for research purposes and the data must be examined to determine if it has sufficient rigour and detail to answer the study aims and objectives. Conducting retrospective research also involves paying careful consideration to the timeframe of data collection. For example, to measure a student's socio-economic status, the Northern Ireland Multiple Deprivation Measure (NIMDM) will be employed. It is therefore imperative that the 2017 version of the

NIMDM is used, as it relates to the data pertaining to the students address at the time they applied for the course (between 2012 – 2016).

Twenty of the 25 studies included in the systematic review were conducted on data that was collected in retrospect (Ahmad and Safadi 2009, Newton and Moore 2009, Wolkowitz and Kelley 2010, Shulruf et al. 2011, Timer and Clauson 2011, Díaz et al. 2012, Lancia et al. 2013, Underwood et al. 2013, Cunningham et al. 2014, Hinderer et al. 2014, Elkins 2015, Pitt et al. 2015, Gale et al. 2016, Traynor et al. 2016, Wambuguh et al. 2016, Callwood et al. 2018, Lui et al. 2018, Tartavouille et al. 2018, Van Hofwegen et al. 2019, Callwood et al. 2020). This demonstrated that using a retrospective database is a feasible method of data collection, and can be applied to this study methodology.

3.4 Sample and setting

Pre-registration undergraduate nursing programmes are delivered by three universities in Northern Ireland, Queen’s University Belfast, the Open University and Ulster University. While there would have been clear benefits in conducting this research study across all three universities in Northern Ireland, such as increasing the sample size and generalisability of the study findings, there were disadvantages also. The selection processes and course structures at these universities have similarities, but they are not identical. For example, Ulster University utilised face-to-face interviews to select students, and Queen’s University utilised MMIs which have a different structure. Both of these universities used UCAS scores to admit students, yet the Open University had no minimum academic entry requirements and most students who enrolled on this nursing programme were nominated to do so by their NHS employer. The programme content, structure, duration and outcomes also differed and as such, this would have made comparisons between variables difficult. Therefore, the study was conducted solely at Ulster University.

This aspect of the methodology begins with a historical and contextual overview of the study setting.

In 2012 the Nursing and Midwifery Council approved programme at Ulster University changed and new programmes for both Adult and Mental Health were commenced. This was implemented one year before the Francis Report (2013) was published. These programmes lasted up until 2018 and the cohorts from 2019 commenced another new programme. As

such, this study included every student that was ever enrolled on these programmes for the full three-year duration it was provided between 2012 and 2016, a total population sample.

The fulltime programmes are delivered in Northern Ireland and students are awarded a Bachelor of Science undergraduate degree in Adult or Mental Health Nursing on completion, which makes them eligible to apply to join the NMC register of nurses and midwives in the UK. The Department of Health and Social Care services and Public Health commission undergraduate nursing programmes in Northern Ireland. All applications made to the Adult and Mental Health nursing programmes at Ulster University are made through UCAS. There were around 2000 applications received for these programmes each year between 2012 and 2016. Every applicant submitted a 500-word personal statement with their UCAS application which was scrutinised by academic staff for content pertaining to the set criteria that included the applicants' desire to nurse, motivation for nursing, expectations of the role of a nurse and of a career in nursing, and decision-making, some affecting self and others. Each personal statement is given a numeric score for each of the criteria statements and a total score is calculated out of a maximum of 16 (appendix 1). Each staff member involved in this assessment process were trained in how to conduct this aspect of the application. Approximately 1500 applicants satisfied the minimum personal statement score and academic entrance criteria required to move to the next stage of selection process, which was an interview.

Only applicants that normally reside in Northern Ireland or the Republic of Ireland (three years minimum residence required) are eligible to apply for the courses as determined by the Department of Health who funds the programmes. The standard entry requirements for the adult and mental health programmes were as follows:

- Qualifications (or qualifications pending) worth 280 UCAS points,
- GCSE grade C or above in maths, English and science,
- English language competence at a minimum of 7.0 Academic International English Language Testing System (IELTS),
- A health screening assessment,
- Enhanced Disclosure Access Northern Ireland check, at a cost of £33 to each applicant.

(Ulster University 2022b)

Population and sampling

Approximately 1500 interviews took place each year. Each panel had one academic member of staff from the university School of Nursing and one member of nursing staff from practice learning areas. Every panel member received equality and diversity training prior to conducting the interviews, and interview training was also available. Applicants were asked a total of six questions (the first was unscored to help them settle and relax into the interview) and the rest focused on motivation to be a nurse, understanding of the course, their expectation of nursing, previous behaviour decision making skills, and interpersonal skills (Appendix 2). Each applicant was given a score from each of the five questions and a total score (maximum 25). Students were ranked on the basis of the interview total score. All applicants were informed of the outcome of the interview via UCAS and could obtain feedback from the application process if desired.

A UCAS score of 280 equates to BBC at A-level. The equivalent is accepted for other courses such as the Access Diploma, whereby an average score of 65% also equates to 280 points, as does two distinctions and a merit for a BTEC qualification (Ulster University 2022b).

Applicants who were successfully admitted to and commenced the programmes were granted a non-means tested tax-free bursary worth approximately £400 per month from the Department of Health for the duration of the programme (36 months) or until they discontinued their studies. The bursary was not required to be refunded if a student did not progress through the programme.

The numbers of students who were offered a position on the programme remained the same between 2012 and 2015, with an additional 40 places being funded in the Adult branch in 2016 (Table 4).

Table 4 - Department of Health funded positions available on the programmes

Year	Adult	Mental Health	Total
2012	178	46	224

2013	178	46	224
2014	178	46	224
2015	178	46	224
2016	218	46	264
Total	930	230	1160

Places on the programme that were not filled, that have occurred due to attrition, can be given to students who have completed prior education in undergraduate nursing in other universities and obtained an average mark of 60% or above in their grades. All students had to complete the programme within five years of enrolment.

Part one

Part one of the study focused on those who applied for a position on one or both of the pre-registration BSc Honours programmes in Adult or Mental Health Nursing at Ulster University. These participants will be known as *applicants*.

Part two

Part two of the study focused on those who were successful at application and enrolled on one of the pre-registration BSc Honours programmes in Adult or Mental Health Nursing at Ulster University. These participants will be known as *students*.

Participant inclusion criteria

All applicants who applied through the UCAS system for the BSc Honours Adult or Mental Health Nursing programmes to commence between September 2012 and September 2016, were eligible for inclusion, regardless of whether they were eligible to apply for the courses.

Participant exclusion criteria

Any students who applied in 2011 and deferred their position on the programme for a year were excluded as their selection scores were not available.

3.5 Analytical strategy

Included variables

The following variables were included: *Age, Gender, Entry Route, Course Commencement, Socio-Economic Status (SES), Specific Learning Difficulty (SpLD), UCAS Scores, Personal Statement Scores, Interview Scores, Grade Point Average (GPA 1+2+3), and Course Completion*. Data pertaining to these variables were collected from the university admissions office for every application submitted and from the Examinations Department for programme outcomes.

Measuring Age – Age was measured using participants’ age on application. When submitting a UCAS form, applicants give details of their age (date of birth) which is collected by the university admissions office. Every student who enrolled had their date of birth verified at registration by university staff by means of identification (e.g., a driving licence).

Measuring Gender – Gender was measured as male or female. When submitting a UCAS form applicants give details of their gender (which at the time on the UCAS application form referred to the sex a person was assigned at birth) which is collected by the university admissions office. Every student who enrolled had their gender verified at registration by university staff by means of identification (e.g. their birth certificate).

Measuring Entry Route – Entry Route was measured using the qualifications that applicants provided on their UCAS application form. When submitting their UCAS forms applicants give details of their qualifications (including any pending), that make them eligible to apply for the programme. This data are collected by the university admissions office. Students’ qualifications were verified through UCAS and at registration by producing grade transcripts.

The data pertaining to *Age, Gender* and *Entry Route* were collected for every applicant, and was used in part one of the analysis and part two if a student commenced the programme.

Measuring SES – SES was determined using a student’s postcode, which was collected from the university admissions office. Each postcode was entered into the NIMDM website where a postcode rank is generated automatically, and the corresponding number displayed on screen. The rank is based on the 2017 NIMDM which embraced the addresses the students provided in the five cohorts sampled between 2012 and 2016. The previous NIMDM was released in 2010. The NIMDM scores are compiled using postal areas that are assigned a score based on income deprivation (25%), employment deprivation (25%), health deprivation and disability (15%), education, skills and training deprivation (15%), access to services (10%), living environment (5%), and crime and disorder (5%) (Ijpelaar et al. 2017). The address that the student gave at enrolment was the address that was used in the analysis. Due to the volume of work required to manually source the NIMDM number for all applicants, the SES was collected for students only.

Measuring SpLD – Students with SpLD(s) were identified from the Ulster University reasonable adjustments database, which academic staff have access to and is maintained by the Student Experience and Wellbeing (Student Support) department. The database tells us which students are entitled to reasonable adjustments during their time at university, and what the adjustments are, from additional time in examinations to allowances for spelling and grammar in written assignments (a full list of reasonable adjustments available to students is available in Crawford et al. 2022). Students who have an official diagnosis of a SpLD from an educational psychologist are entitled to an assessment for reasonable adjustments from Student Support. This database therefore contains every student who had been diagnosed with any type(s) of SpLD and had chosen to disclose it to Student Support in order to be assessed for reasonable adjustments. The database reflects every student who was ever part of the database, whether they were added in first, second or third year of the programme. The demographic variable SpLD was not available for the applicants, therefore this variable was used in part two of the study only.

Measuring Personal Statement Scores - Personal statements were scored by one member of academic staff and the scoring form used is displayed in Appendix 1. These scores were held by the university admissions department.

Measuring UCAS Scores – UCAS scores were collected from the UCAS application forms by the university admissions department.

Measuring Interview Scores – Interview scores are calculated by two interview panel members following an applicant’s interview and the scores were then held by the university admissions department. Only one overall interview score was available thus inter-rater reliability analysis between panellists could not be established.

Measuring Course Commencement – A list of every applicant who is successful at selection and enrolls in the programme is compiled by the university admission department for each year of entry. This was used to determine who commenced the course.

Measuring GPA - Students complete six 20 credit modules each year and are assessed using a variety of methods including examinations, assignments and presentations. Grades are awarded as a percentage between 0 and 100 and the pass mark is 40%. Students who fail a module are given the option of re-taking the assessment as a second attempt, and no matter what grade they achieve, the maximum grade awarded is 40%. Multiple attempts at assessments are permitted in line with university policy and the highest score was used in the final calculation. Students can carry fails into subsequent years, but all modules have to be passed to be awarded a nursing degree at the end of the programme. Students can repeat an assessment a maximum of three times. Some research studies of similar design (in different higher education disciplines) used only first attempts at assessment (Kale et al. 2019), but in order to reflect the actual grades that students are awarded and that count towards their degree classification, the students best attempt or second attempt will be used, whichever is the higher. Multiple attempts will not be recorded or factored into the equation, which was as follows:

The sum of the final mark awarded for all modules attempted in one year, divided by the number of modules attempted in the same year.

GPA 3 was available for every cohort as it had been calculated to work out each student’s degree classification. The GPA for years 1 and 2 were calculated by the PhD researcher.

Measuring Course Completion - Students who completed all academic modules and clinical placement were awarded a BSc Honours degree in Adult or Mental Health Nursing. These individuals are classed as ‘yes’ for *Course Completion*. Students who fail to complete clinical placement or academic modules can be awarded alternative qualifications such as a

Certificate in Healthcare or BSc Honours degree in Health Sciences. These qualifications do not entitle an individual to apply to join the NMC and therefore these students will be classed as ‘no’ for *Course Completion*.

In summary, the variables included in **part one** of the analysis are displayed in Table 5.

Table 5 – Study part one variables included

Demographic (independent) variables	Outcome (dependent) variable
Age Gender Entry Route	Course Commencement

The variables included in **part two** of the analysis are displayed in Table 6.

Table 6 – Study part two variables included

Demographic variables (Independent variables)	Selection variables (Intermediate variables)	Outcome variables (Dependent variables)
Age Gender Entry Route SES SpLD	UCAS scores Personal statement scores Interview scores	GPA 1 GPA 2 GPA 3 Course Completion

Excluded variables

Home/international - It was initially thought by the research team that the participants’ home or international status could be used in the analysis. An international student, as defined by the university admissions department, is a student who requires a Tier 4 Visa to study in the UK. This does not include students from any European country, and it would not necessarily include students from minority backgrounds. For example, a Caucasian student whose first language is English from the USA would be considered an international student. Yet, a student from Romania whose second language was English would be considered a

domestic student, and a refugee from Syria who had recently obtained Irish citizenship would also be considered a domestic student. This is not an accurate reflection of the concept under investigation and does not necessarily represent the common characteristics that international students share that have been shown to correlate with university educational outcomes. These include differences in culture, small or non-existent social support networks, difficulties with understanding course content due to speaking English as a second language, and racial discrimination (Tranter et al. 2018). International students comprised a total of n=30 participants in the full database, thus correlations with home students are statistically inappropriate. For these reasons this variable was excluded from the analysis.

Degree classification - There was the option to categorise the students' final year GPA into degree classifications in order to predict what category of degree students would be likely to achieve. Categorising continuous data into categorical data is not advised as it limits the amount of statistical analysis that can be conducted and reduces statistical power (Pallant 2020).

Clinical outcomes - As all students who complete pass their clinical assessments, there was no variation in the data for a statistical analysis to be conducted, so passing or failing clinical assessment was excluded as a variable from the analysis. Nevertheless, all clinical placements and academic assessments must be passed in order for a student to be awarded a BSc Honours degree in nursing and be eligible to apply to join the NMC register. Therefore, passing clinical assessments would be reflected in successful completion of the programme.

Relationships that will not be explored

The relationship between *Entry Route* and *UCAS Scores* will not be analysed as the associations are pre-determined. For example a person with a previous degree will have a higher UCAS score than a person with A-levels, or a person with a Higher National Diploma will have a higher UCAS score than an applicant with a Higher National Certificate.

Table 7 provides an overview of all variables included in the study, including their category boundaries and any details of how the information was verified.

Table 7 - Overview of all variables included

Variable	Definition	Type	Available from	University verification
Age	Age as specified by the applicant on their UCAS application form.	Continuous	The university admissions department.	Birth certificate or another form of identification at enrolment.
Gender	As specified by the applicant on their UCAS application form	Dichotomous, male or female	The university admissions department.	Birth certificate or another form of identification at enrolment.
Entry route	Each applicant's entry route to university. If an applicant had taken several level three qualifications, the most recent was used.	Categorical	The university admissions department.	Prior academic record certified at enrolment.
SES	Derived from the Northern Ireland Multiple Deprivation measure using each student's postcode.	Continuous	The university admissions department.	Postcode verified on enrolment using proof of address provided by student.
SpLD	Any type of neurological processing condition (e.g., dyslexia).	Dichotomous, yes or no.	The reasonable adjustments database.	Proof of diagnosis by an educational psychologist provided by student support.

UCAS scores	The number of points awarded by UCAS for each qualification.	Continuous	The university admissions department.	Verified by examinations board via UCAS, and on enrolment.
Personal statement scores	Score awarded by academic staff.	Continuous	The university admissions department.	Assessment score provided by one academic member of staff. No formal verification undertaken of this score.
Interview scores	Score awarded by interview panel.	Continuous	The university admissions department.	Assessment score provided by both members of the interview panel. No formal verification undertaken of this score.
Course Commencement	Applicants who were successful at application, accepted a position on the programme and enrolled in year one.	Dichotomous, yes or no	The admissions department.	Stipulated by the admissions department and confirmed by the successful applicant via UCAS.
GPA 1	Average academic grade in year one, as specified on the	Continuous	School of Nursing end of year	Average grades are verified by

	student examination sheet.		examination sheets.	the course directors.
GPA 2	Average academic grade in year two, as specified on the student examination sheet.	Continuous	School of Nursing end of year examination sheets.	Average grades are verified by the course directors.
GPA 3	Average academic grade in year three, as specified on the student examination sheet.	Continuous	School of Nursing end of year examination sheets.	Average grades are verified by the course directors.
Course Completion	Students who were awarded a BSc honours degree in nursing and were eligible to apply to join the NMC register.	Dichotomous, yes or no	School of Nursing end of year examination sheets.	Successful completion is verified by course directors and Board of Examiners.

Timepoints for data collection

Data were collected for applicants and those who subsequently became students at the following time points:

Time 1 – The first data collection timepoint was when each student applied through UCAS for a position on the nursing programmes. At this stage every applicant to the nursing programmes is assigned a unique identification number through UCAS. This number was used as the participant identification number for this study. Variables that were available at this timepoint were *Age, Gender, SES and Entry Route*. Data were collected on Microsoft Excel files obtained from the university admissions office.

Time 2 – The second data collection point was at enrolment, just before commencing their programmes. The variables that were available at this timepoint were *Course Commencement*, *Personal Statement Scores*, *UCAS Scores* and *Interview Scores*. Data were collected on Microsoft Excel files obtained from the university admissions office.

Time 3 – The third data collection timepoint was at the end of year one of the programme. Data on all students' academic grades, whether or not they had completed year one, were collected from the examinations office by obtaining a printed copy of every student's clinical and academic record.

Time 4 – The fourth data collection timepoint was at the end of year two of the programme. Data pertaining to assessment grades of all students who had progressed into year two of the programme, and whether or not they had completed year two, were collected from the examinations office by obtaining a printed copy of every student's clinical and academic record.

Time 5 – The fifth and final data collection timepoint was at the end of year three of the programme. Data pertaining to assessment grades of all students who had progressed into year three of the programme, and whether or not they had completed year three, were collected from the examinations office by scanning and printing every student's clinical and academic record. Data pertaining to *SpLD* were also collected at this time from the reasonable adjustments database.

As this study builds upon a previous study investigating the overall admissions process at Ulster University, some admissions information had been collected in the above format in 2015 as part of the original study, which was stored on an external hard drive by the chief investigator. This was transferred onto the desktop of the PhD researcher and stored on OneDrive with no external access permitted for other users. The rest of the admissions data for the 2015 – 2016 cohorts were collected in September 2019 directly from the head of the university admissions office via attachments in encrypted email, and transferred directly to OneDrive by the PhD researcher.

Compiling the data

Once the data were collected, and GPAs calculated, it was transferred into a newly designed Microsoft Excel spreadsheet. Here it was coded in preparation for transfer into the Statistical Package for the Social Sciences (SPSS) v26 for analysis. The continuous variables remained numerically unchanged. The dichotomous variables were coded 0 and 1, and categorical variables were given a numeric score and a record of all codes was documented in the study code book. Pallant (2020) suggests that code books should be stipulated in advance of data collection. Due to the retrospective nature of this study, it was necessary to code the data after collecting and compiling it. It was uncertain what data would be available and what format it would be in, thus introducing a code book prior to data collection was not feasible, and as such it was compiled after data collection (Appendix 3).

Missing data

The amount of, and reasons for, missing data must be evaluated to identify any patterns that may introduce bias into the study analysis. Missing data which occurs at random poses less of an issue than patterns of missing data, which have the potential to affect the generalisability of the results. If <5% of data is missing from a large data set, it is unlikely to affect the study results (Tabachnick and Fidell 2019).

Several reasons for missing data could be identified. Firstly, the application process to the nursing programmes changed in 2014. Prior to this, applications were made directly to the Nursing Admissions department, which was subsequently merged with the Central Admissions department. Some of the data requested for this study was lost during this data transfer and was therefore unavailable at the time of data collection. This mainly affected applicants with personal statement scores below the cut off point for interview in the 2014 and 2015 cohorts. This left some loss of data from approximately 2000 applicants which could not be recovered. Secondly, some students enrolled on the course had not applied to Ulster University for the intakes between the years of 2012 and 2016. This could be due to participants applying in a previous year and deferring their start date, or they could have completed previous years of an undergraduate nursing programme in another NMC approved nursing programmes and transferred to Ulster University in their second or third year. This meant that these students' selection scores were not available. Thirdly, entry route data from

the 2015 and 2016 cohorts were only available for the students who commenced the course and thus not all applicants. Finally, there were some students who had not completed the programme by the time data collection had finished. They were still enrolled in the programme with plans in place for completion, but they could not be considered ‘yes or no’ for ‘*Course Completion*’ and these data for these participants was coded as ‘missing’. The code allocated for missing data in SPSS was 999. Any missing information pertaining to students’ DOB, academic grades or postcodes were searched manually on the Student Marks and Progress database in an attempt to ensure that the data set was as complete as possible.

To handle missing data on SPSS there are several options available. One is to exclude every participant with a missing value (listwise). The next is to exclude a participant from analysis where one value is missing from the test being conducted but retaining them for others where the required value is available (pairwise). The last is to replace the missing value with the mean value for that variable. To exclude a participant from the entire analysis because one value is missing is unwarranted and will reduce the sample size unnecessarily. To replace the missing value with the mean value is not recommended as it can severely distort the results from the analysis. To remove a participant from the analysis where the necessary value is missing and include them when the value is available is a way to retain a maximum sample for analyses, therefore the pairwise option was used when available (Field 2018, Hair et al. 2019, Pallant 2020).

Unfortunately, selection scores and postcodes were not available in all combined Excel files and were collected on separate pages by the admissions department for some cohorts. In order to include these in the analysis each postcode, personal statement score, interview score and UCAS score would have had to be manually transferred into the overall database for every applicant, which was beyond the capacity of the PhD researcher. Therefore these variables were included in part two of the analysis only, i.e. the students who enrolled.

One final discrepancy noted in the data collected was that the UCAS scores were calculated differently by the admissions department between the 2012 and 2013 cohorts, and the 2014 – 2016 cohorts. In the earlier years the applicants were awarded points based on their three best grades at level three, for example if a student had undertaken three A-levels and had been awarded 250 points, and then undertook the Access Diploma and was awarded 280 points, their total UCAS score would have been 280. In the latter cohorts, UCAS points were

awarded for post level three study which included the HNC/HND and previous degrees. Consequently, applicants' UCAS scores could be very high for these cohorts depending on what qualifications they had undertaken prior to applying.

How data was checked for accuracy

Once data compiling in Excel was complete it was deemed necessary to have a second member of the research team check the cell entry at random. This data set had large amounts of manually inputted information which could have been entered incorrectly or become misaligned in Excel. Callwood et al. (2018) recommends that 10% of a database should be checked for error. Due to the large amount of data in this study with over 12,000 cell entries, it was decided that 10% of students would have one aspect of their data checked by one other member of the research team and verified against the Student Marks and Progress database. Information was thus verified at the point of entry by the PhD researcher as well as by a second researcher using a database that had not been used in the initial data collection. This part of the study took place during the first national lockdown due to the COVID-19 pandemic, so the data that was checked had to be available through electronic means to members of the research team. It was decided that from the information available remotely, the students' date of birth, postcode, academic grades, or course completion status would be checked.

Once the data checking was complete, the data was anonymised and transferred to SPSS v26 for analysis.

Duplicate applicants

Before part one and two of the data analysis plan could begin it was necessary to remove all duplicate applicants. This meant removing all individuals who had applied for the adult or mental health nursing programmes on more than one occasion, for example, those who had applied and been unsuccessful in previous years and had therefore applied again in subsequent years. These applicants were identified by their unique identification number allocated through UCAS. The identification numbers were sorted in numeric order on SPSS which easily identified duplicate applicants. To further check that the entries with the same identification number were indeed duplicates from previous applications, a change in the year

of application was observed for. For example if a duplicate identification number had an application made in 2012 and another in 2013, this added further evidence that it was the same person applying for the programmes in different years. Age also should have changed. If a duplicate application consistently reported an increase in age that corresponded with the year of application, then the entry was not checked. Where a discrepancy occurred, the identification number was searched in the Excel files to ascertain if it appeared twice (which it would have had the same identification number been used for two individuals) and if so, if the names matched. Where a discrepancy occurred and the identification number clearly had been given to two different people, both applicants were retained and one individual was given a new identification number by the PhD researcher.

Dividing the data set

Once duplicate applications were removed, the database was divided into two separate databases. Database one contained the information of every *applicant* between 2012 and 2016 and database two contained every *student* who was offered a place and enrolled on the course in the same time frame. This was done to facilitate part one and part two of the study analysis.

Screening and cleaning

Before a statistical analysis can be conducted it is imperative that the data collected is screened and cleaned to detect for errors (Field 2018, Pallant 2020). Data entry can be prone to error and simple mistakes, such as incorrectly inputting a value, which can severely distort the data. Screening and cleaning were conducted in two stages. Firstly, the PhD researcher checked that the variable scores were within the expected or possible range and secondly, the error was corrected and recorded (Appendix 4). The code book was an essential tool during this process and provided a reference point for correct data entry and the possible range of scores (Field 2018, Pallant 2020).

Frequency was used to detect outliers and incorrect data entries. Some authors believe that extreme outliers should be removed from the data set to prevent it from distorting the results (Pallant 2020). While the sample in this study was large and the likelihood of outliers having any impact on the overall results was small, this was still considered. Having an idea of what

the data should look like allows for errors to be uncovered. For example, all GPA scores should fall between 0 and 100. Any scores that were above 100 were data entry errors and anything above or below the range of 20-90 were also investigated as outliers, as these are extreme values.

Statistical Analysis

Once the data preparation, checking and cleaning had been completed the preliminary analysis was then undertaken. This began by describing the characteristics of the study participants and checking for normality and linearity using descriptive statistics and frequencies (Pallant 2020). Multicollinearity and homogeneity of variance were assessed using various types of correlational analysis tests.

Descriptive statistics

Continuous variables were assessed using descriptive statistics such as variable average (mean), range (difference between the lowest and highest number), minimum (lowest number), maximum (highest number), and the distribution of scores (standard deviation, skew and kurtosis). Histograms were used to check data for normal distribution and scatterplots for linearity (Fisher and Marshall 2009, Pallant 2020). In social sciences it is generally accepted that data will not always be linear or normally distributed due to the nature of the populations. For example, in education, students who apply for places in university tend to be younger and therefore their ages would be positively skewed. One way to help combat the effect that this has is to use a large sample size ($n > 200$) (Pallant 2020). Histograms are also recommended when working with large samples as any skew and kurtosis is likely to reach statistical significance with large samples, and as such should be ignored in these cases (Field 2018). Descriptive frequencies statistics were employed for categorical variables to identify how many applicants fell into each category (Fisher and Marshall 2009, Pallant 2020).

Parametric tests vs non-parametric tests

It is better to identify the distribution of data before deciding on whether or not to use parametric tests or non-parametric tests (Grech and Calleja 2018). Parametric tests assume

that data has a normal distribution, or that there are equal numbers of participants between groups (Pallant 2020). Non-parametric tests are distribution-free and make less assumptions about the data and are suggested for use in small and non-normally distributed data sets. Nevertheless, parametric tests are still robust, even when used on non-normally distributed data. They also have higher statistical power than non-parametric tests and are more likely to avoid type 1 and type 2 errors. Non-parametric tests are less robust and less likely to detect a correlation that truly does exist. Therefore, it is best practice to use parametric tests where possible, even if data are skewed (Grech and Calleja 2018, Pallant 2020).

Manipulation of the data was considered in order to redistribute the data around the centre and reduce variability between groups. This can be done in several ways including by arranging continuous variables into categories with equal numbers of scores in each group (binning). Reducing continuous variables into categories would inevitably lose information so this was not used (Pallant 2020). There was also the option of changing the distribution of scores by transforming the data (log transformation), although the results of this method are mixed and often unreliable (Feng et al. 2013). In the case of a large sample the skewness is unlikely to affect results and therefore proceeding with parametric tests using non-normally distributed data is unlikely to make any difference. The similarities between parametric and non-parametric test results have been noted by various statisticians (Kühnast and Neuhäuser 2008, Grech and Calleja 2018, Field 2018, Pallant 2020). Consequently, parametric tests were used for all statistical analyses in this study, when available.

Inferential statistics

The next step of the analysis was to explore the relationships between variables using correlational analysis. A range of statistical tests were employed which included the Pearson's correlation, partial correlations, cross-tabulation and one-way analysis of variance (ANOVA) tests.

Pearson's correlation

A Pearson's correlation matrix was used to investigate the strength and direction of the correlations between all continuous variables, and continuous variables with one dichotomous variable (Pallant 2020). It also served as an assessment of the multicollinearity

between variables which helped to determine the suitability of the data for subsequent analysis (Kim 2019), including the path analysis which will be used to test the model for objective four.

Partial correlations

Partial correlations were used to control for any effect that the demographic variables had on the selection scores, when assessing the effect that the selection scores had on the outcome variables (Rankin 2013, Field 2018).

Cross-tabulation

The Chi-square Test for Independence was used to analyse the associations between all categorical variables. Where two dichotomous variables formed part of the analysis the Yates Continuity Correction method was employed and the Phi-Coefficient to determine the effect size. The Cramers-V reading provided the effect size for associations between variables that had more than two categories (Gravetter and Wallnau 2017). It was expected that each cell would have a count of at least five, fulfilling the assumptions for this aspect of the analysis. Yet, Chi-square tests can still be used if at least 80% of the cells have at least five values in the results table (Pallant 2020).

ANOVA

ANOVA was used to explore the relationships between the independent categorical variables and the dependent continuous variables. The variance between groups was determined using the Levene's Test of Homogeneity. The Post-hoc Tukey Honest Significant Difference (HSD) test was used to identify where any significant differences between groups occurred (Pallant 2020).

Significance and effect size

The effect size provides a numeric summary of the strength and direction between two variables which can range from -1 to +1. With large samples, even small correlations can achieve statistical significance. Therefore, the effect size and level of shared variance were

considered when determining if the correlations had any educational significance (Pallant 2020). Cohen's D (1988) was used to measure the effect sizes which are grouped as follows:

- <.1 equals little to no correlation
- .1 to .29 equals a small correlation
- .3 to .49 equals a moderate correlation
- >.5 equals a strong correlation

Eta² was calculated to obtain the effect size for the ANOVA tests using the following calculation: $\eta^2 = \text{sum of squares between groups} / \text{total sum of squares}$ (Pallant 2020). Eta² refers to the amount of variance explained by belonging to a certain group, where 0 equates to none of the variance being explained, and 1 equates to all of the variance being explained. Therefore $\eta^2 = 0.14$ would mean that 14% of the variance is being explained (Richardson 2011, Lakens 2013). Cohen (1988) defines Eta² effect sizes as follows:

- $\eta^2 = 0.01$ equals a small correlation
- $\eta^2 = 0.06$ equals a medium correlation
- $\eta^2 = 0.14$ equals a large correlation

The significance level for all statistical analysis was set at 5% ($p = <.05$) (Field 2018, Pallant 2020).

Part one: analysis of all applicants

Preliminary analysis

In this part of the study, the variables which were analysed using descriptive statistics were *Age*. The variables which were analysed using frequencies were *Gender*, *Entry Route* and *Course Commencement*.

Inferential analysis

Pearson's correlations were used to measure the correlations between *Age* and *Course Commencement*, and *Gender* and *Course Commencement*. A Chi-square Test of

Independence was used to measure the associations between *Gender* and *Course Commencement*, and *Entry Route* and *Course Commencement*.

Part two: analysis of students

Preliminary analysis

In this part of the study, the variables which were analysed using descriptive statistics were *Age*, *SES*, *Personal Statement Scores*, *UCAS Scores*, *Interview Scores*, and *GPA 1, 2 and 3*. The variables which were analysed using frequencies were *Gender*, *Entry Route*, *SpLD* and *Course Completion*.

Inferential analysis

Pearson's correlations were used to analyse the correlations between the demographic characteristics (*Age*, *Gender*, *SES*, *SpLD*), the selection scores (*Personal Statement Scores*, *UCAS Scores*, *Interview Scores*), and the outcome variables (*GPA 1, 2 and 3*, and *Course Completion*). Where any dichotomous variable was being measured with another dichotomous variable (for example *Gender* and *Course Completion*) this was excluded from the Pearson's correlation analysis and the Chi-Square Test for Independence was used instead. The demographic variables, selection variables and outcome variables were analysed in the Pearson's correlation matrix. The demographic variables were then controlled for, and the selection variables and outcome variables re-analysed. Incidentally, some of the study analyses revealed strong correlations between the outcome variables, *GPA 1, 2 and 3* which was explored further using linear regression.

Entry Route was a categorical variable with more than two categories, therefore it was not included in the Pearson's correlation matrix. Rather the associations between *Entry Route* and *GPA 1, 2 and 3* were analysed using ANOVA and the Chi-square Test of Independence was used between *Entry Route* and *Course Completion*.

Path analysis

The predictive validity of the demographic variables and selection scores on the outcome variables was determined using path analysis and was conducted using Analysis of a Moment

Structures (AMOS) v 26, an extension of SPSS v 26. Path analysis belongs to a family of statistical analyses techniques called Structural Equation Models (SEM) that use bivariate correlations to estimate the strength and direction of each structural relationship using a correlation or covariance matrix as the input. Path analysis is an extension of the linear regression model whereby each path is being regressed to identify the effect that an independent variable has on a dependent variable.

Three of the twenty-five studies extracted for the systematic review (paper 1) used multiple regression to analyse the effect that the independent variables had on the outcome variables (Cunningham et al. 2014, Hinderer et al. 2014, Tartavouille et al. 2018). While this method was also considered for this study, the benefit of using path analysis is that it measures the strength and direction of the relationships both directly and indirectly, thus allowing for more complex models to be analysed than in standardised or hierarchical multiple regression. The difference is that each path is calculated simultaneously on its own merit, rather than over and above the contribution each other variable is making to the model (Sarwono 2017, Hair et al. 2019, Sharp et al. 2019). Path analysis also gives us the option to test the overall fit of the model (how well the model fits the data collected). The competing models strategy was used which measured the fit between two or more models, to identify the model with the best or equal fit (Hair et al. 2019). While path analysis can be conducted on a single model, it is best practice to compare it with at least one other model so that the goodness of fit can be measured. Another benefit of using path analysis is that a variable can act as a dependent and an independent variable (also known as an intervening variable) with arrows entering and exiting it. Path analysis is also recommended for use in large data sets >200 for normally distributed data or > 400 for non-normally distributed data (Sarwono 2017). While path analysis has been used to assess the predictive power of variables in other nursing and educational research (Yim 2014, Yu et al. 2018, Sharp et al. 2019, Taimalu and Luik 2019, Ambani et al. 2020), it has not been used to identify the predictive power of selection and demographic variables with pre-registration nursing student outcomes.

In path analysis the independent variables are known as exogenous variables and will have either a straight arrow exiting from it or a curved arrow between variables (which represents the total amount of multicollinearity between exogenous variables that are accounted for in the model). Intervening or dependent variables are known as endogenous variables and will have arrows both entering and exiting from them. They are not assessed for multicollinearity

(covariance). Every endogenous variable will be ascribed an error (e) term. Error is always measured in path analysis due to the inability to measure the construct perfectly. This is not done in multiple regression, which is another difference between the two types of analysis. Measurement error is not assigned to the exogenous variables as they are the predictor variables (Garson 2018). The variables are renamed as presented in Table 8.

Table 8 - Variables renamed in path analysis

Variable typically known as	Variable known as in path analysis
Independent variable	Exogenous variable Intervening/endogenous variable
Dependent variable	Endogenous variable

Assumptions for path analysis

There are several assumptions and requirements necessary to conduct a path analysis (Streiner 2005, Sarwono 2017, Garson 2018, Hair et al. 2019, Ambani et al. 2020). These are listed as follows:

- The paths should be travelling in one direction with no looping or reciprocal paths.
- All variables must lead to the endogenous variable, either through direct or indirect paths.
- Each equation or ‘path’ in the model should have at least 10 – 20 study participants.
- The variables must either be on a continuous scale, an interval scale (e.g., Likert 1 – 5) or a dichotomous scale which is coded 0 and 1.
- All variables must be observed or measured and numeric, with no latent variables.
- Linearity - there must be a linear relationship between the exogenous and endogenous variables.
- Normality - scores for each variable must be evenly distributed.
- Multicollinearity – the exogenous variables must be independent of each other. This was tested automatically in AMOS before proceeding with the analysis, and also was tested in the Pearson’s correlation matrix before the measurement model was specified.
- Homoscedasticity - the variance in the error between variables must be constant.

Goodness of Fit

To assess how well the path model fits the data, goodness of fit measurements were used. There is no one agreed method of assessing the goodness of fit of a model (how well the model fits the data) and researchers should report fit indices from two categories, the absolute fit indices and incremental fit indices (Hair et al. 2019).

Absolute fit indices indicates how well the specified model has the capability to reproduce the data. It is measured independently and is not compared with any other model. Examples of absolute fit indices that are usually reported include the Chi-square statistically based fit measurement, the normed Chi-square, and the Root Mean Square Error of Approximation (RMSEA) (Volkert et al. 2018, Ambani et al. 2020, Zhang and Savalei 2020).

The Chi-square statistically based fit measurement should render a non-significant goodness of fit measurement. This is difficult to achieve when the sample size is large ($n > 200$) as when the sample increases, so does the Chi-square and the significance value becomes less meaningful (Yim 2014). The Normed Chi-square is the Chi-square divided by the degrees of freedom, but the degrees of freedom should still be reported as the normed Chi-square will not serve in its place. A Normed Chi-square ratio of less than five is considered good (Moss 2016). The RMSEA is commonly used as an alternative fit measurement that corrects for large sample sizes as it considers model complexity and sample size in its calculation. It is suited to comparative models for sample sizes above 500. An acceptable RMSEA value is considered 0.08 or above, with 0.08, 0.05 and 0.01 considered a moderate, good and excellent fit respectively. It is reported alongside the low and high 90% confidence intervals (Chen et al. 2008).

Incremental fit indices assess how well the specified model compares to a baseline model (typically the null model), which is the model that assumes there are no associations between variables. The comparative fit index (CFI) is most frequently reported. The CFI values fall between 0 and 1, with a higher measurement being favourable (Hair et al. 2019). The following thresholds for the fit indices were obtained from Chen et al. (2008), Moss (2016) and Hair et al. (2019) and were used to guide the analysis of the models goodness of fit (Table 9).

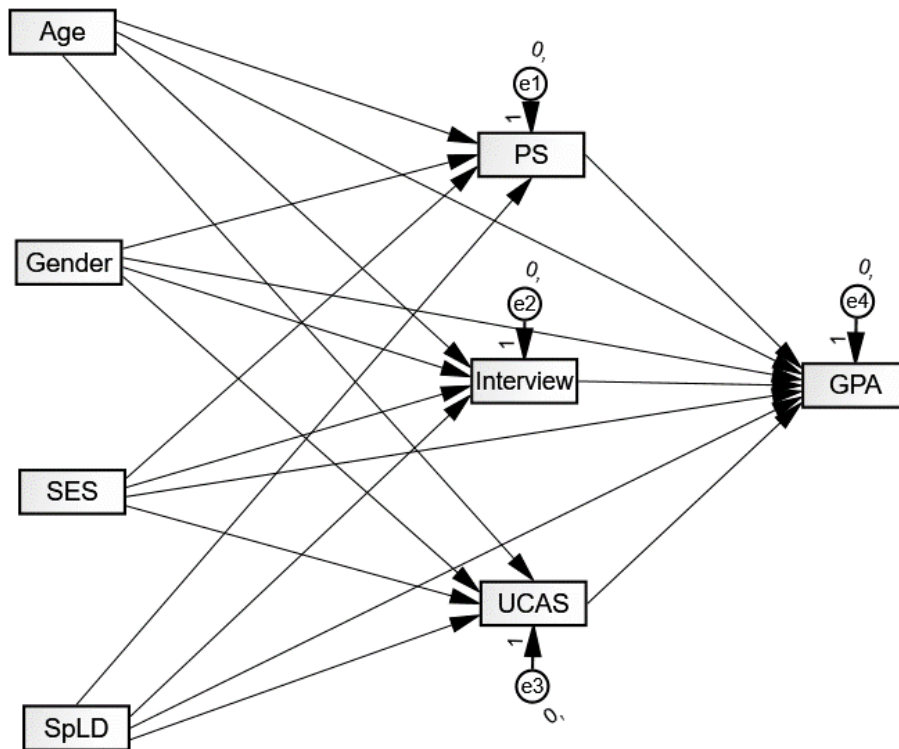
Table 9 - Acceptable threshold for fit indices

Measurement	Threshold
χ^2	Insignificant p value
χ^2/df	<5
RMSEA	<.08
CFI	.96 or higher

Measurement model specification

A path diagram is a visual representation of the conceptual measurement model (Yu et al. 2018, Hair et al. 2019, Kim 2019). Paths should be based on theoretical concepts, researcher experience, or prior research such as the findings from paper 1 our systematic review (Hair et al. 2019). The paths are predetermined and specified in advance to enable appropriate data collection in relation to the variables to be included and the minimum sample size required. The lack of a path in the diagram means that the relationship has not been considered or specified (Tabachnick and Fidell 2019). All continuous and dichotomous demographic and selection variables were entered into the path model and the outcome specified for each model was the GPA which can be visualised in Figure 2.

Figure 2 – Path diagram measurement model

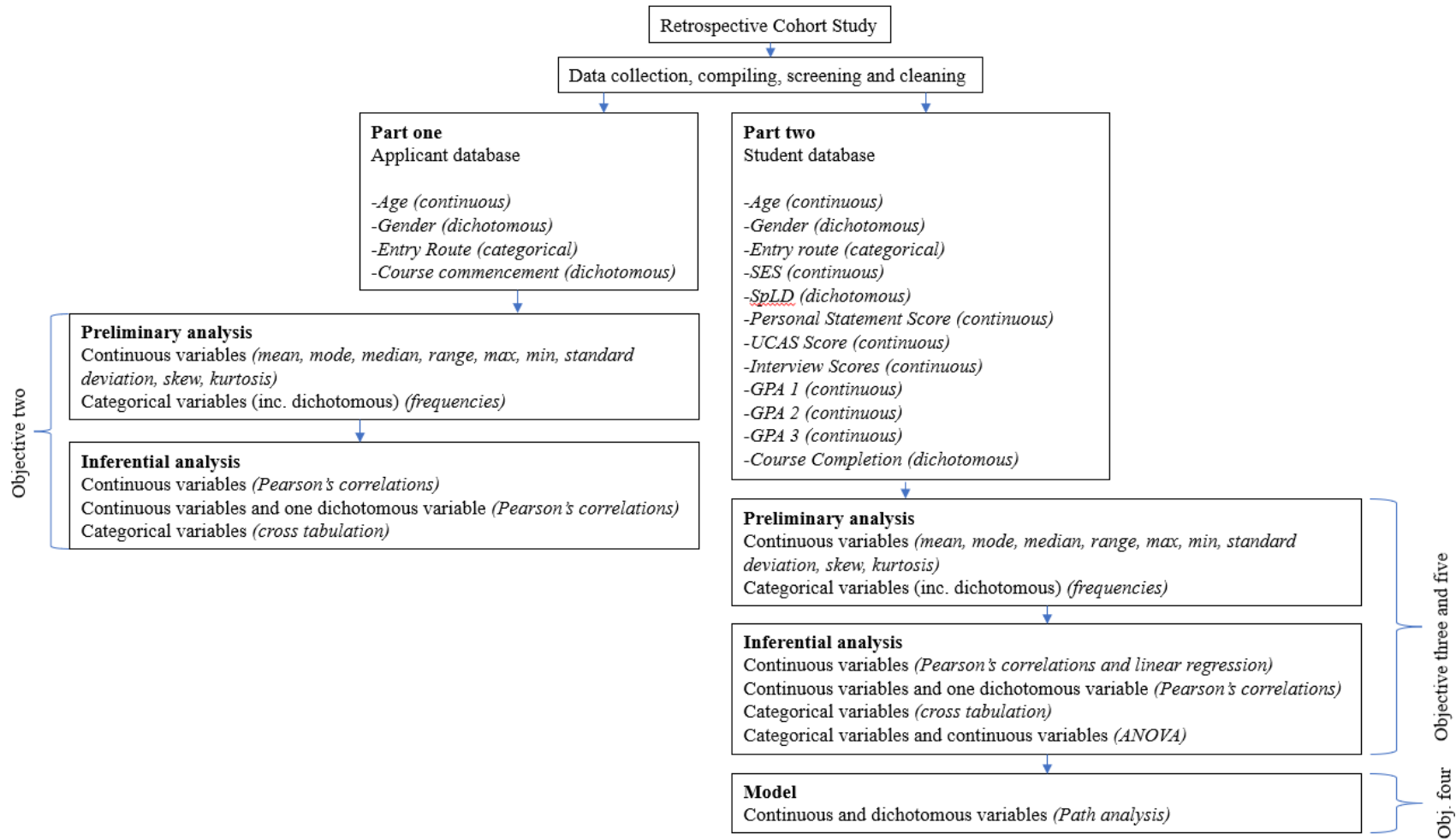


Note. PS – personal statement score

The path analysis was conducted using the *Maximum Likelihood method* (the only option available in AMOS where missing data occur) and all non-significant paths were progressively removed before modifications were made to improve model fit.

In summary, a full overview of the data preparation and statistical analysis is presented in Figure 3.

Figure 3 - Data preparation and statistical analysis flowchart



3.6 Ethical considerations

Obtaining ethical approval

This low-risk category ‘A’ study was initially part of a wider study being conducted at Ulster University which was granted ethical approval in 2015 by the Research and Ethics Committee. Permissions were in place to collect data for all applicants for the 2012 – 2014 adult and mental health cohorts pertaining to age, gender, entry route, postcode, UCAS data (including applicant names, identification numbers and scores), personal statement scores, interview scores, student grades in year 1, 2 and 3, and course completion rates of the pre-registration undergraduate nursing programmes. An amendment was approved by the Research and Ethics Committee at Ulster University to add the PhD researcher to the research team and to expand the data collection to include cohorts 2015 and 2016 and to obtain the students’ SpLD status for cohorts 2012 - 2016.

Ref: <14-06-2015>, amended 06-06-2019

The latest research protocol is available in Appendix 6 and the most recent ethical approval form is available in Appendix 7. Permission to proceed with the research study was granted by the Head of School of Nursing at Ulster University in June 2019 (Appendix 5). Once permissions were granted, data collection began.

A principal risk in this study was that the identity of the participants could be disclosed due to accidental breaches in anonymity and confidentiality. This is an important issue to mitigate against in all research studies. This study was exempt from providing study participants with participant information leaflets about the study, or obtaining their informed consent to use their data. While general data protection regulation permits this exemption in some research (Information Commissioner’s Office 2021), a breach of anonymity in a study that the participants were unaware they were part of would be catastrophic for the research team and University. In order to protect each participants identity it was necessary to consider ways in which to protect participant data against this.

Anonymity

Due to the retrospective nature of the study, no contact between the research team and participants was necessary, as data collection involved retrieving data that were readily available in official Ulster University documents and databases. Although the PhD researcher had been through the pre-registration selection process at Ulster University and attended the university as an undergraduate nursing student, these cohorts did not pertain to any time the PhD researcher spent at the university and therefore, they did not know the applicants or students from these cohorts. Only data which was necessary to conduct the study was collected and stored by the research team and all participant details were anonymised in Excel prior to transfer to SPSS for analysis. Participant details were not shared outside of the research team and were only shared within the four-member team on a 'need-to-know' basis. None of the applicants' identifying details were shared in any dissemination event (such as PhD Research Seminars) during the period of the research.

Confidentiality

To help ensure that participants were protected against accidental loss or theft of data, all data collected on printed paper were stored in a locked filing cabinet in a locked room on the university campus in the PhD researcher's office. Data were subsequently transferred into Excel files which were saved on a password protected computer. The PhD researcher and chief investigator were the only team members with access to the data files, either through the original data collection phase in 2015 or through the data collection phase in 2019.

3.7 Rigour

In order for a study to be valid and reliable the design, data collection, data analysis and reporting of results must be considered (Creswell 2018). Validity refers to whether an instrument can measure what it sets out to measure (Parahoo 2014). While this study did not use a measurement instrument (such as a survey), it did employ the use of a Microsoft Excel file sheet to gather and collate the data. One Excel file was designed by the PhD research team and was used consistently for the data entry across all cohorts of students. The code book ensured that data entry were consistent throughout. Due to the manual transfer of data between printed information and Excel files, errors may have occurred. Ten percent of every student participant had one aspect of their data entry verified by another member of the

research team by checking the Student Marks and Progress database. Further checking would have been undertaken if the error rate was >10%. Any variable that reported > 5% missing data was explored further to identify why it may have been left empty and to assess for any patterns of missing data.

Reliability

The reliability of the data was assumed due to the rigorous checking methods used throughout the admissions process at Ulster University. All data entered into a UCAS application form is verified on enrolment, such as applicants' address, date of birth, gender and prior academic records. Any discrepancies that arise would be corrected at enrolment. All student grades and results are subject to examination board approval and students have the opportunity to challenge grades which are incorrectly displayed on their examination record.

Bias

Smith and Nobel (2014) state that bias can occur in research through the study design, selection of participants, data collection and measurement, analysis and publication of results. The study included all data for all available applicants and all students who had initially enrolled for a three-year duration for the programme which ran between 2012 and 2019. In this PhD study, dropout from the study sample as non-completion is considered a programme outcome so no students were lost to follow-up. There is no risk to participants altering their behaviour under observation as the study is retrospective. For this same reason, there is no contact between the research team and participants. All data that were collected for the study had been compiled in advance by other members of staff within the university, minimising the risk of bias in data collection. Therefore, the risk of bias was considered low.

3.8 Summary

This chapter provided details on how this study was designed and conducted with details pertaining to the data collection, data preparation and statistical analysis presented. All necessary measures were employed to ensure the rigor of the study methods, presentation of findings and ethical considerations. The results are presented in the next chapter.

4 Chapter four - Results

4.1 Introduction

Chapter four reports the results of part one and part two of the statistical analysis. It begins by presenting the results that relate to part one objective two, followed by part two objective three and four, which are written in paper format, and objective five which is written in paper format. Each of the objectives are presented at the beginning of each section. All SPSS and AMOS output sheets are available from the PhD researcher on request.

Please note, at this point it is important to again make clear the difference between parts one and two of this study. Part one is in relation to people who apply for the pre-registration nursing programmes at Ulster University and are known as ‘applicants’. Part two is in relation to those who have accepted a position on the programmes and are known as ‘students’.

Data cleaning and screening

During this process, three minor errors were discovered and amended. The range, minimum and maximum tests were re-executed, and all variables were within the expected limits as indicated by the code book (Appendix 3).

Missing data

Missing data were assessed and accounted for < 5% for each variable aside from *Personal Statement Scores* and *Entry Route*, which both had evident patterns of missing data. The information available in the admissions department for the 2013 and 2014 cohorts excluded those who did not obtain a personal statement score that was high enough for them to be offered an interview. In 2013 all applicants who obtained a score below seven points were excluded and in 2014 all applicants that obtained a score below 11 were excluded. Based on the approximate number of applications received for the programmes per year it is likely that missing applications account for about 1200 applications and approximately 1000 applicants. In Table 10 and 11 it is clear that the number of applications and applicants were less than in previous and subsequent cohorts which mirrors the missing aspects noted from the admissions data that was obtained from the admissions office.

Table 10 - Year of entry to the programme with all applications

	Frequency	Percent
2012	1668	22.7
2013	1085	14.8
2014	1034	14.1
2015	1696	23.1
2016	1869	25.4
Total	7352	100.0

Table 11 - Year of entry to the programme with duplicate applicants removed

	Frequency	Percent
2012	1437	21.7
2013	951	14.3
2014	905	13.6
2015	1477	22.3
2016	1861	28.1
Total	6631	100.0

Table 12 summarises how missing applicant data impacted the numbers of participants in each cohort. As it is not possible to be completely sure of how many applicants were excluded due to low personal statement scores, some cells contain approximations which are based on the number of applicants for cohorts 2012, 2015 and 2016. The cohorts that were affected by missing data are highlighted in bold.

Table 12 – Missing data due to applicants being excluded for low personal statement scores

Year	2012	2013	2014	2015	2016
Expected	1437	approx. 1457	approx. 1457	1477	1861
Missing	N/A	approx. 480	approx. 480	N/A	N/A
Actual	1437	951	905	1477	1861
Percentage missing	N/A	approx. 33%	approx. 33%	N/A	N/A

Table 13 summarises the missing data from the entry route variables for years 2012, 2015 and 2016. These cohorts were subsequently excluded from correlational analysis in part one of the analysis which involved using *entry routes*. The cohorts that were affected by missing data are highlighted in bold.

Table 13 - Missing data for entry route variables

Year	2012	2013	2014	2015	2016
Expected	1437	951	905	1477	1861
Missing	462	29	4	1261	1588
Actual	975	922	901	216	273
Percentage missing	32%	3%	0.4%	85.4%	85.3%

The *Entry Route* variable was missing for applicants who were not awarded a place on the programmes in the 2015 and 2016 cohorts. This pattern of missing data meant that there was no variation in the outcome variable *Course Commencement*. These cohorts were subsequently excluded from the analysis. It was noted that the 2012 cohort had 32% of entry route data missing. Therefore, this cohort was excluded from the analysis also. This resulted in an effective sample of 1823 applicants for the entry route aspect of the analysis in part one. The remaining 2013-2014 cohorts were analysed for patterns of missing data which appeared to have occurred at random.

4.2 Objective two – Demographic characteristics and entry routes of applicants

Objective two - To review the demographic characteristics and entry routes of those who apply for a position on the pre-registration nursing programmes at Ulster University.

Preliminary analysis

Records were available for 7352 applications that were made to the undergraduate pre-registration Adult and Mental Health Nursing programmes at Ulster University between 2012

and 2016. There were some duplications where applicants had applied for the programmes on more than one occasion over several years. Duplicate applicants were identified using the applicants' unique identification number and were removed from the sample which then decreased to 6631.

Taking into account the missing applicant data in the 2015 and 2016 cohorts, the ratio of applicants to programme positions available was calculated for years 2012 – 2014 and was found to be 5:1.

The variables included in the descriptive and inferential analysis were *Age, Gender, Entry Route* and *Course Commencement*.

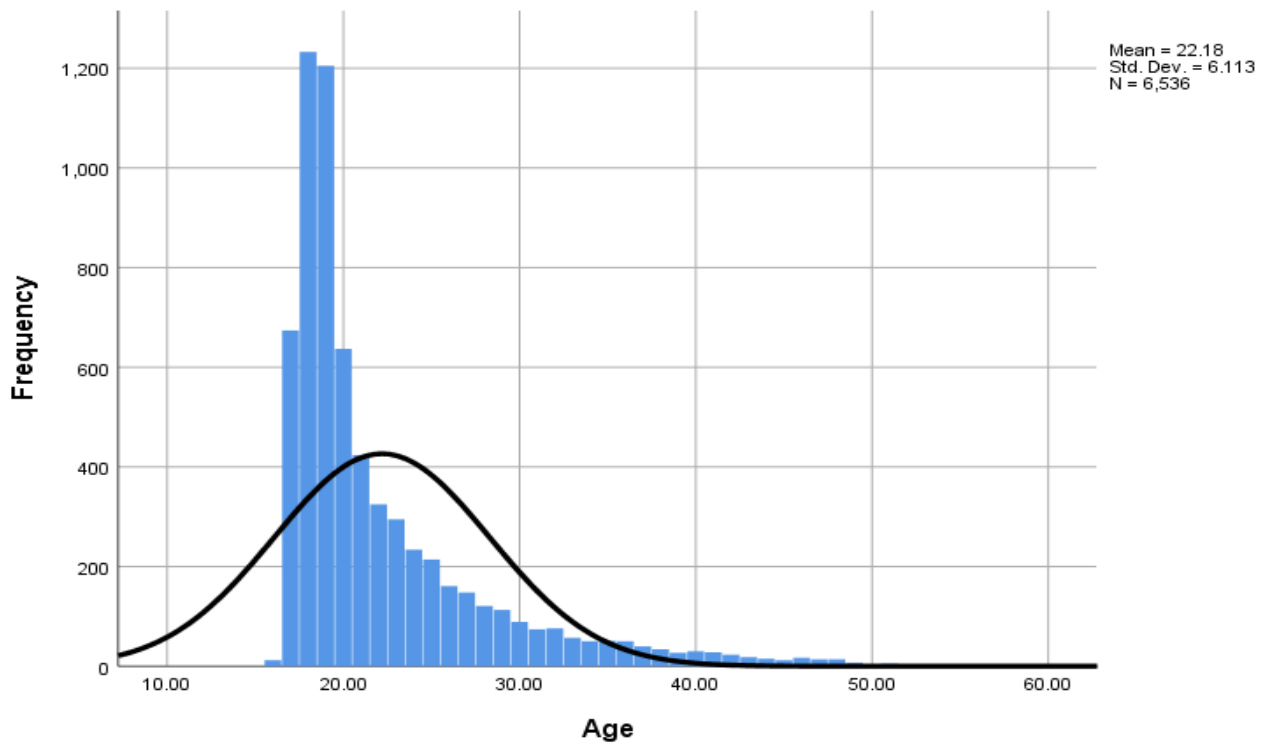
Age

The applicants' age was available in 6536 (98.6%) of cases (Table 14). The youngest applicant was 16, the oldest was 59 and the mean age was 22 (standard deviation (SD) = 6.11). Skewness and kurtosis levels were high, and data were positively skewed, as seen in the histogram (Figure 4).

Table 14 - Descriptive statistics age of applicants

N	Minimum	Maximum	Range	Mean	SD	Skewness	SD	Kurtosis	SD
6536	16	59	43	22.1847	6.11322	2.031	.030	4.411	.061

Figure 4 - Histogram for applicants' age



Gender

The applicants' gender was available in 6631 (100%) of cases. Females totalled 91 percent of the applicants (Table 15).

Table 15 - Frequency statistics for applicants' gender

	Frequency	Percentage
Female	6028	90.9
Male	603	9.1
Total	6631	100.0

Entry Route

Entry routes were available for 1823 of the applicants for the 2013 – 2014 cohorts. Entry routes were categorised into eight groups: A-levels, Access Diploma, BTEC, previous

degree, Higher National Certificate (HNC), Higher National Diploma (HND), Irish leaving Certificate (ILC) and other, which comprised mostly international qualifications (Table 16).

Table 16 - Frequency statistics for applicants' entry route (2013 – 2014)

Entry route	Frequency	Percentage
A-level	675	36%
Access Diploma	456	25%
BTEC	308	17%
HNC	88	5%
HND	53	3%
Previous degree	132	7%
ILC	102	6%
Other	9	<1%
Total	1823	100%

Table 17 - Description of categories and qualifications

Entry route	Description
A - level	A level three school leaving qualifications which uses examination, coursework, or a final piece/performance to test students in one or more subjects chosen by the individual student.
Access Diploma	A level three qualification aimed at adults who wish to pursue study at higher education and is usually studied at a technical college or through distance learning.
BTEC	A level three vocational or technical qualification usually studied at a technical college.
HNC	A level four qualification usually studied at a technical college.
HND	A level five qualification usually studied at a technical college.
Previous degree	A level six academic qualification awarded by a university for study at undergraduate level.
ILC	Final matriculation examinations taken in Irish secondary schools.
Other	Other qualifications including stand-alone modules and international qualifications.

Course Commencement

Across the five cohorts from 2012-2016, profiles were available for a total of 1152 students who commenced the course (17.4%) while 5479 applicants did not commence the course (82.6%).

Inferential statistics

Age and Course Commencement

The mean age of those who commenced the programme was 24 and 22 for those who did not (Table 18). A Pearson's correlation showed that there was a positive and significant correlation between *Age* and *Course Commencement*, meaning that as applicants got older, they were more likely to be successful in commencing the programmes. The effect size was small ($r=.144$, $p=.000$) which means that the relationship between *Age* and *Course Commencement* was weak.

Table 18 - Age of those who commenced the programme and those who did not

Commenced the programme	Mean	N	SD	Minimum	Maximum
No	21.7781	5389	5.87087	16	59
Yes	24.0950	1147	6.82853	17	52
Total	22.1847	6536	6.11322	16	59

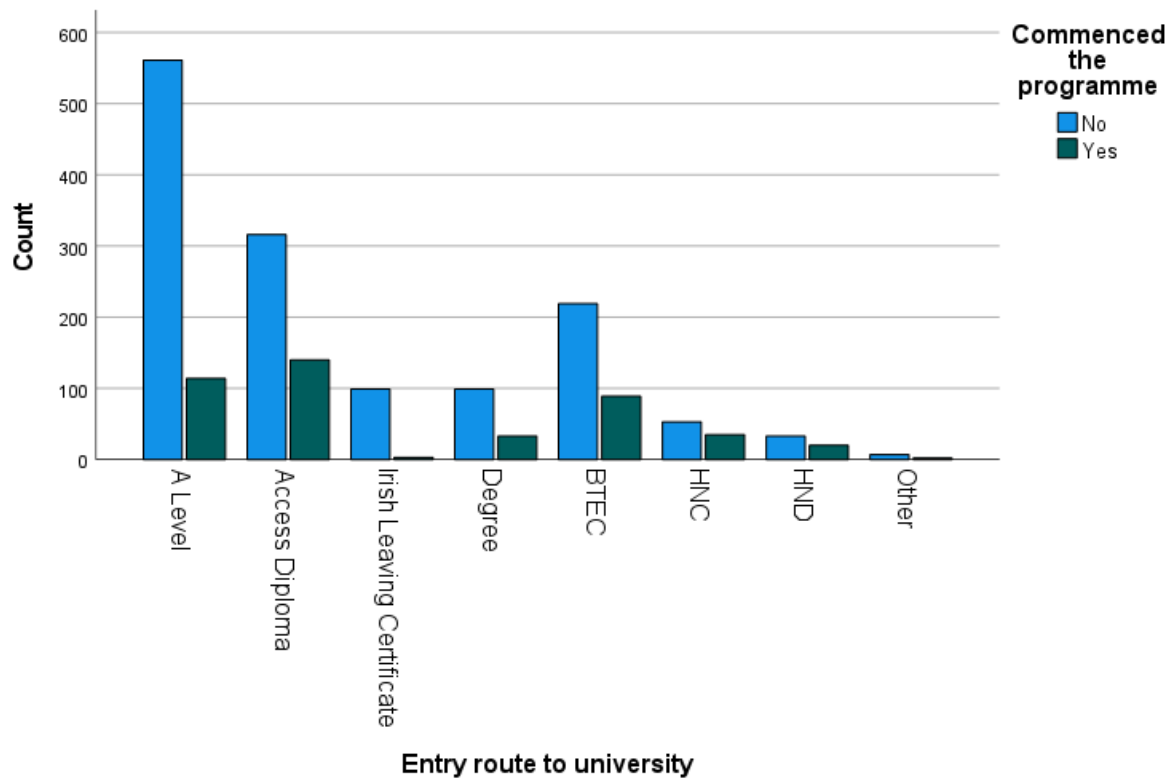
Gender and Course Commencement

Ninety-one percent of those who commenced the programme were female and 9% were male. A Chi-square Test for Independence using Yates's continuity correction showed that there was no significant difference in gender between those who commenced the programme and those who did not ($\chi^2(1, n=6631) = .065$, $p = .799$) which means that there was no relationship between *Gender* and *Course Commencement*. The lowest expected frequency in each group was at least five, therefore no assumptions were violated during the analysis.

Entry route and Course Commencement

Figure 5 shows a bar chart of the entry routes for all applicants divided into the groups that commenced the programme and those who did not.

Figure 5 - Entry route of those who commenced the programme and those who did not



A Chi-Square Test for Independence indicated a significant association between *Entry Route* and *Course Commencement*. The adjusted residuals were $> +/- 2$ in six cases suggesting there were greater numbers of successful applicants in the Access Diploma, BTEC, HNC and HND groups, and less in the A-levels and ILC groups [$\chi^2 (7, n=1823) = 76.537, p=.000, \text{Cramer's } V=.205$] (Table 19). At least 93.7% of the cells had a minimum of five observations, so no assumptions were violated during the analysis.

Table 19 - Cross tabulation between entry route and course commencement

			Commenced the programme		Total
			No	Yes	
Entry route to university	A Level	Count	561	114	675
		% within Entry route to university	83.1%	16.9%	100.0%
		Adjusted Residual	5.4	-5.4	
	Access Diploma	Count	316	140	456
		% within Entry route to university	69.3%	30.7%	100.0%
		Adjusted Residual	-3.9	3.9	
	Irish Leaving Certificate	Count	99	3	102
		% within Entry route to university	97.1%	2.9%	100.0%
		Adjusted Residual	5.1	-5.1	
	Degree	Count	99	33	132
		% within Entry route to university	75.0%	25.0%	100.0%
		Adjusted Residual	-.3	.3	
	BTEC	Count	219	89	308
		% within Entry route to university	71.1%	28.9%	100.0%
		Adjusted Residual	-2.2	2.2	
	HNC	Count	53	35	88
		% within Entry route to university	60.2%	39.8%	100.0%
		Adjusted Residual	-3.6	3.6	
	HND	Count	33	20	53
		% within Entry route to university	62.3%	37.7%	100.0%
		Adjusted Residual	-2.4	2.4	
Other	Count	7	2	9	
	% within Entry route to university	77.8%	22.2%	100.0%	
	Adjusted Residual	.1	-.1		
Total		Count	1387	436	1823
		% within Entry route to university	76.1%	23.9%	100.0%

4.3 Objective three - Demographic characteristics, selection scores and programme outcomes of students

Objective three - To identify any correlations between demographic characteristics, university selection criteria and student outcomes for the undergraduate pre-registration nursing programmes at Ulster University.

Preliminary analysis

Records were available for 1152 students who commenced the undergraduate pre-registration Adult and Mental Health Nursing programmes at Ulster University between 2012 and 2016. According to school records, 1160 places were funded by the Department of Health between 2012 and 2016. This left eight missing student participant profiles. It is possible that these students may have applied in 2011 and deferred their place, therefore their selection data would not be available in the admissions office. It is also possible that they could have transferred to Ulster University for 2nd or 3rd year of the programme from a nursing programme at another university and again, their admissions data would not exist.

The variables included in the analysis were *Age*, *Gender*, *Entry Route*, *Socio-Economic Status (SES)*, *Specific Learning Difficulty (SpLD)*, *UCAS Scores*, *Personal Statement Scores*, *Interview Scores*, *Grade Percent Average (GPA)* for years 1, 2 and 3 of the programme and *Course Completion* rates. Table 20 shows the descriptive statistics for the continuous variables.

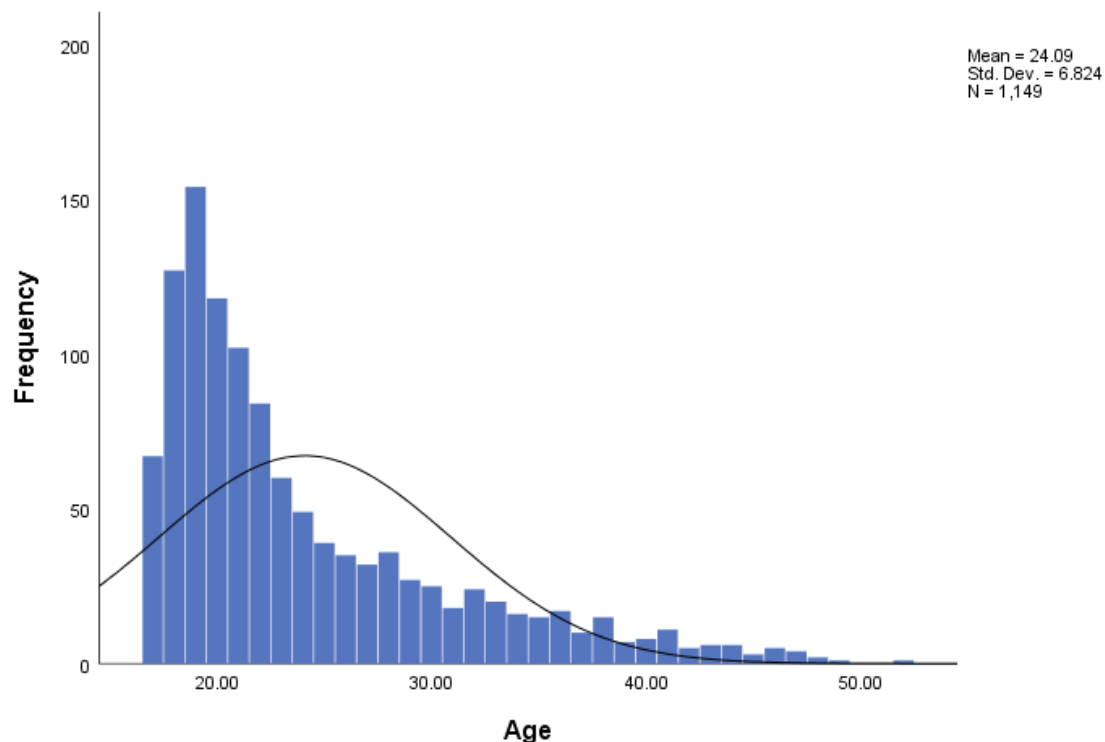
Table 20 - Descriptive statistics for continuous variables

	N	Range	Min	Max	Mean	SD	Skewness (SE)		Kurtosis (SE)	
Age	1149	35	17	52	24.0905	6.82373	1.379	.072	1.359	.144
SES	1026	888	1	889	355.1306	221.78422	.329	.076	-.765	.153
UCAS score	1122	470	260	730	354.5455	85.33173	1.680	.073	2.667	.146
Personal statement	1123	9	7	16	12.5289	1.76766	.013	.073	-.682	.146
Interview score	1118	16	9	25	21.2594	2.77745	-.746	.073	.786	.146
GPA 1	1130	62	24	86	58.4442	9.02869	.057	.073	-.001	.145
GPA 2	1076	63	20	83	58.6050	8.03175	-.091	.075	.455	.149
GPA 3	1053	62	25	87	60.9107	8.28575	-.070	.075	.357	.151

Age

The students' age was available in 1149 cases. The mean age was 24 (SD = 6.824), the lowest was 17 and the highest was 52. The ages were positively skewed, as most students were in their late teens and early twenties (Figure 6).

Figure 6 - Histogram for students' age



Gender

The students' gender was available in all 1152 cases. Female students encompassed 1050 (91%) of the sample and male students 102 (9%).

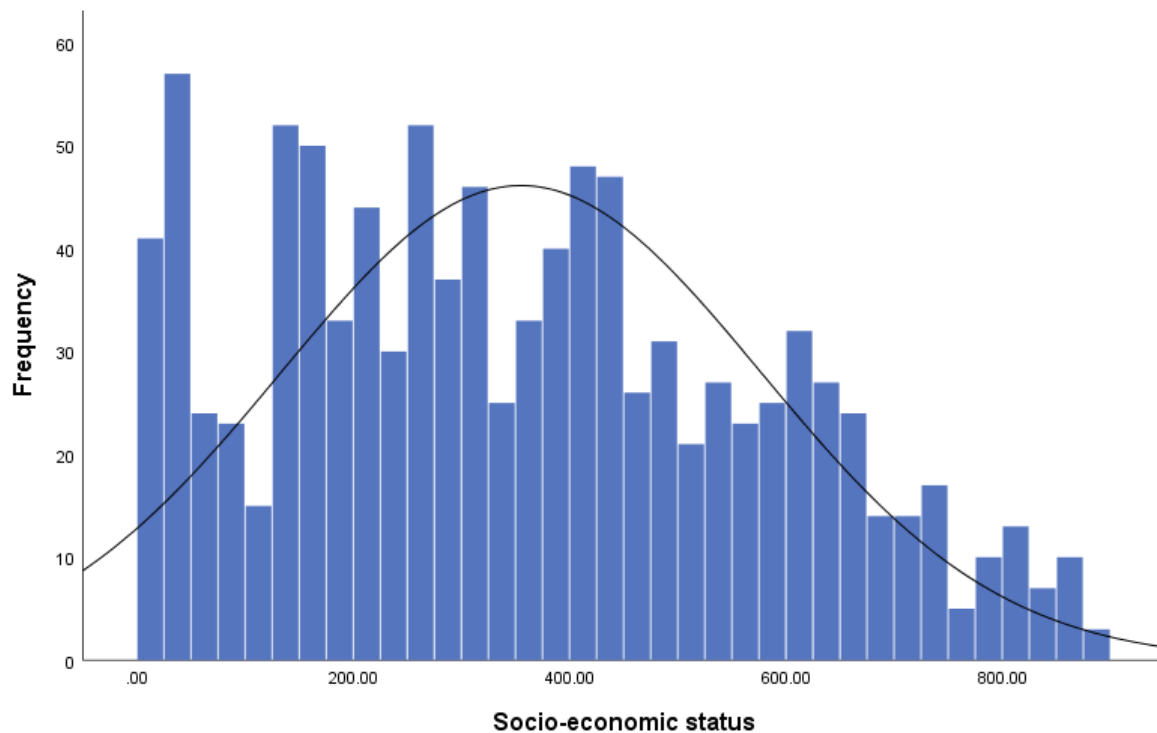
Entry route

Due to the low numbers of students in the 'other' and ILC categories, these groups were combined for the remaining analysis. The student's entry route was available in 1140 cases. The Access Diploma accounted for 344 (30%) of the sample and was the largest group, followed by A-levels (n=306, 27%), BTEC (n=237, 21%), previous degree (n=104, 9%), HNC (n=77, 7%), HND (n=56, 5%) and other (n=16, 1%).

SES

The students' SES was available in 1026 cases and only included those who lived in Northern Ireland. The mean SES was 355 (SD = 221.784), the lowest was 1 and the highest was 889. Students were represented across all levels of socio-economic status (Figure 7).

Figure 7 - Histogram for students' SES



SpLD

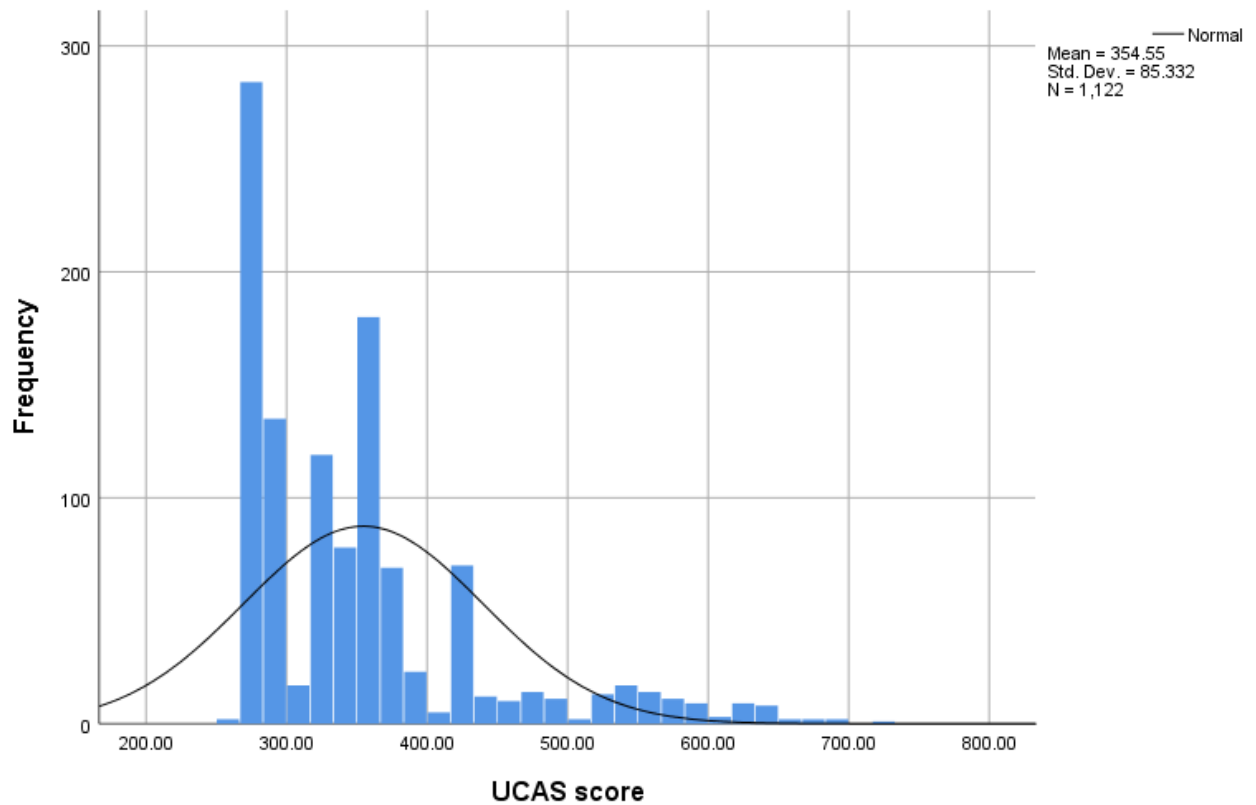
SpLD status was available in all 1152 cases. Students with SpLDs totalled 144 (12.5%) of the sample and students without SpLDs encompassed 1008 (87.5%) of the sample.

UCAS Scores

The student's UCAS Scores were available in 1122 cases. The mean UCAS score was 355 (SD = 85.332) which was 75 points higher than the minimum required to enter nursing programmes which was 280. The lowest score was 260 and the highest was 730 (Table 20). The lowest score was obtained by a student who had completed first year of university on a different programme where 260 was above the minimum standard. The student then

transferred into first year of nursing with no new UCAS scores but the completion of the first year was enough for them to meet the minimum standard required to commence nursing. The score that occurred the most was 280, followed by 360, and the scores were positively skewed (Figure 8).

Figure 8 - Histogram for students' UCAS scores



Personal Statement Scores

Students' personal statement scores were available in 1123 cases. The mean score was 13 (SD = 1.768), the lowest was 7 and the highest was 16 (Table 20). The scores were normally distributed (Figure 9).

Interview Scores

Students' interview scores were available in 1118 cases. The mean interview score was 21 (SD = 2.777). The lowest was 9 and the highest was 25, which was the maximum score achievable (Table 20). Only one student achieved a score of 9, two students achieved scores

of 10 and three achieved scores of 11. The interview scores were negatively skewed (Figure 10).

Figure 9 - Histogram for students' personal statement scores

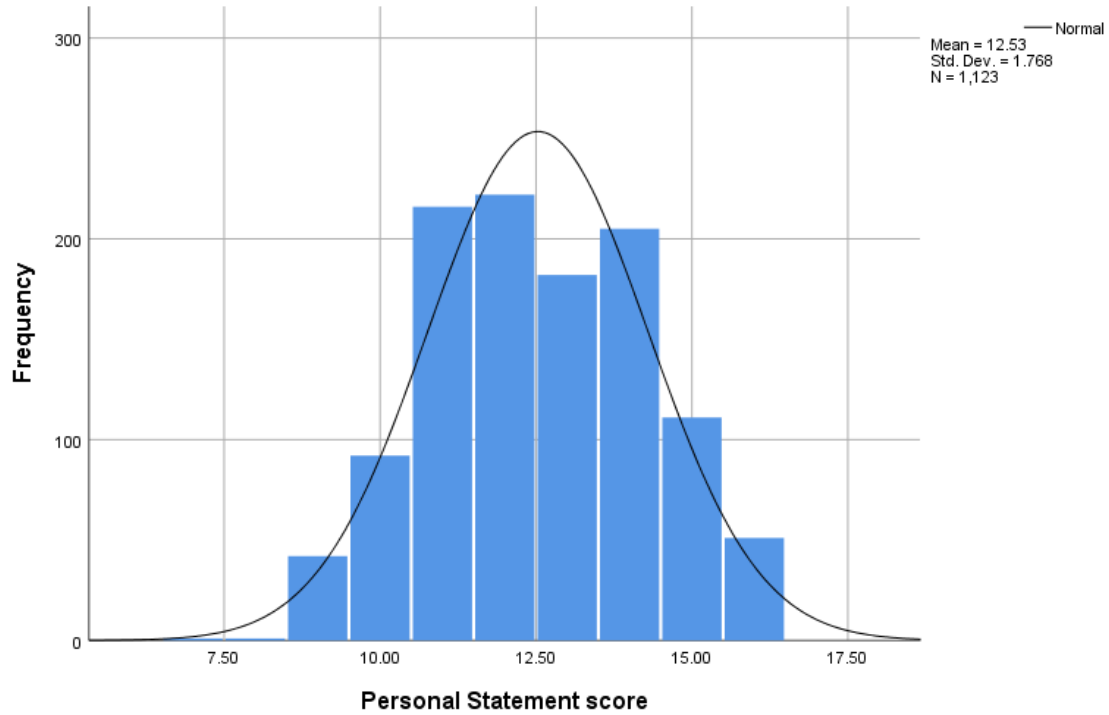
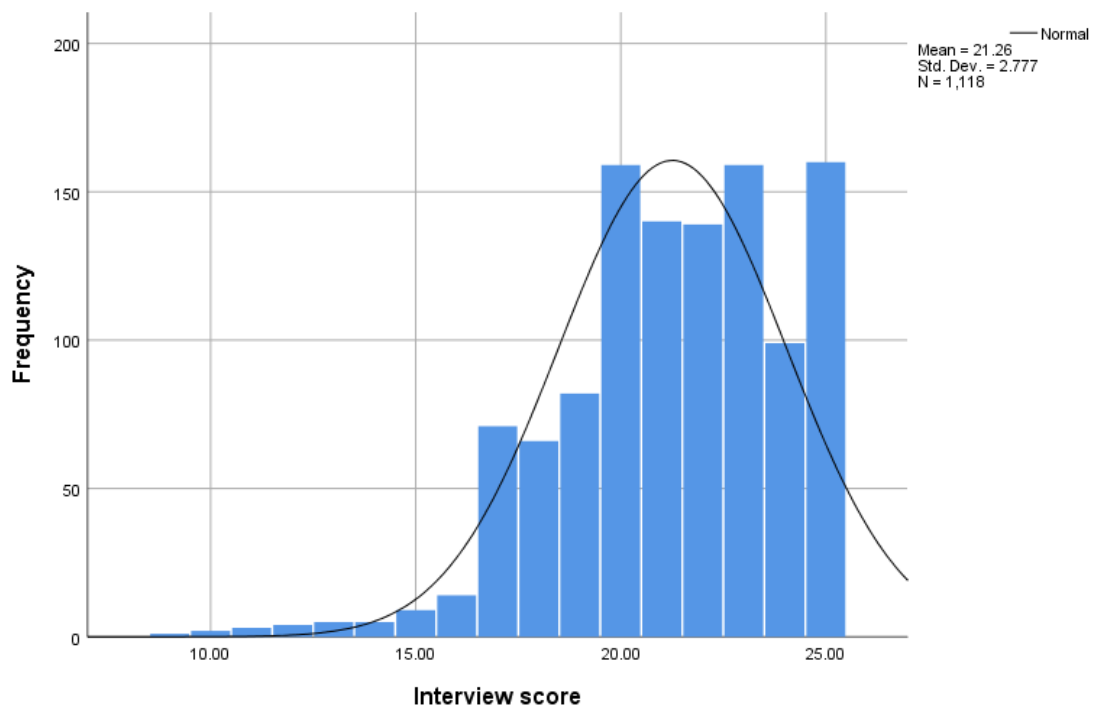


Figure 10 - Histogram for students' interview scores



GPA

GPA 1, 2 and 3 scores were available in 1130, 1076 and 1053 cases in years 1, 2 and 3 respectively. The mean scores were 58% (SD = 9.029), 59% (SD = 8.032) and 61% (SD = 8.286). The lowest score over all three years of the programme was 20% and the highest was 87% (Table 20). The scores for all three year groups were normally distributed (Figure 11, 12 and 13).

Figure 11 - Histogram for students' GPA 1 scores

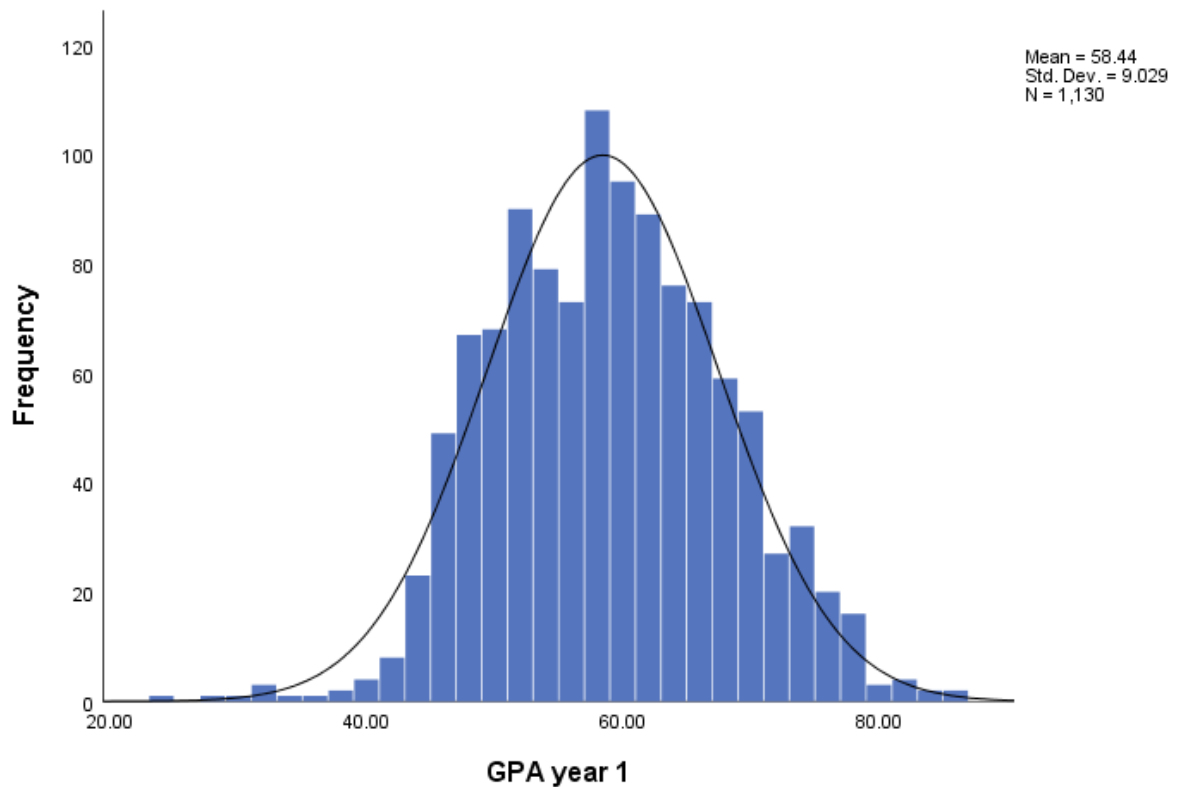


Figure 12 - Histogram for students' GPA 2 scores

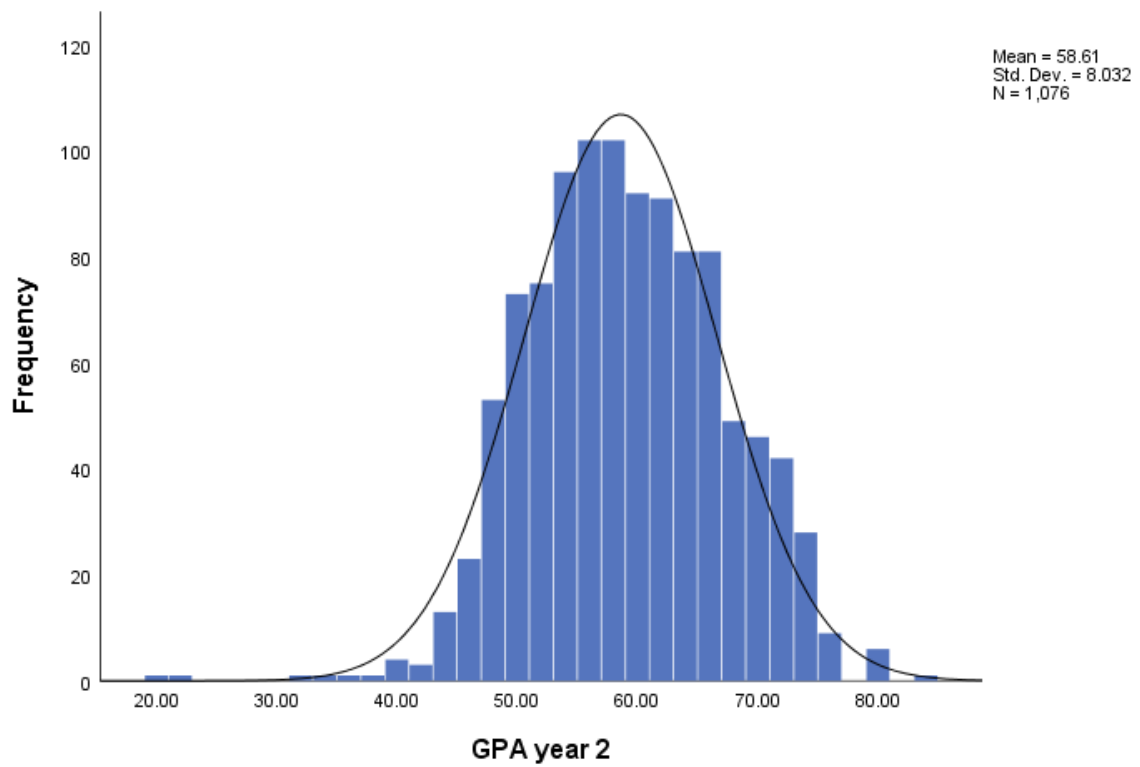
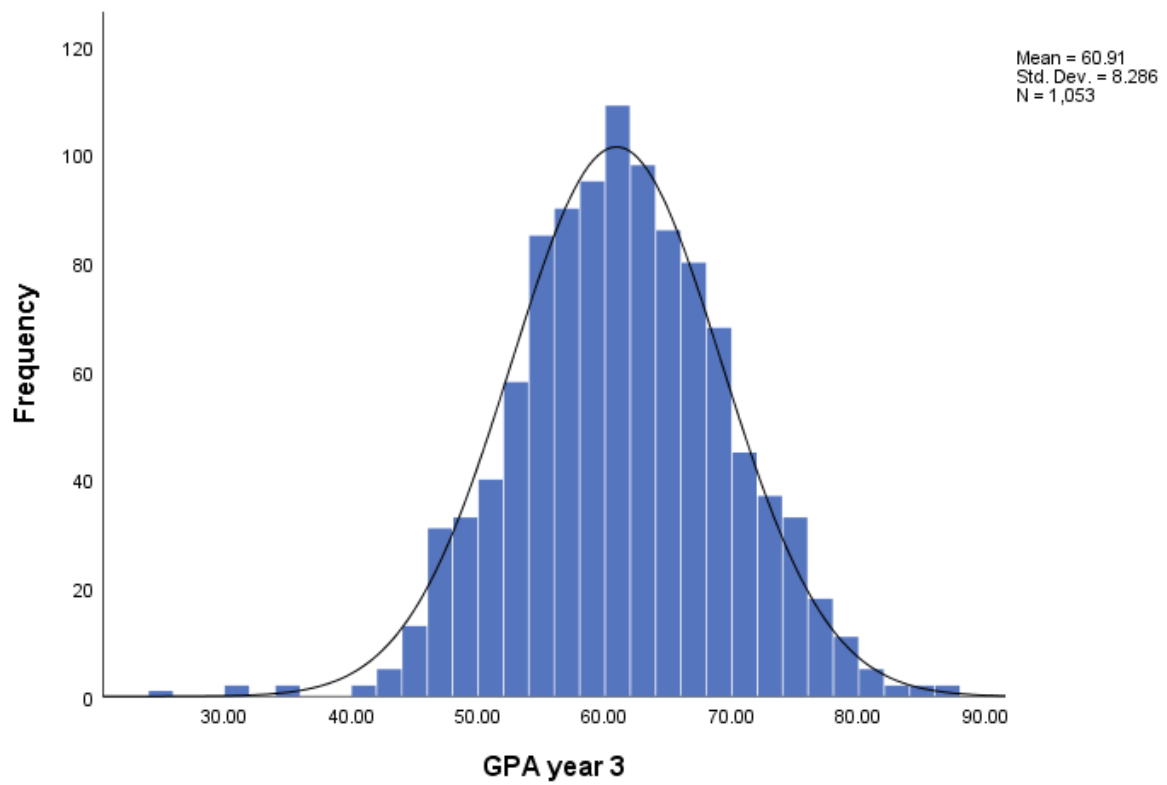


Figure 13 - Histogram for students' GPA 3 scores



Course Completion

Completion rates were available in 1149 cases. A total of 1015 students (88%) had completed the programme and 134 (12%) had not. Three students had not yet completed the programme at the time of data analysis and their *Course Completion* data were coded as missing.

Inferential statistics

The Pearson's correlation matrices between the demographic, selection and outcome variables are displayed in Table 21 and the partial correlations which controlled for the influence of the demographic variables are displayed in Table 22.

Table 21 - Pearson's correlation coefficient matrix

		Gender	SES	SpLD	UCAS scores	Personal statement Scores	Interview scores	GPA 1	GPA 2	GPA 3	Course completion
Age	Pearson Correlation	.122**	-.165**	.058*	-.044	.112**	.058	.155**	.155**	.129**	-.063*
	Sig. (2-tailed)	.000	.000	.048	.142	.000	.051	.000	.000	.000	.034
	N	1147	1025	1147	1118	1119	1114	1126	1072	1049	1144
Gender	Pearson Correlation		.002	.095**	.043	.005	.127**	.030	.046	.016	-.058*
	Sig. (2-tailed)		.938	.001	.149	.858	.000	.321	.133	.599	.049
	N		1026	1152	1122	1123	1118	1130	1076	1053	1149
SES	Pearson Correlation			-.078*	.014	-.051	-.021	.069*	.046	.075*	.062*
	Sig. (2-tailed)			.012	.656	.104	.518	.029	.158	.022	.049
	N			1026	1000	1001	995	1007	959	940	1023
SpLD	Pearson Correlation				.001	-.024	.021	-.168**	-.075*	-.102**	-.036
	Sig. (2-tailed)				.986	.415	.487	.000	.014	.001	.229
	N				1122	1123	1118	1130	1076	1053	1149
UCAS Scores	Pearson Correlation					.033	.124**	.156**	.149**	.137**	.059*
	Sig. (2-tailed)					.268	.000	.000	.000	.000	.048
	N					1108	1106	1102	1046	1023	1119

Table 22 - Partial correlations controlling for age, gender, SES and SpLD

Control Variables			GPA 1	GPA 2	GPA 3	Course Completion
Age Gender SES SpLD	UCAS Scores	Correlation	.167	.157	.145	.059
		Significance (2-tailed)	.000	.000	.000	.063
		df	994	953	934	994
	Personal Statement Scores	Correlation	.014	.041	-.020	-.022
		Significance (2-tailed)	.658	.210	.544	.481
		df	995	953	934	995
	Interview Scores	Correlation	.122	.105	.142	.051
		Significance (2-tailed)	.000	.001	.000	.109
		df	989	953	934	989
	GPA 1	Correlation			.606	.278
		Significance (2-tailed)			.000	.000
		df		953	934	1001
	GPA 2	Correlation			.699	.272
		Significance (2-tailed)			.000	.000
		df			934	953
	GPA 3	Correlation				.281
		Significance (2-tailed)				.000
		df				934

Partial correlations

The impact of the demographic variables was controlled for using partial correlations. In comparison to the effect sizes when the variables were not controlled for, the change in effect size for the selection variables was very small. Therefore, the influence that demographic characteristics has on selection scores and how these impact outcomes are practically meaningless and as such, the partial correlation matrix is reported in this thesis, but the results are not explored or referred to any further.

Age

The Pearson's correlation coefficient showed that *Age* was positively correlated with *Personal Statement Scores*, with increasing age being associated with higher scores. The correlation is statistically significant, but the effect size is small, which means the relationship is weak ($r=.111$, $n=1120$, $p=.000$). *Age* did not correlate with *UCAS Scores* ($r=.043$, $n=1119$, $p=.158$) or *Interview Scores* ($r=.058$, $n=1115$, $p=.055$).

Age was positively correlated with *GPA 1*, *2* and *3*, with increasing age being associated with higher GPAs. The correlations were significant, but the effect sizes were small, which means the relationships are weak [*GPA 1* ($r=.156$, $n=1128$, $p=.000$)] [*GPA 2* ($r=.156$, $n=1074$, $p=.000$)] [*GPA 3* ($r=.130$, $n=1051$, $p=.000$)].

Age was negatively correlated with *Course Completion*, which meant that an increasing age was associated with being more likely to complete the programme. The correlation was significant, and the effect size is very small, which means the relationship is practically meaningless ($r= -.063$, $n=1146$, $p=.034$).

Gender

The Pearson's correlation coefficient showed that *Gender* was positively correlated with *Interview Scores*, with male students having higher interview scores than females ($r=.127$, $n=1118$, $p=.000$). The correlation was significant, but the effect size was small. The average *Interview Scores* for males was 22, and females was 21.

Gender was not significantly correlated with *UCAS Scores* ($r=.043$, $n=1122$, $p=.149$) or *Personal Statement Scores* ($r=.005$, $n=1123$, $p=.858$). There were no significant relationships between *Gender* and *GPA 1, 2 and 3* [*GPA 1* ($r=.030$, $n=1130$, $p = .321$)] [*GPA 2* ($r=.046$, $n=1076$, $p = .133$)] [*GPA 3* ($r=.016$, $n=1053$, $p=.599$)]. A Chi-square Test for Independence using Yates' Continuity Correction showed that there were no significant associations between *Gender* and *Course Completion* [$\chi^2 (1, n=1149) = 3.280$, $p= .070$, $\phi=-.058$].

ANOVA was used to further explore if any relationship could be determined between *Gender* and *GPA 1, 2 and 3*. The Levene's Test of Homogeneity showed that the homogeneity of variance was non-significant, which means that there was no variance between groups (male and female). The results confirm those revealed by the Pearson's correlation, that there was no statistically significant relationship between *Gender* and *GPA 1, 2 and 3* [*GPA 1* = $f(1, 1128) .986$, $p= .321$], [*GPA 2* = $f(1, 1074) 2.263$, $p= .133$], [*GPA 3* = $f(1, 1051) .277$, $p=.599$].

Entry Routes

ANOVA was used to explore the correlations between *Entry Route* and *Personal Statement Scores, Interview Scores, GPA 1, 2 and 3*. The Levene's Test of Homogeneity showed that the homogeneity of variance was non-significant, which means that there was no variance between groups, aside from with the *Personal Statement Score* variable (Table 23).

Table 23 - Tests of homogeneity of variances

		Levene's test	df1	df2	significance
Personal Statement score	Based on Mean	2.489	6	1113	.021
	Based on Median	2.304	6	1113	.032
	Based on Median and with adjusted df	2.304	6	1101.931	.032
	Based on trimmed mean	2.468	6	1113	.022
Interview score	Based on Mean	.472	6	1109	.830
	Based on Median	.513	6	1109	.799
	Based on Median and with adjusted df	.513	6	1102.366	.799

	Based on trimmed mean	.470	6	1109	.831
GPA 1	Based on Mean	1.723	6	1112	.112
	Based on Median	1.752	6	1112	.106
	Based on Median and with adjusted df	1.752	6	1081.752	.106
	Based on trimmed mean	1.729	6	1112	.111
GPA 2	Based on Mean	1.827	6	1057	.091
	Based on Median	1.673	6	1057	.124
	Based on Median and with adjusted df	1.673	6	1019.418	.124
	Based on trimmed mean	1.823	6	1057	.091
GPA 3	Based on Mean	.490	6	1034	.816
	Based on Median	.459	6	1034	.839
	Based on Median and with adjusted df	.459	6	995.288	.839
	Based on trimmed mean	.500	6	1034	.808

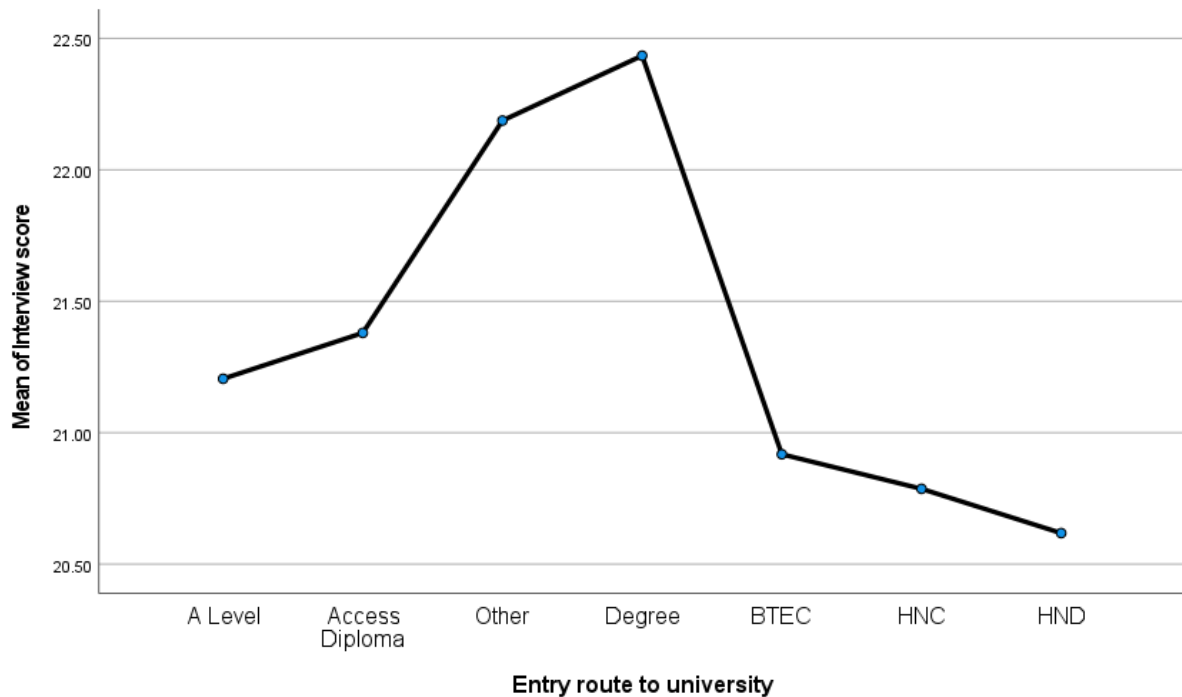
Firstly, the relationships between *Entry Routes* and the selection scores will be presented. The results showed that there was no significant association between *Entry Route* and *Personal Statement Scores* [$f(6, 1120) 1.612, p = .140$]. There was a significant association between *Entry Routes* and *Interview Scores* [$f(6, 1116) 4.960, p = .000 \eta^2 = 0.026$]. The mean differences in scores are presented in Table 24 and the difference can be seen in Figure 14.

Table 24 - Mean differences in scores between Entry Route with Interview Scores

Entry Route		Interview Score
A Level	Mean	21.2053
	N	302
	SD	2.72753
Access Diploma	Mean	21.3798
	N	337
	SD	2.69666
Other	Mean	22.1875
	N	16
	SD	2.61327

Degree	Mean	22.4343
	N	99
	SD	2.52805
BTEC	Mean	20.9181
	N	232
	SD	2.87807
HNC	Mean	20.7867
	N	75
	SD	2.88656
HND	Mean	20.6182
	N	55
	SD	2.55670
Total	Mean	21.2643
	N	1116
	SD	2.76380

Figure 14 - Means plot differences in scores between entry routes with interview scores



Post-hoc comparisons using Tukey HSD indicated that the significant differences were occurring with the previous degree category (Table 25), which means that students with a previous degree obtained statistically significantly higher interview scores, but the difference was small.

Table 25 - Post hoc comparisons between Entry Route and Interview Scores

Dependent Variable: Interview score							
	(I) Entry route to university	(J) Entry route to university	Mean Difference (I-J)	SE	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Tukey HSD	A-level	Access Diploma	-.17452	.21670	.984	-.8146	.4656
		Other	-.98220	.70158	.802	-3.0545	1.0901
		Degree	-1.22905*	.31672	.002	-2.1646	-.2935
		BTEC	.28719	.23875	.893	-.4180	.9924
		HNC	.41863	.35283	.899	-.6235	1.4608
		HND	.58712	.40094	.766	-.5972	1.7714
	Access Diploma	A Level	.17452	.21670	.984	-.4656	.8146
		Other	-.80768	.69975	.911	-2.8746	1.2592
		Degree	-1.05452*	.31264	.014	-1.9780	-.1311
		BTEC	.46172	.23331	.429	-.2274	1.1508
		HNC	.59316	.34916	.617	-.4382	1.6245
		HND	.76164	.39772	.471	-.4131	1.9364
	Other	A Level	.98220	.70158	.802	-1.0901	3.0545
		Access Diploma	.80768	.69975	.911	-1.2592	2.8746
		Degree	-.24684	.73688	1.000	-2.4234	1.9297
		BTEC	1.26940	.70689	.551	-.8186	3.3574
		HNC	1.40083	.75311	.508	-.8237	3.6253
		HND	1.56932	.77681	.402	-.7252	3.8638
	Degree	A Level	1.22905*	.31672	.002	.2935	2.1646
		Access Diploma	1.05452*	.31264	.014	.1311	1.9780
		Other	.24684	.73688	1.000	-1.9297	2.4234
		BTEC	1.51624*	.32831	.000	.5465	2.4860
		HNC	1.64768*	.41865	.002	.4111	2.8843
		HND	1.81616*	.45993	.002	.4576	3.1747
	BTEC	A Level	-.28719	.23875	.893	-.9924	.4180
		Access Diploma	-.46172	.23331	.429	-1.1508	.2274
		Other	-1.26940	.70689	.551	-3.3574	.8186
		Degree	-1.51624*	.32831	.000	-2.4860	-.5465
		HNC	.13144	.36326	1.000	-.9416	1.2044
		HND	.29992	.41015	.991	-.9116	1.5114
HNC	A Level	-.41863	.35283	.899	-1.4608	.6235	
	Access Diploma	-.59316	.34916	.617	-1.6245	.4382	
	Other	-1.40083	.75311	.508	-3.6253	.8237	
	Degree	-1.64768*	.41865	.002	-2.8843	-.4111	
	BTEC	-.13144	.36326	1.000	-1.2044	.9416	
	HND	.16848	.48550	1.000	-1.2656	1.6025	

HND	A Level	-.58712	.40094	.766	-1.7714	.5972
	Access Diploma	-.76164	.39772	.471	-1.9364	.4131
	Other	-1.56932	.77681	.402	-3.8638	.7252
	Degree	-1.81616*	.45993	.002	-3.1747	-.4576
	BTEC	-.29992	.41015	.991	-1.5114	.9116
	HNC	-.16848	.48550	1.000	-1.6025	1.2656

Secondly, the relationship between *Entry Route* and *GPA 1*, *2* and *3* will be presented. There was a statistically significant difference for all three academic outcomes *GPA 1*, *2* and *3*: *GPA 1* [$f(6, 1110) 20.554, p = .000, \eta^2 = .0998$], *GPA 2* [$f(6, 1064) 14.176, p = .000, \eta^2 = .0745$], *GPA 3* [$f(6, 1041) 15.218, p = .000, \eta^2 = .0811$]. These differences are presented in Table 26 and can be visualised in the means plots (Figure 15, 16 and 17). Despite reaching statistical significance the effect sizes were small, as were the differences in mean scores.

Table 26 - Mean differences in scores between *Entry Route* with *GPA 1*, *2* and *3*

Entry route		GPA 1	GPA 2	GPA 3
A Level	Mean	58.9635	58.8241	61.3965
	N	301	290	285
	SD	9.16599	8.56525	7.77052
Access Diploma	Mean	59.2396	58.8770	61.3873
	N	338	317	315
	SD	8.13345	7.05723	8.08528
Other	Mean	60.1250	59.1250	65.2857
	N	16	16	14
	SD	8.88351	7.63217	6.55660
Degree	Mean	64.9804	64.0816	66.1684
	N	102	98	95
	SD	9.38081	8.06248	8.02211
BTEC	Mean	54.4635	55.9537	57.6587
	N	233	216	208
	SD	8.32009	7.25725	7.63186
HNC	Mean	55.4865	55.7808	58.2113
	N	74	73	71
	SD	6.99558	7.90086	7.82654
HND	Mean	57.9818	59.0370	60.3396
	N	55	54	53
	SD	8.99484	7.88589	9.46439
Total	Mean	58.3968	58.5479	60.8636
	N	1119	1064	1041
	SD	9.00297	8.01701	8.26547

Figure 15 - Means plot Entry Route and GPA 1

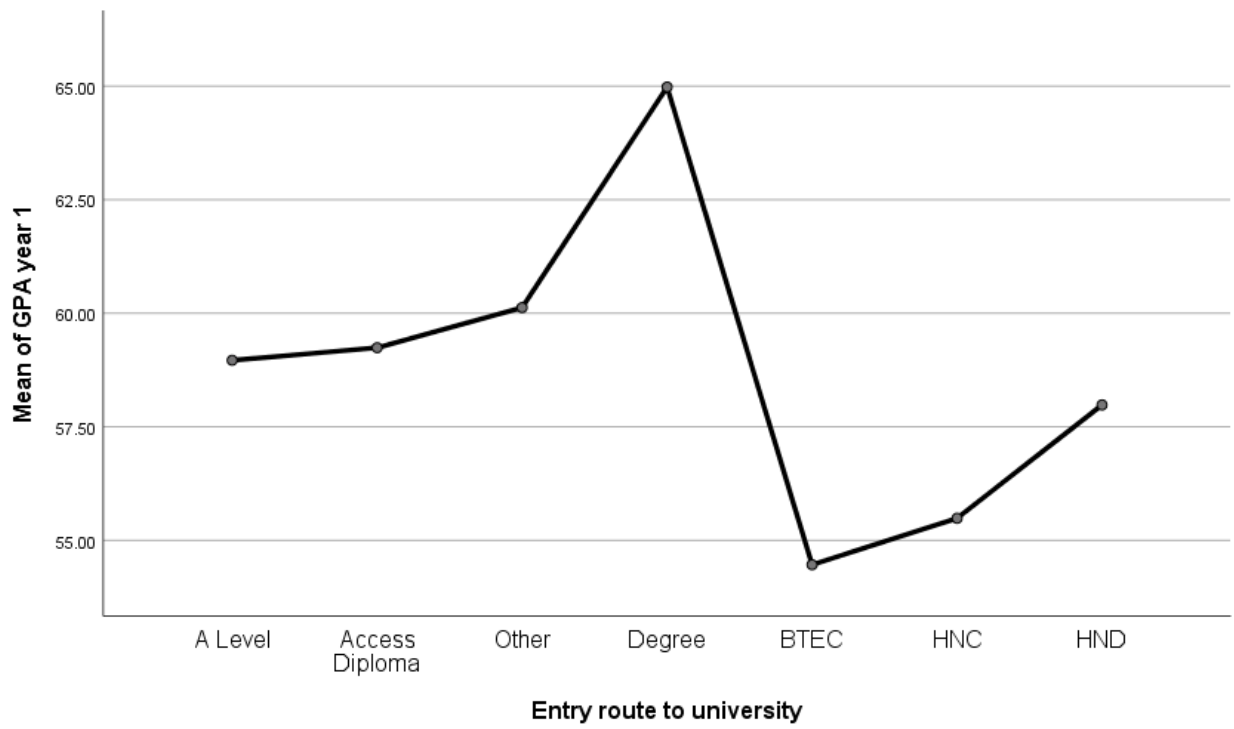


Figure 16 - Means plot Entry Route and GPA 2

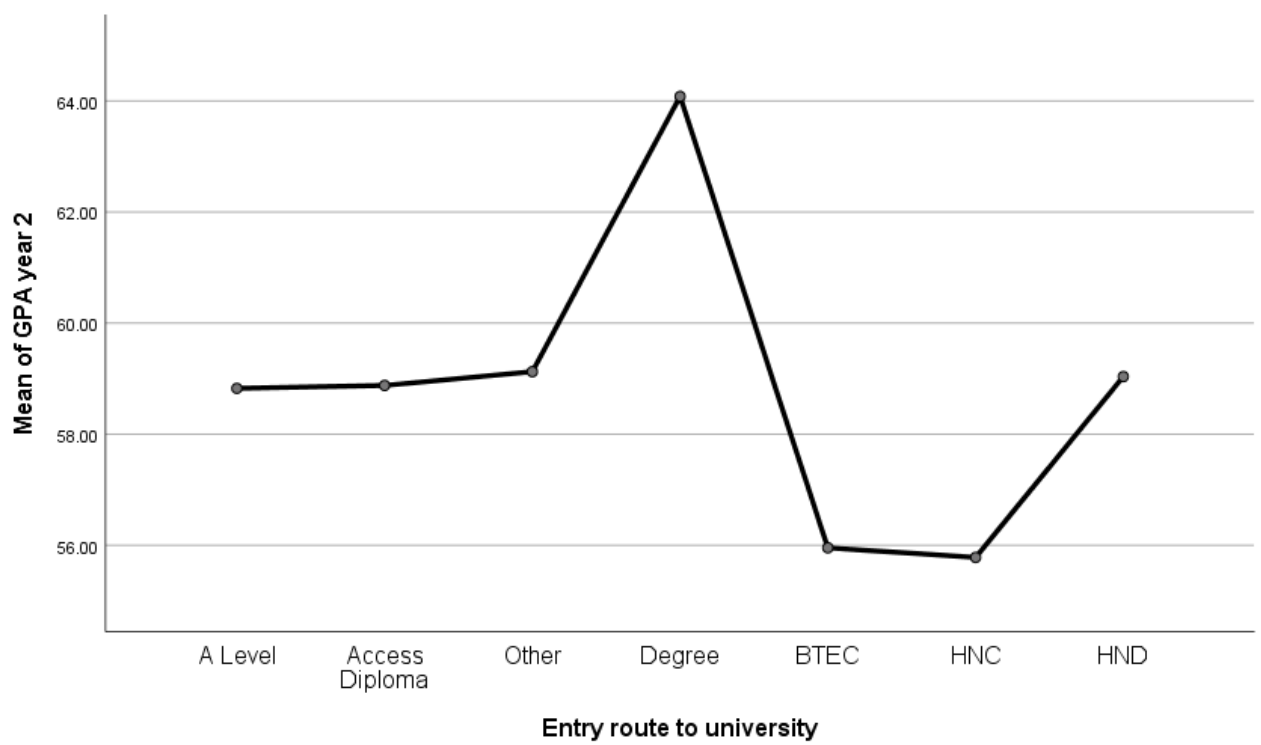
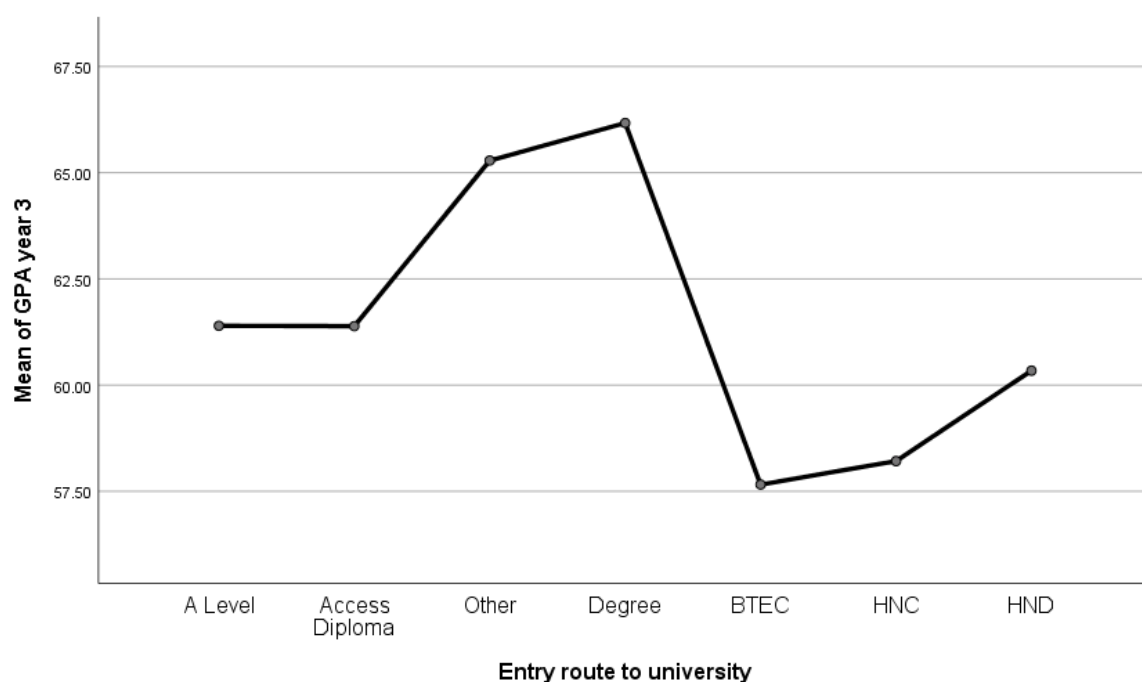


Figure 17 - Means plot Entry Route and GPA 3



Post-hoc comparisons using Tukey HSD indicated that the significant differences were occurring between previous degree and all other categories (aside from other). A-levels and Access Diploma were also significantly different from BTEC and HNC. These same differences were seen in *GPA 1, 2* and *3*, the only difference being that ‘other’ was significantly different from BTEC and HNC in *GPA 3*. This means that students with previous degrees achieved statistically significantly higher GPA than those without, and students with A-levels and the Access Diploma achieved higher than those with a HNC or a BTEC (Table 27).

A Chi-square Test for Independence showed that there were no significant associations between *Entry Route* and *Course Completion* [χ^2 (6, n=1137) = 6.938, p= .327, phi= .078].

Table 27 - Post hoc comparisons between Entry Route and GPAs

Dependent Variable		(I) Entry route to university	(J) Entry route to university	Mean Difference (I-J)	SE	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
GPA 1	Tukey HSD	A Level	Access Diploma	-.27619	.67877	1.000	-2.2811	1.7287
			Other	-1.16154	2.19737	.998	-7.6520	5.3289
			Degree	-6.01694*	.98126	.000	-8.9153	-3.1185

			BTEC	4.49994*	.74735	.000	2.2924	6.7074
			HNC	3.47697*	1.11130	.030	.1945	6.7595
			HND	.98164	1.25596	.987	-2.7282	4.6914
		Access Diploma	A Level	.27619	.67877	1.000	-1.7287	2.2811
			Other	-.88536	2.19129	1.000	-7.3579	5.5871
			Degree	-5.74075*	.96757	.000	-8.5987	-2.8828
			BTEC	4.77613*	.72929	.000	2.6220	6.9302
			HNC	3.75316*	1.09924	.012	.5063	7.0000
			HND	1.25783	1.24530	.952	-2.4205	4.9361
		Other	A Level	1.16154	2.19737	.998	-5.3289	7.6520
			Access Diploma	.88536	2.19129	1.000	-5.5871	7.3579
			Degree	-4.85539	2.30302	.348	-11.6579	1.9471
			BTEC	5.66148	2.21349	.140	-.8766	12.1996
			HNC	4.63851	2.36136	.438	-2.3363	11.6134
			HND	2.14318	2.43279	.975	-5.0426	9.3290
		Degree	A Level	6.01694*	.98126	.000	3.1185	8.9153
			Access Diploma	5.74075*	.96757	.000	2.8828	8.5987
			Other	4.85539	2.30302	.348	-1.9471	11.6579
			BTEC	10.51687*	1.01686	.000	7.5133	13.5204
			HNC	9.49391*	1.30785	.000	5.6309	13.3569
			HND	6.99857*	1.43280	.000	2.7665	11.2307
		BTEC	A Level	-4.49994*	.74735	.000	-6.7074	-2.2924
			Access Diploma	-4.77613*	.72929	.000	-6.9302	-2.6220
			Other	-5.66148	2.21349	.140	-12.1996	.8766
			Degree	-10.51687*	1.01686	.000	-13.5204	-7.5133
			HNC	-1.02297	1.14286	.973	-4.3987	2.3527
			HND	-3.51830	1.28397	.089	-7.3108	.2742
		HNC	A Level	-3.47697*	1.11130	.030	-6.7595	-.1945
			Access Diploma	-3.75316*	1.09924	.012	-7.0000	-.5063
			Other	-4.63851	2.36136	.438	-11.6134	2.3363
			Degree	-9.49391*	1.30785	.000	-13.3569	-5.6309
			BTEC	1.02297	1.14286	.973	-2.3527	4.3987
			HND	-2.49533	1.52480	.659	-6.9992	2.0085
		HND	A Level	-.98164	1.25596	.987	-4.6914	2.7282
			Access Diploma	-1.25783	1.24530	.952	-4.9361	2.4205
			Other	-2.14318	2.43279	.975	-9.3290	5.0426
			Degree	-6.99857*	1.43280	.000	-11.2307	-2.7665
			BTEC	3.51830	1.28397	.089	-.2742	7.3108
			HNC	2.49533	1.52480	.659	-2.0085	6.9992
GPA 2	Tukey HSD	A Level	Access Diploma	-.05283	.62849	1.000	-1.9094	1.8038
			Other	-.30086	1.98626	1.000	-6.1683	5.5666
			Degree	-5.25749*	.90373	.000	-7.9271	-2.5879

			BTEC	2.87043*	.69516	.001	.8169	4.9240		
			HNC	3.04332*	1.01281	.043	.0514	6.0352		
			HND	-.21290	1.14635	1.000	-3.5993	3.1735		
		Access Diploma	A Level	.05283	.62849	1.000	-1.8038	1.9094		
			Other	-.24803	1.98184	1.000	-6.1024	5.6064		
			Degree	-5.20466*	.89396	.000	-7.8454	-2.5639		
			BTEC	2.92327*	.68241	.000	.9074	4.9391		
			HNC	3.09615*	1.00410	.034	.1300	6.0623		
			HND	-.16007	1.13866	1.000	-3.5237	3.2036		
		Other	A Level	.30086	1.98626	1.000	-5.5666	6.1683		
			Access Diploma	.24803	1.98184	1.000	-5.6064	6.1024		
			Degree	-4.95663	2.08552	.209	-11.1173	1.2040		
			BTEC	3.17130	2.00398	.694	-2.7485	9.0911		
			HNC	3.34418	2.13505	.704	-2.9628	9.6512		
			HND	.08796	2.20154	1.000	-6.4155	6.5914		
		Degree	A Level	5.25749*	.90373	.000	2.5879	7.9271		
			Access Diploma	5.20466*	.89396	.000	2.5639	7.8454		
			Other	4.95663	2.08552	.209	-1.2040	11.1173		
			BTEC	8.12793*	.94202	.000	5.3452	10.9107		
			HNC	8.30081*	1.19580	.000	4.7684	11.8332		
			HND	5.04460*	1.31083	.002	1.1724	8.9168		
		BTEC	A Level	-2.87043*	.69516	.001	-4.9240	-.8169		
			Access Diploma	-2.92327*	.68241	.000	-4.9391	-.9074		
			Other	-3.17130	2.00398	.694	-9.0911	2.7485		
			Degree	-8.12793*	.94202	.000	-10.9107	-5.3452		
			HNC	.17288	1.04712	1.000	-2.9203	3.2661		
			HND	-3.08333	1.17678	.121	-6.5596	.3929		
		HNC	A Level	-3.04332*	1.01281	.043	-6.0352	-.0514		
			Access Diploma	-3.09615*	1.00410	.034	-6.0623	-.1300		
			Other	-3.34418	2.13505	.704	-9.6512	2.9628		
			Degree	-8.30081*	1.19580	.000	-11.8332	-4.7684		
			BTEC	-.17288	1.04712	1.000	-3.2661	2.9203		
			HND	-3.25622	1.38829	.223	-7.3572	.8448		
		HND	A Level	.21290	1.14635	1.000	-3.1735	3.5993		
			Access Diploma	.16007	1.13866	1.000	-3.2036	3.5237		
			Other	-.08796	2.20154	1.000	-6.5914	6.4155		
			Degree	-5.04460*	1.31083	.002	-8.9168	-1.1724		
			BTEC	3.08333	1.17678	.121	-.3929	6.5596		
			HNC	3.25622	1.38829	.223	-.8448	7.3572		
		GPA 3	Tukey HSD	A Level	Access Diploma	.00919	.64960	1.000	-1.9098	1.9282
					Other	-3.88922	2.17519	.557	-10.3151	2.5366
					Degree	-4.77193*	.94136	.000	-7.5529	-1.9910

			BTEC	3.73784*	.72463	.000	1.5972	5.8785
			HNC	3.18522*	1.05395	.041	.0717	6.2988
			HND	1.05687	1.18863	.974	-2.4545	4.5683
		Access Diploma	A Level	-.00919	.64960	1.000	-1.9282	1.9098
			Other	-3.89841	2.17034	.551	-10.3099	2.5131
			Degree	-4.78112*	.93009	.000	-7.5287	-2.0335
			BTEC	3.72865*	.70992	.000	1.6314	5.8259
			HNC	3.17603*	1.04390	.039	.0922	6.2599
			HND	1.04768	1.17972	.974	-2.4374	4.5328
		Other	A Level	3.88922	2.17519	.557	-2.5366	10.3151
			Access Diploma	3.89841	2.17034	.551	-2.5131	10.3099
			Degree	-.88271	2.27476	1.000	-7.6027	5.8373
			BTEC	7.62706*	2.19396	.010	1.1458	14.1084
			HNC	7.07445*	2.32362	.038	.2101	13.9388
			HND	4.94609	2.38772	.371	-2.1076	11.9998
		Degree	A Level	4.77193*	.94136	.000	1.9910	7.5529
			Access Diploma	4.78112*	.93009	.000	2.0335	7.5287
			Other	.88271	2.27476	1.000	-5.8373	7.6027
			BTEC	8.50977*	.98396	.000	5.6030	11.4165
			HNC	7.95715*	1.24656	.000	4.2746	11.6397
			HND	5.82880*	1.36232	.000	1.8043	9.8533
		BTEC	A Level	-3.73784*	.72463	.000	-5.8785	-1.5972
			Access Diploma	-3.72865*	.70992	.000	-5.8259	-1.6314
			Other	-7.62706*	2.19396	.010	-14.1084	-1.1458
			Degree	-8.50977*	.98396	.000	-11.4165	-5.6030
			HNC	-.55261	1.09217	.999	-3.7790	2.6738
			HND	-2.68097	1.22264	.300	-6.2928	.9309
		HNC	A Level	-3.18522*	1.05395	.041	-6.2988	-.0717
			Access Diploma	-3.17603*	1.04390	.039	-6.2599	-.0922
			Other	-7.07445*	2.32362	.038	-13.9388	-.2101
			Degree	-7.95715*	1.24656	.000	-11.6397	-4.2746
			BTEC	.55261	1.09217	.999	-2.6738	3.7790
			HND	-2.12836	1.44242	.759	-6.3895	2.1328
		HND	A Level	-1.05687	1.18863	.974	-4.5683	2.4545
			Access Diploma	-1.04768	1.17972	.974	-4.5328	2.4374
			Other	-4.94609	2.38772	.371	-11.9998	2.1076
			Degree	-5.82880*	1.36232	.000	-9.8533	-1.8043
			BTEC	2.68097	1.22264	.300	-.9309	6.2928
			HNC	2.12836	1.44242	.759	-2.1328	6.3895
*. The mean difference is significant at the 0.05 level.								

SES

Pearson's correlation coefficient testing showed that there was no significant correlation between *SES* and *Personal Statement Scores*, *UCAS Scores* and *Interview Scores* [*Personal Statement Scores* ($r=-.051$, $n=1001$, $p=.104$)] [*UCAS Scores* ($r=.014$, $n=1000$, $p=.656$)] [*Interview Scores* ($r=-.021$, $n=995$, $p=.518$)]. *SES* was negatively correlated with *GPA 1* and *3*, in which decreasing levels of deprivation were associated with increasing scores on *GPA 1* and *3*. The correlations were significant and very small, which means that the relationship was very weak and practically meaningless [*GPA 1* ($r=.069$, $n=1007$, $p=.029$)] [*GPA 3* ($r=.075$, $n=940$, $p=.022$)]. *SES* was not significantly correlated with *GPA 2* ($r=.046$, $n=959$, $p=.158$).

Pearson's correlation coefficient testing showed that *SES* was negatively correlated with *Course Completion*, with people from less deprived areas less likely to complete the programme. The correlation was significant and very small, which means that the relationship was very weak and practically meaningless ($r=.062$, $n=1023$, $p=.049$).

SpLD

Pearson's correlation coefficient testing showed that having a SpLD did not correlate significantly with any of the selection scores: *UCAS Scores* ($r=.001$, $n=1122$, $p=.986$), *Personal Statement Scores* ($r=-.024$, $n=1123$, $p=.415$), *Interview Scores* ($r=.021$, $n=1118$, $p=.487$). *SpLD* were positively correlated with *GPA 1*, *2* and *3*, with students without SpLDs associated with higher GPAs. The correlations were significant and small [*GPA 1* ($r=.168$, $n=1130$, $p=.000$)], [*GPA 2* ($r=.075$, $n=1076$, $p=.014$)], [*GPA 3* ($r=.102$, $n=1053$, $p=.001$)].

ANOVA was used to detect significant differences between the mean grades in years 1, 2 and 3 for students with and without SpLDs. The Levene's Test of Homogeneity revealed equal variance between groups. The results indicate that there are significant differences between the scores of students with and without SpLDs at all three timepoints, but the effect sizes are small: *GPA 1*: [$f = (1, 1128) = 32.605$, $p = .000$, $\eta^2 = 0.03$], *GPA 2*: [$f = (1, 1074) = 6.019$, $p = .014$, $\eta^2 = 0.01$], *GPA 3*: [$f = (1, 1051) = 10.950$, $p = .001$, $\eta^2 = 0.01$].

A Chi-square Test for Independence using Yates' Continuity Correction showed that the two groups of students, with or without SpLDs, were not significantly different from each other, meaning there was no difference in programme completion rates [χ^2 (4, n=1149) =1.13, p=.287].

UCAS Scores

The Pearson's correlation coefficient showed that *UCAS Scores* were positively correlated with *GPA 1, 2 and 3*, with students with higher UCAS scores associated with higher GPAs. The correlations were significant and small [*GPA 1* (r= .156, n= 1102, p= .000)], [*GPA 2* (r= .149, n= 1046, p= .000)], [*GPA 3* (r= .137, n= 1023, p= .000)]. *UCAS Scores* were positively correlated with *Course Completion*, with students with increasing UCAS scores associated with increasing programme completion rates. The correlation was significant and very small (r= .059, n= 1119, p= .048).

Personal Statement Scores

A Pearson's correlation coefficient showed that *Personal Statement Scores* were not significantly correlated with *GPA 1, 2 and 3* or programme completion [*GPA 1* (r=.033, n=11.3, p= .270)] [*GPA 2* (r=.057, n= 1049, p=.065)] [*GPA 3* (r= -.005, n= 1027, p= .880)] [*Course Completion* (r= -.030, n=1121, p=.321)].

Interview Scores

Pearson's correlation coefficient testing showed that *Interview Scores* were positively correlated with *GPA 1, 2 and 3*, with students with increasing interview scores associated with increasing GPAs. The correlations were significant and small [*GPA 1* (r= .125, n= 1099, p= .000)], [*GPA 2* (r= .113, n= 1044, p= .000)], [*GPA 3* (r= .143, n= 1022, p= .000)]. *Interview Scores* were not significantly correlated with *Course Completion* (r= .040, n=1116, p= .187).

GPA 1, 2 and 3

Incidentally the Pearson's correlation matrix (Table 21) showed that there were significant correlations between *GPA 1, 2 and 3*, all of which were large. These relationships were

explored further using linear regression and presented in paper 2 which is available in section 4.5.

4.4 Objective four - A model to predict student outcomes

Objective four - To design a selection model with the ability to predict programme outcomes.

Using path analysis, AMOS v26, was used to construct the model which was used to determine the demographic and selection variables that could predict programme outcomes. The variables that were entered into the measurement model were *Age*, *Gender*, *SES*, *SpLD*, *Personal Statement Scores*, *UCAS Scores* and *Interview Scores*, all of which were tested against each of the continuous outcome variables *GPA 1*, *2* and *3* in three separate models. The non-significant paths were progressively removed, and modifications made to improve model fit. The best fitting model was Model four and the results show that the demographic characteristics and selection scores were able to account for 10%, 7% and 7% of the variance in *GPA 1*, *2* and *3* respectively. Linear regression was then employed to further explore the large correlations between *GPA 1*, *2* and *3*. The results showed that *GPA 1* and *2* could explain a greater percentage of the variance in *GPA 3*, which reached 52%.

Detailed results for objective four are presented in paper 2 which is available in the next section. This has been submitted to the Journal of Clinical Nursing for peer review (Appendix 8).

**Investigating the predictive validity of selection methods
for pre-registration nursing programmes in the United
Kingdom - A retrospective cohort study.**

Caroline Crawford*

Vidar Melby

Pauline Black

Ben Fitzpatrick

&

Paul Slater

*Indicates corresponding author

Ms Caroline Crawford, University of Ulster, School of Nursing, Room MG121b, Northland Road, Derry, BT48 7JL.
Dr Vidar Melby, University of Ulster, School of Nursing, Room MG 121a, Northland Road, Derry, BT48 7JL.
Dr Pauline Black, University of Ulster, School of Nursing, Room MG 121b, Northland Road, Derry, BT48 7JL.
Dr Ben Fitzpatrick, University of Ulster, School of Sport, Room MC 023, Northland Road, Derry, BT48 7JL.
Dr Paul Slater, University of Ulster, School of Nursing, Room 12J12, Shore Road, Newtownabbey, BT37 0QB.

Abstract

Introduction: Nurses represent around 50% of the global healthcare workforce and their role is ever changing and growing in complexity. Attrition rates for undergraduate pre-registration nursing programmes reach a staggering 24% average across the UK. One intervention to help meet the demand for graduate nurses is to improve attrition rates from pre-registration nursing programmes, ultimately strengthening the availability of the future nursing workforce.

Aims: The aim of this paper is to investigate the predictive validity of the selection methods used for the Adult and Mental Health pre-registration nursing programmes at one university in the UK.

Design: A retrospective cohort study.

Methods: Pearson's correlations and cross-tabulation was used to determine the relationships between variables. Path analysis explored the direct and indirect effects between the demographic characteristics, selection scores and programme outcomes.

Results: Results indicated weak correlations between age, socio-economic status, prior academic grades and interview scores with academic achievement across all three years of the nursing programmes. As students age, socio-economic status, prior academic grades and interview scores increase, so too do their academic performance, albeit that the association is weak.

Conclusion: The results of this study have implications for identifying groups of students who would benefit from early interventions to help them succeed academically, and poses questions about the validity of the selection criteria currently being used in pre-registration undergraduate nursing programmes. Such questions must be addressed through further research.

Relevance to clinical practice: This study highlights the weak relationships that selection scores/demographic characteristics have with student outcomes for undergraduate nursing programmes, and that alternative methods of selection should be considered/developed. Nursing students should be encouraged to avail of all academic support available to them at the earliest opportunity to help them achieve their academic goals throughout their undergraduate education and beyond.

Key words: nurse, selection, undergraduate, student, predictive validity.

Introduction

Nurses represent around 50% of the global healthcare workforce and their role is ever changing and growing in complexity, yet the global shortage of nurses is expected to reach nine million by 2030 (World Health Organisation 2020). Nurses have immense responsibility and accountability to themselves, their employer, service users and the wider general public (Nursing and Midwifery Council (NMC) 2018a). During the SARS Covid-19 pandemic, nurses demonstrated their ability to work and adapt under extreme pressures and validated the importance of the nursing profession in maintaining the health and wellbeing of the population. Nurses are invaluable for any health service to function effectively. The shortage of nurses threatens the survival of health services and their ability to provide safe and effective care to service users in hospitals and communities. Although there have been efforts to curtail the scale of the effects that this reduced nursing workforce will have on health services (for example the introduction of the Nursing Associate role in England (Bird 2017)), the importance of maintaining or even enhancing the nursing workforce is palpable. Aiken et al. (2014) conducted a quantitative study across nine European countries to investigate the impact that degree educated nurses had on patient outcomes. They concluded that with every 10 percent increase in the number of graduate nurses there was a 7 percent decrease in patient mortality rates. The results of this comprehensive study are mirrored in other studies (Liao, Sun, Yu, & Li 2016, Audet, Bourgault, & Rochefort 2018) and verify the importance of cultivating a nursing workforce that is educated to meet the demands of the health service. One intervention that could help to meet the demand for graduate nurses is to improve attrition rates from undergraduate nursing programmes, ultimately strengthening the availability of the future nursing workforce (Timer & Clauson 2011).

The rates of non-completion for pre-registration undergraduate nursing programmes vary across schools of nursing, with attrition rates reaching a staggering 24 percent average across the United Kingdom (UK) (The Health Foundation 2019). Although some attrition from nursing programmes is expected (Rankin 2013), educational providers must aim to recruit candidates who can complete their programmes of study with clinical and academic success. Failure in academic study is disheartening for students but will also have financial and career implications for the individuals (Seidman 2012). Academic failure in undergraduate nursing is of concern, not only because it can lead to delays in programme completion, but also because it will affect the global availability of graduate nurses (Dante, Petrucci, & Lancia 2013). Identifying students and applicants at risk of attrition should be a priority for nurse educators.

In the UK, the nursing profession is regulated by the NMC. The ultimate aim of the NMC is to protect the public, which involves setting the minimum standards of education for nursing (which is degree

level), and stipulates minimum requirements for candidates who apply for NMC approved pre-registration nursing programmes. The minimum standards are as follows:

- Candidates must be suitable for their chosen field of nursing (adult, mental health, learning disability or child nursing).
- They must demonstrate values in accordance with the NMC Code of Professional standards of practice (2018a).
- They must have the capability to learn behaviours which align with the Code.
- They should have sufficient numeracy, literacy and digital capabilities to enable them to achieve programme outcomes.
- They should demonstrate proficiency in the English language (NMC 2018b).

Following the Bologna process, all applicants must have a minimum of 12 years formal education prior to commencing a nursing programme in Europe (Dante et al. 2013). Many universities providing the NMC accredited programmes supplement these minimum standards with their own criteria. This can include a higher level of prior academic achievement, an interview, or an autobiographical essay (often referred to as a personal statement). Applications to pre-registration nursing programmes are usually oversubscribed, with a ratio of 2:1 of applicants to places available in the UK (Royal College of Nursing (RCN) 2018). Up until 2018 the NMC required that candidates for nursing programmes should have face-to-face contact with nursing schools prior to being accepted into a programme of study. This requirement was often interpreted as a face-to-face interview and was removed in the 2018 revised standards (NMC 2018b).

Exploring the predictive validity of the selection methods used for pre-registration nursing programmes has clear value. Nurse educators must be satisfied that their selection criteria are proficient in selecting people who will be successful in the course and subsequently be eligible to register with the NMC. Explicit and evidence-based entry criteria should ensure that the most suitable candidates are selected to embark on a higher education level pre-registration course in nursing.

Background

Universities use a wide variety of criteria to select applicants for undergraduate pre-registration nursing programmes, with varying degrees of predictive validity (Crawford et al. 2021). Such criteria include prior academic performance, admissions tests, interviews and personal statements. The association between demographic attributes (e.g., age and gender) and programme outcomes have also been considered in the literature. Although such non-modifiable characteristics could never be used in

a selection process, it may be beneficial to identify the demographic characteristics of students deemed 'at risk' of failure, in a bid to intervene and help improve nursing student success rates.

Timer and Clauson (2011) considered whether prior grade point average (GPA), interviews and a supplemental score comprising a personal statement and structured résumé could predict nursing students' overall academic performance throughout their programme. They found a significant correlation between prior GPA and overall course grade average, with students with higher GPA attaining higher academic performance grades. They reported no significant correlation between interviews or the supplemental score with programme outcomes, meaning that interviews, personal statements and résumés had no predictive value with academic success. They found that male students were overrepresented in the lowest grade quartile and underrepresented in the highest grade quartile. Students with ethnic minority status were also overrepresented in both of the lowest grade quartiles, but there were no statistically significant differences between age and programme outcomes. This study was conducted in Canada with one cohort sample of nursing students (n=249).

Hinderer, DiBartolo, and Walsh (2014) investigated the correlation that prior GPA and the standardised admissions test Health Education System Admission Assessment (HESI-A2) had with timely completion of the programme and overall GPA, with one cohort of undergraduate nursing students in the USA (n=89). The authors concluded that students with a higher prior GPA were more likely to obtain a higher course GPA and graduate on time (completion of the programme within four years, without stopping or dropping out). Those with higher HESI-A2 scores were more likely to have higher GPA but were not more likely to complete on time. Used in combination, both selection methods were able to explain 20 percent of the variance in the prediction of timely progression, correctly predicting 83 percent of cases of successful completion. Furthermore, Tartavouille, Adorno, Garbee, Kensler and Manning (2018) reported on an investigation into the predictive validity of prior GPA, the same standardised admission test (HESI-A2), an essay score and interview score, with the graduation rates of one cohort of nursing students in the USA (n=149). The results showed a significant correlation between prior GPA and the admissions test with on-time completion of the programme within six semesters. There were no significant correlations between essays or interviews with on-time completion of the programme (Dr Todd Tartavouille, 02/01/21, personal communication).

House, Sturgeon, Garrett-Wright and Blackburn (2015) conducted an investigation into academic staff and applicants' perceptions of a newly introduced group interview as part of a selection process at one school of nursing in the USA (n=89). The data were collected via survey and the results revealed that the participants found the experience beneficial. Applicants favoured the opportunity to present themselves as more than an examination score and thus were able to demonstrate their desire to be a

nurse. Opposition to the process included the influence of coaching prior to interview and the uncertainty that applicants' performance at interview would accurately depict their true characteristics, with one participant stating that 'anyone can be nice and look appropriate for 20 minutes' (House et al. 2015 pg. 59). Following the introduction of the interview, the school saw an increase of diversity in cohorts with the percentage of non-Caucasian students rising from 2.5% to 7.5%. The predictive validity of the interviews with student outcomes was not explored.

Donaldson, McCallum and Lafferty (2010) designed an interview score sheet (ISS) which comprised scores for a range of entry variables that included standard and content of written work, prior healthcare experience, communication and subject knowledge. The ISS was tested on five cohorts of undergraduate nursing students in the UK (n=638). The authors reported statistically significant correlations between individual variables and outcomes. They found that standard and content of written work, subject knowledge, communication and references correlated with passing the first year of the programme, with those achieving higher grades at selection gaining better outcomes. A limitation of this study is the short follow up times, as the selection scores were compared to year one outcomes only.

Traynor, Galanouli, Roberts, Leonard and Gale (2016) reported on the validity of the Multiple Mini Interview (MMI) method of selection with nursing students in the UK (n=110) and their first-year grades comprising three academic and one clinical module. The authors did not test the full cohort of students, but requested volunteers instead, which they struggled to get. No significant relationships between MMIs and student outcomes were found, but as the students had already commenced the nursing programme when data were collected this may have affected answers given at interview. The students' original interview scores were also considered as a predictor of success, but no correlations with outcomes were found, unlike the personal statement scores which demonstrated small correlations with all academic outcomes but not performance in the clinical module.

Rankin (2013) examined the predictive relationship between emotional intelligence (EI) test scores with clinical and academic performance, with one cohort of undergraduate nursing students in the UK (n=178). They concluded that EI was a valid indicator of clinical success, and that prior academic achievement could predict academic success and progression from first to second year but not clinical success. Older students with higher EI scores were more likely to progress through the programme which was measured by successfully enrolling in year two. EI tests are not currently being used as a selection method for undergraduate nursing programmes (Crawford et al. 2021). Rankin (2013) alludes to potential bias in the 'self-reporting' design of EI tests in which applicants may give favourable answers to enhance their application and increase the likelihood of their acceptance onto the programme.

McNeill, Erskine, Ellis and Traynor (2018) designed a Nurse Match test, a digital psychometric test aimed at assessing a candidate for 'desirable' values in nurses. The investigation was conducted on 63 first-year nursing students at one university in the UK. The results demonstrated that the instrument had a valid and reliable scoring system and was efficient to use as indicated by the survey responses of the participants. The instrument scores were correlated with other selection procedures (MMIs) but not with any of the students' academic outcomes.

Bulfone et al. (2021) investigated the associations between demographic characteristics and academic failure, (defined as non-completion of the programme within three years), at one university in Italy. From a sample of 753 undergraduate nursing students, they concluded that academic failure was associated with age, gender, university pre-admission test score and secondary school certificate grades. Students who were older and male were more likely to experience academic failure than students who were younger and female. This is one of the most comprehensive studies to date, but the authors did not consider students who completed the programme outside the allotted timeframe, nor did they consider any academic outcomes in the second or third years of the programme.

Wray, Aspland, Barrett and Gardiner (2017) investigated the predictive power of student demographic variables with the completion of an undergraduate nursing programme in the UK. A total of 807 students were enrolled in the study between 2009 and 2014. The results indicated that gender, ethnic group and disability had no correlation with programme completion, and that older students who lived locally and had dependents were less likely to be lost from the programme. This study is one of few to investigate the effect that a disability has on student outcomes. The authors reported that 'disability' included students who were diagnosed with learning difficulties, but do not provide definitions for the variables 'older' 'living locally' or 'dependents'.

In the UK, the most common form of entry to undergraduate programmes is via the Universities and College Admissions Service (UCAS) system. Candidates who apply to university through UCAS are awarded numerical scores called tariff points for each examination taken and grades awarded at level three of the Regulated Qualifications Framework. This is explained later in the paper, but it is in essence a reflection of an individual's prior academic record. No research has been conducted on the predictive value of UCAS in nursing, although its predictive validity has been explored in other disciplines. Cheng and Catline (2015) investigated the relationship between UCAS scores and first year academic performance with undergraduate psychology students (n=126). They found the relationship to be significant but weak. Kale, Kamble and Spalding (2020) explored the predictive validity of UCAS scores with years one and two academic grades for 169 occupational therapy, physiotherapy and speech and language therapy (SALT) students. Small to moderate correlations with some academic outcomes in 1st and 2nd year were reported. The UCAS points of the students enrolled

in the physiotherapy and SALT programmes correlated with first-year grades, and occupational therapy and SALT correlated with 2nd year grades with remaining associations being non-significant.

Much of the literature to date is limited by small sample sizes and single cohorts of students with limited follow up times. Some selection methods have not been tested on participants within a real selection process setting, and there are inconsistencies in results regarding the predictive power of age and gender. There is also a dearth of literature into the impact that disabilities, such as learning difficulties, can have on programme outcomes. Not enough evidence is available to reach conclusions as to the predictive validity of non-cognitive selection methods like interviews and personal statements, and the predictive validity of UCAS scores was not represented in the nursing literature at all. Some studies explored new types of selection methods, yet the predictive power of some commonly used methods for entry to undergraduate nursing programmes in the UK have not yet been verified for use. Larger studies are required to identify the predictive validity of some of the most commonly used selection methods for nursing programmes, and the relationships they have with student outcomes from programme commencement to programme completion. This led to the following question: can selection scores and demographic variables predict students who will succeed clinically and academically on a pre-registration nursing course?

Theoretical Framework

The theoretical framework used to guide this study design was the Theory of Student Retention by Dr Alan Seidman (2012). Seidman defines retention as the students' ability to achieve pre-determined goals in academia that enable them to complete their chosen programme of study. He argues that universities should have the structures in place to identify students that may be at risk of non-completion or failure. These students should be identified at the earliest opportunity (e.g., at enrolment) for intensive interventions that will support them throughout their studies and help them achieve their academic goals at University. This in essence is the purpose of our study through the exploration of associations between demographic variables and selection scores and a range of programme outcomes.

The Study

This report was compiled using the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement for cohort studies (2022) (supplementary file 1).

Aims

Using student admissions and progress data at one university in the UK, this paper aims to investigate the predictive validity of the selection methods used for adult and mental health pre-registration nursing programmes and determine the influence that demographic outcomes have on academic performance.

The specific objectives of the paper are:

1. To review the demographic characteristics of those who were accepted for a position on the pre-registration nursing programmes at Ulster University.
2. To identify any correlations between student demographic characteristics and university selection criteria with student outcomes for the pre-registration undergraduate nursing programmes at Ulster University.
3. To develop a model using student demographic variables and selection scores that has the ability to predict student outcomes.

Design

A retrospective cohort study.

The Setting

This study was conducted in one university in the UK that offers the BSc Honours degrees in Adult and Mental Health nursing, which are presently commissioned by the Department of Health. Approximately 2000 applications are received each year for these programmes which during the period of data collection offered between 224 and 316 student places per year. The courses are NMC accredited and the selection criteria are guided by NMC standards (stated above) with additional criteria set by the university (explained below).

The selection process at Ulster University

Academic selection

The UCAS tariff point system is used by most UK universities to select students for undergraduate courses. Each academic grade is allocated a pre-determined number of points depending on the level of study and grade obtained. The points from the different subjects studied are totalled to give an

overall score. If the score is greater than or equal to the minimum number required by the school, then candidates will be considered for entry to the programmes. Applicants can be considered for examinations taken and results still pending. Points can also be allocated for non-academic qualifications such as accredited exams in music, dance and drama, but the points awarded are relatively small (<10 per qualification). The School of Nursing has a minimum requirement of 280 UCAS points for the BSc Honours Adult and Mental Health Nursing courses. A candidate that obtained A-level grades in three subjects equating to BBC, a 65% average in the Access to Higher Education Diploma or a distinction and two merits in a BTEC National Diploma would be awarded a score of 280. A detailed description of entry routes for these programmes is available in table 15.

Personal statements

Personal statements are autobiographical essays completed by all applicants as part of their UCAS application form. These are all screened by academic nursing staff for content pertaining to values, experience and desire to study nursing. Each applicant is given a score out of 16 and the top 1500 who meet the academic eligibility requirement are invited to attend a face-to-face interview.

Interviews

Face-to-face panel interviews are conducted by academic staff in partnership with members of clinical staff from health care trusts. Typically, two interviewers ask each candidate six pre-determined questions for which they are scored on each answer. The maximum score available is 25 and the scores are used to rank order each candidate. Applicants are then offered a place in that order subject to the successful completion of any pending qualifications.

Student outcomes

To be successful in the nursing programmes, students must complete 2300 theory learning hours in an academic environment and 2300 hours of practice learning in clinical settings. All academic modules must be passed at 40% or above, and all clinical placements must be passed. The students complete six equally weighted modules per year across three semesters. The students included in this sample, enrolled in cohorts from 2012 – 2016, were required to complete the three-year programme within five years of first enrolling. Upon successful completion, students are eligible to apply to join the NMC register and practice nursing in the UK.

Participants

The participants were pre-registration undergraduate nursing students enrolled on the BSc Honours Adult or Mental Health Nursing degree programmes at Ulster University between 2012 and 2016. Data were obtained for all students enrolled in these five cohorts. These cohorts of students were the only ones to complete all three years of this particular NMC approved programme that was being delivered at Ulster University at the time.

Variables

The demographic variables under investigation were age, gender, socio-economic status (SES), and a diagnosis of a specific learning difficulty (SpLD). The selection variables were personal statement score, UCAS score and interview score. The outcome variables measuring student success were grade percent average (GPA) in year 1, 2 and 3 and course completion. These are defined in box 1.

Box 1 – Variable name, definition and category boundaries

Name	Definition	Category boundaries
Age	Age on application, as calculated from each student's date of birth.	Age 17 or above
Gender	Specified by the applicant on the application form.	Male or female
SES	Determined by postcode on the Northern Ireland Multiple Deprivation Measure †	1 (most deprived) - 890 (least deprived)
SpLD	Diagnosed by an educational psychologist ‡	Yes or no
UCAS score	A numerical score given to each student based on their total number of points awarded by UCAS.	280 points or above (no maximum score)
Personal statement score	A numerical score awarded by one academic member of staff based on the content presented	0 – 16 points

	within one 500-word autobiographical essay that is submitted as part of the UCAS application form.	
Interview score	A numerical score awarded by two interview panel members.	0 – 25 points
GPA 1, 2 and 3	A mixture of sessional examinations and coursework assignments that are taken as part of six equally weighted modules per year.	0 – 100%
Course completion	Completing and passing all academic assessments and clinical placements within five years and being awarded a BSc Honours degree in adult or mental health nursing. Those who are not awarded this qualification are not eligible to apply to join the NMC register and are classed as non-completion. Non-completion can be caused by academic failure, clinical practice failure, transfer to other programmes of study or because of attrition for personal reasons.	Yes or no

† The SES score was derived from the Northern Ireland Multiple Deprivation Measure which measures deprivation rank in areas of Northern Ireland that are grouped together by postcodes. Deprivation is measured by seven domains: 1. levels of crime and disorder, 2. access to services, 3. employment deprivation, 4. income deprivation, 5. living environment, 6. educational and training deprivation, 7. health deprivation and disability (Ijpelaar, Power and Green 2017). This measurement was unique to all students registered with a Northern Ireland postcode at the time of enrolment and excluded all students with a Republic of Ireland address as it had no comparable measure.

‡ These are students who have disclosed a neurological divergent diagnosis (such as dyslexia, dyscalculia, or dyspraxia) to the university and are entitled to reasonable adjustments to aid their learning. These include additional time in examinations, lecture notes in advance of class, provision of a school laptop and additional library facilities.

Clinical outcomes were initially considered for inclusion in the study, but less than one percent of students fail their clinical placements and as such, little meaningful analysis could be undertaken.

Data collection

Data were collected between September and October 2019. Information pertaining to student demographic variables and selection scores were collected from the school admissions office and were available on Microsoft Excel files. The student academic performance grades and completion rates were obtained from faculty records and students with SpLDs were determined from the reasonable adjustments database maintained by the Student Experience and Wellbeing department. Each student was given a unique identification number at admission to the course, and this was used to track each participant throughout the study. Data was manually transferred into a newly designed study specific Microsoft Excel file. Data were then coded and anonymised, and transferred into SPSS v26 for analysis. As the study was retrospective in nature, no contact between researchers and students occurred. All information was stored confidentially on password protected computers.

Validity and reliability

Students' date of birth, gender, postcode and prior academic achievement are verified at the point of enrolment using their birth certificate, personal identification and grade transcripts. A diagnosis of a specific learning difficulty is made by an educational psychologist and written confirmation of the diagnosis is provided to the Student Experience and Wellbeing department. Data provided by the admissions department (personal statement scores and interview scores) were assumed to be correct. Manual transfer of data can be prone to error so 10 percent of the students had one aspect of their data cross-checked by three members of the research team. There was 98.5% accuracy, so no further checking was deemed necessary.

Ethical considerations

Ethical approval was granted by the university research and ethics board, and administrative permission to conduct the research was given by the head of the School of Nursing. The study did not require student consent to access their records held by admissions or the School of Nursing academic staff. All students within the relevant year-groups were included.

Analytical strategy

Descriptive statistics (mean and standard deviation) were conducted for the continuous variables (age, SES, UCAS score, personal statement score, interview score, and GPA 1, 2 and 3). Frequencies and percentages were calculated for the dichotomous variables gender, SpLD and course completion. The relationships between the continuous variables, or one continuous and one dichotomous variable were assessed using Pearson's correlations (Pallant 2020), and associations between dichotomous variables were calculated using cross-tabulation (Gravetter & Wallnau 2017). The data were checked for linearity, multicollinearity, and homogeneity to ensure that the assumptions for each statistical analysis were satisfied. Missing data were dealt with using the 'all available' approach (Pairwise) and the significance level was set at 0.05.

Path analysis was used to simultaneously explore the direct and indirect effects of the independent variables on each dependent variable. Linear regression was then used to identify the individual variance explained by each statistically significant relationship identified in the path model. The maximum likelihood method of estimation was employed, and model fit was assessed using the chi-square which should render a non-significant reading. However, this is difficult to achieve when the sample size is large, as when the sample increases so does the Chi-square and the significance value becomes less meaningful (Yim 2014, Garson 2018). Therefore, the Normed Chi-square goodness of fit measurement will also be used, which is the χ^2 divided by the degrees of freedom (df) (Moss 2016), along with the Confirmation Fit Index (CFI) and the Mean Square Root of Approximation (RMSEA) (Hair, Black, Babin, & Anderson 2019). The following thresholds for the fit indices will be used to guide the interpretation of the model fit (table 1).

Table 1 – acceptable threshold for fit indices

Fit indices	Threshold
χ^2	Insignificant p value
χ^2 / df	< 5
CFI	.96 or higher
RMSEA	<.08

Results

Descriptive statistics

Demographic characteristics

Profiles were available for 1152 students, 91% were females and the mean age was 24 years (standard deviation = 6.824). Students were represented across all levels of the SES from 1 (the most deprived) to 889 (the least deprived) and the mean score was 355 (standard deviation 221). Students with SpLDs comprised 12.5% of the sample. Although positive skew was noted in some variables (age and SES), the large sample size in this study ($n > 200$) renders parametric tests appropriate to use (Field 2017, Pallant 2020) (table 2).

Selection scores

The mean UCAS score was 355 out of 1122 cases, considerably above the minimum requirement for the nursing courses. The mean personal statement score was 13 out of a total of 16 points and was available in 1123 cases. Interview scores were available in 1118 cases and the mean score was 21, out of a maximum of 25 (table 2).

Outcome measurements

GPA 1 was available for 1130 students and this number subsequently dropped each year as students discontinued the programme (1076 in second year and 1053 in third year). Full details of GPA scores are available in table 2. The lowest score obtained in all three year-groups was 20%, the highest was 87% and the mean scores in years 1, 2 and 3 were 58%, 59% and 61% respectively. A total of 88% of students completed the programme and were eligible to apply to join the NMC register (table 3).

Table 2 – descriptive statistics for study participants (continuous variables)

	N	Minimum	Maximum	Mean	Standard deviation	Skew (SE)		Kurtosis (SE)	
Age	1149	17	52	24.0905	6.82373	1.379	.072	1.359	.144
SES	1026	1	889	355.1306	221.78422	.329	.076	-.765	.153
UCAS score	1122	260	730	354.5455	85.33173	1.680	.073	2.667	.146
Personal Statement score	1123	7	16	12.5289	1.76766	.013	.073	-.682	.146

Interview score	1118	9	25	21.2594	2.77745	-.746	.073	.786	.146
GPA 1	1130	24	86	58.4442	9.02869	.057	.073	-.001	.145
GPA 2	1076	20	83	58.6050	8.03175	-.091	.075	.455	.149
GPA 3	1053	25	87	60.9107	8.28575	-.070	.075	.357	.151

Table 3 – descriptive statistics for study participants (dichotomous variables)

Variable name	Frequency (n) and percentage
Gender	Females: 1050 (91%), males: 102 (9%)
SpLD	Yes: 144 (12.5%), no: 1008 (87.5%)
Course completion	Yes: 1015 (88%) no: 134 (12%)

Correlation Analysis

A Pearson's correlation coefficient analysis was conducted to show the strength and direction of the relationships between demographic, selection and academic variables and to check for any high levels of multicollinearity (table 4). The Pearson's correlation revealed no multicollinearity between variables. Overall, the correlations between demographics and selection scores with programme outcomes were positive and significant but small ($r=.1 - .29$) or very small ($<.1$). The reader should consider the overall effect size between variables for a better understanding of how the variables relate to one another. Gender and personal statements were uncorrelated with any outcome measures. Although it was not part of the initial study aims, the largest significant correlations can be seen between years GPAs 1+2+3 which were then explored further using regression analysis.

Table 4 – Pearson's correlation matrix

	Gender	SES	SpLD	Interview score	Personal statement score	UCAS	GPA 1	GPA 2	GPA 3	Course Completion
Age	.122** p=.000	-.165** p=.000	.058* p=.048	.058 p=.051	.112** p=.000	-.044 p=.142	.155** p=.000	.155** p=.000	.129** p=.000	.063* p=.033
Gender		.002 p=.938	---	.127** p=.000	.005 p=.858	.043 p=.149	.030 p=.321	.046 p=.133	.016 p=.599	---
SES			-.078* p=.012	-.021 p=.518	-.051 p=.104	.014 p=.656	.069* p=.029	.046 p=.158	.075* p=.022	.062* p=.049

SpLD				.021 p=.487	-.024 p=.415	.001 p=.986	-.168** p=.000	-.075* p=.014	-.102** p=.001	---
Interview score					-.007 p=.826	.124** p=.000	.125** p=.000	.113** p=.000	.143** p=.000	.040 p=.187
Personal statement score						.033 p=.268	.033 p=.270	.057 p=.065	-.005 p=.880	-.030 p=.321
UCAS score							.156** p=.000	.149** p=.000	.137** p=.000	.059* p=.048
GPA 1								.720** p=.000	.622** p=.000	.266** p=.000
GPA 2									.709** p=.000	.260** p=.000
GPA 3										.274** p=.000

SES: socio economic status derived from the Northern Ireland Multiple Deprivation Measure

SpLD: Specific Learning Difficulty

UCAS: The Universities and College Admissions Service scores

GPA 1, 2 and 3: grade percent average for years 1, 2 and 3

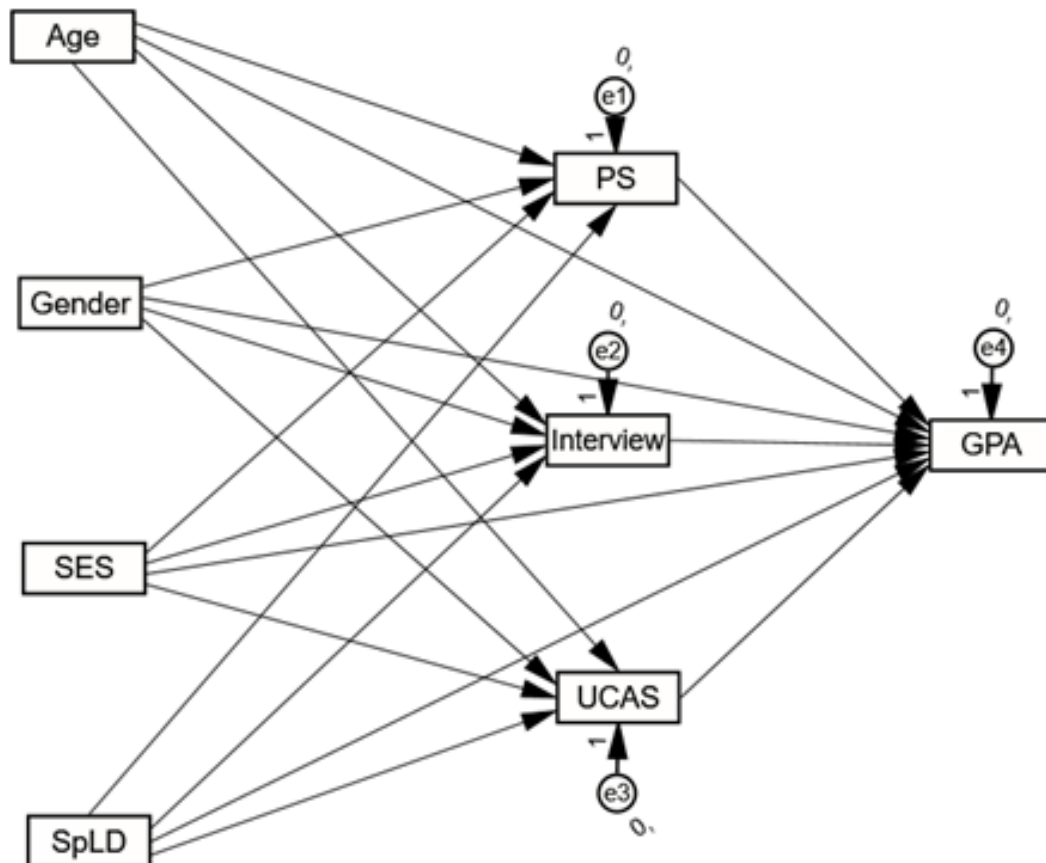
Course completion: Completed the nursing programme

To assess the associations between dichotomous variable combinations (gender and course completion, SpLDs and course completion) a Chi-square test for independence (using Yate's continuity correction) was used. The results indicated no significant association between gender and course completion [$\chi^2 (1, n= 1147) = 3.280, p=.07$] or SpLD and course completion [$\chi^2 (4, n=1149) = 1.13, p=.287$].

Path analysis

Using AMOS v26, the variables were entered into the measurement model as denoted in the path diagram (Figure 1).

Figure 1 - Measurement model path diagram



To measure the effects on all three time points, three path models were assessed, one for each continuous outcome, which were GPA 1, GPA 2 and GPA 3 (figures 2, 3 and 4).

Figure 2 – Path model GPA 1

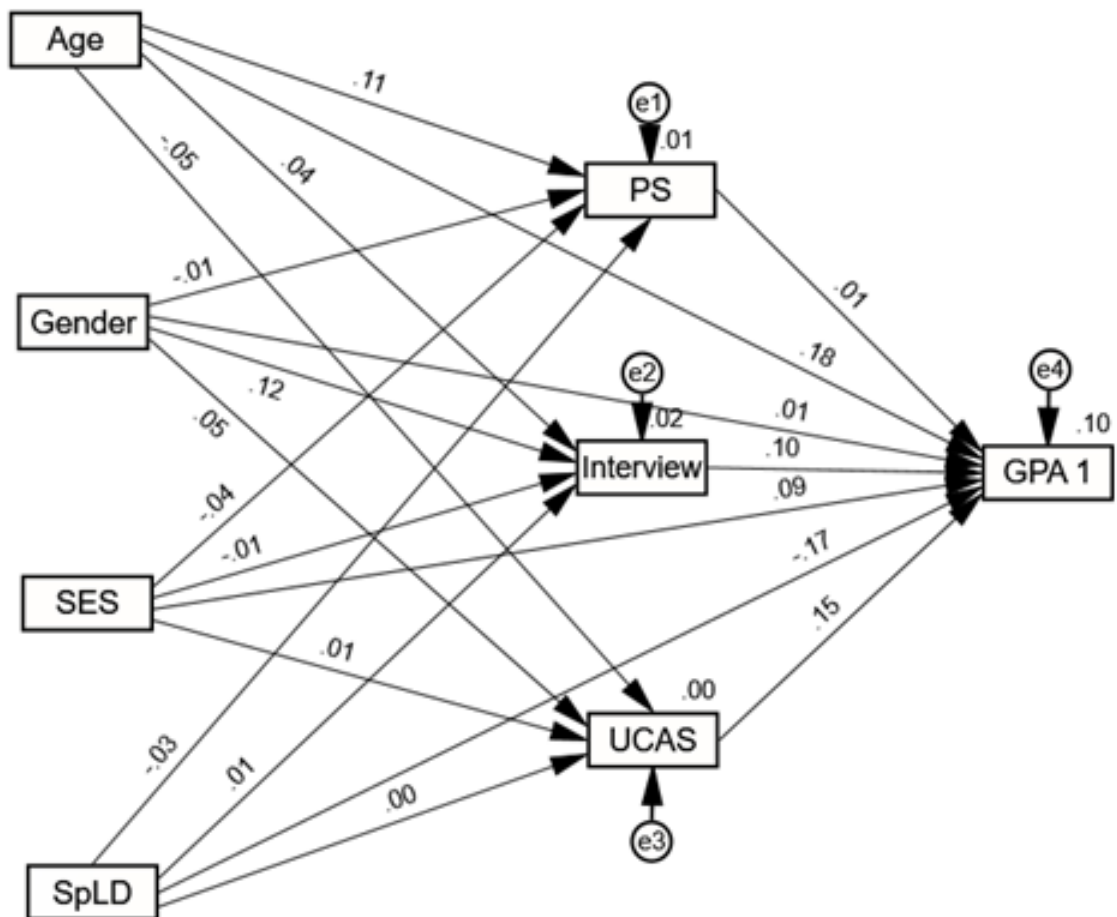


Figure 3 – Path model GPA 2

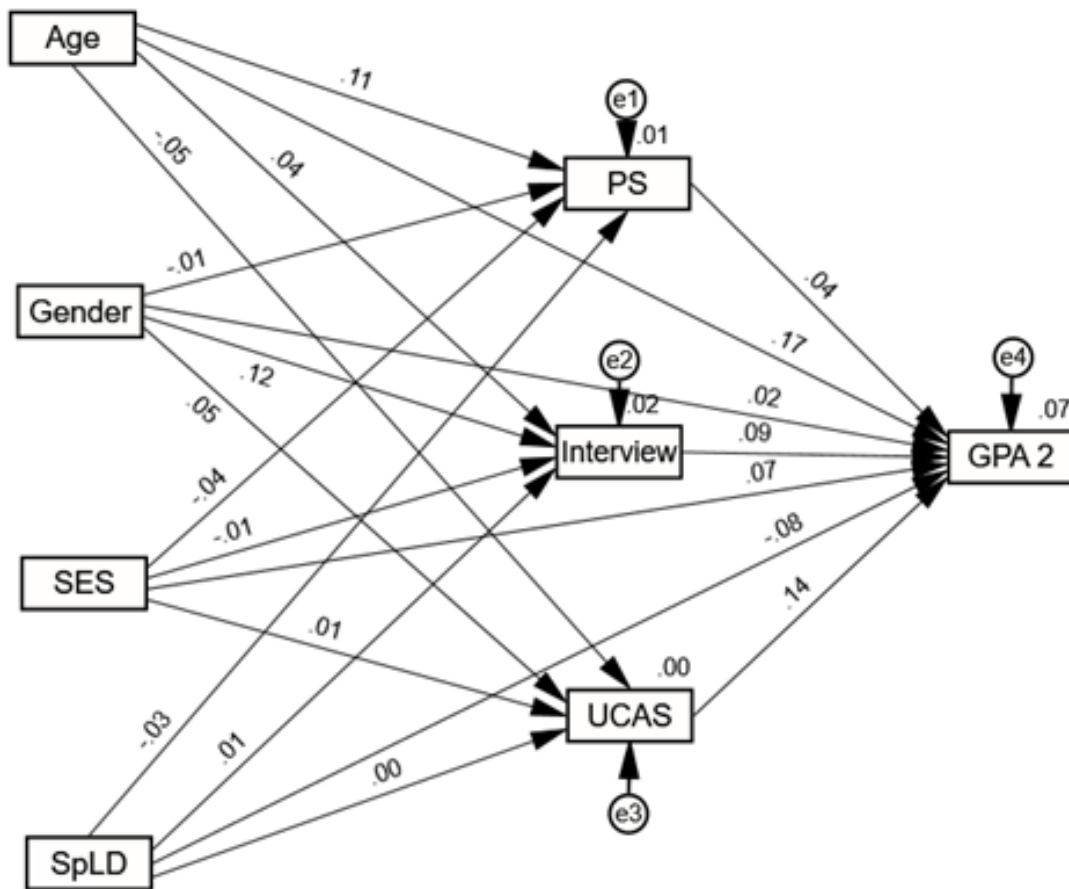
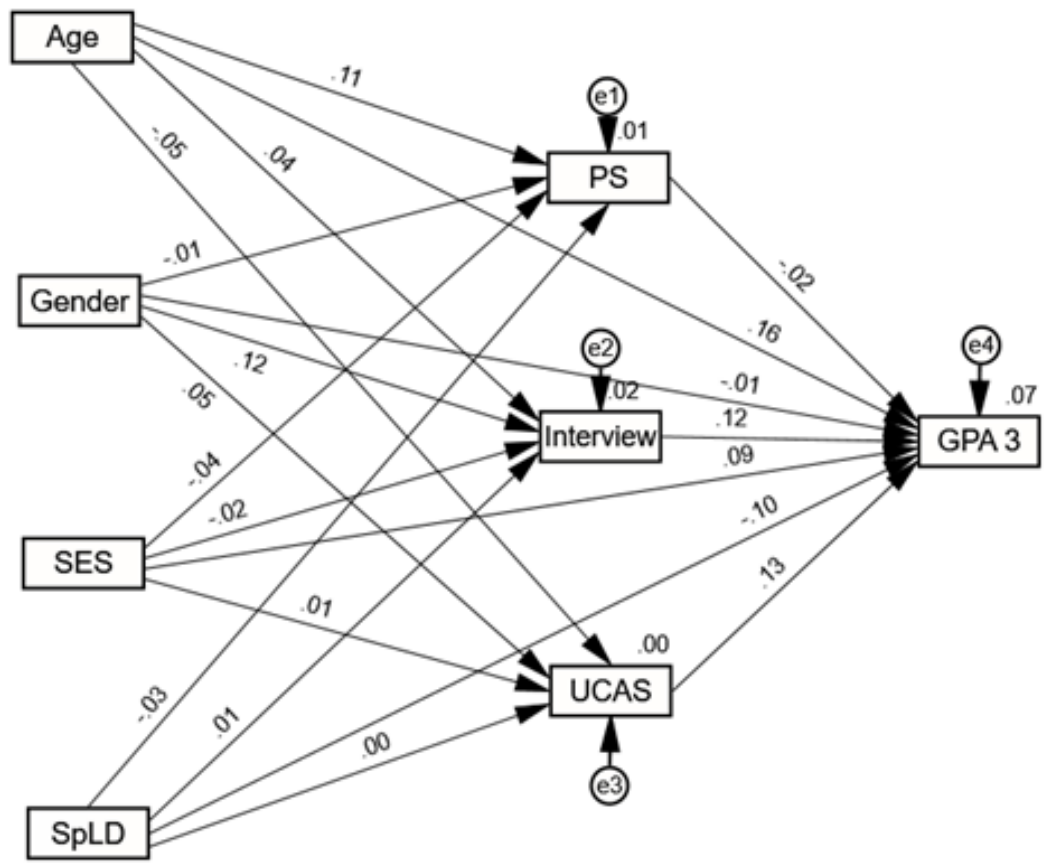


Figure 4 – Path model GPA 3



The path coefficients are summarised in table 5 and the significant paths are highlighted in **bold**.

Table 5 – Path coefficients for GPA 1, 2 and 3

Path	Path coefficient	T (critical ratio)	P value
Age > Personal statement score	.11	3.652	.000
Age > Interview score	.04	1.365	.172
Age > UCAS score	-.05	-1.623	.105
Age > GPA 1	.18	6.200	.000
Age > GPA 2	.17	5.645	.000
Age > GPA 3	.16	5.175	.000
Gender > Personal statement score	-.01	-.178	.859
Gender > Interview score	.12	4.027	.000
Gender > UCAS score	.05	1.624	.104
Gender > GPA 1	.01	.181	.856

Gender › GPA 2	.02	.569	.569
Gender › GPA 3	-.01	-.449	.653
SES › Personal statement score	-.04	-1.143	.253
SES › Interview score	-.01	-.412	.680
SES › UCAS score	.01	.217	.828
SES › GPA 1	.09	2.884	.004
SES › GPA 2	.07	2.275	.023
SES › GPA 3	.09	2.991	.003
SpLD › Personal statement score	-.03	-1.109	.268
SpLD › Interview score	.01	.194	.846
SpLD › UCAS score	.00	-.047	.963
SpLD › GPA 1	-.17	-6.069	.000
SpLD › GPA 2	-.08	-2.769	.006
SpLD › GPA 3	-.10	-3.508	.000
Personal statement score › GPA 1	.01	.325	.745
Personal statement score › GPA 2	.04	1.174	.241
Personal statement score › GPA 3	-.02	-.777	.437
Interview score › GPA 1	.10	3.499	.000
Interview score › GPA 2	.09	2.862	.004
Interview score › GPA 3	.12	4.084	.000
UCAS score › GPA 1	.15	5.202	.000
UCAS score › GPA 2	.14	4.666	.000
UCAS score › GPA 3	.13	4.221	.000

All models were recursive, and minimum was achieved (which means that the variance and covariance were successfully estimated). The measurement models fit indices provide a baseline from which to compare modifications to the path diagrams (table 6).

Table 6 – Measurement model fit indices for GPA 1, 2 and 3

	χ^2	df	χ^2 /df	CFI	RMSEA	90% RMSEA	P value
GPA 1	82.530	9	9.170	.638	.084	.042 - .092	.000
GPA 2	82.912	9	9.212	.547	.084	.068 - .102	.000
GPA 3	82.789	9	9.199	.553	.084	.068 - .102	.000

All non-significant paths were progressively removed and the reduced model was tested with modifications considered and implemented to improve model fit for path model GPA 1. This process was then repeated for GPA 2 and GPA 3. Model four was the best fit for all three programme outcomes and are highlighted in bold in tables 8, 9 and 10. Figures 5, 6 and 7 show the final model (model 4) for each outcome measure (GPA 1, 2 and 3) with significant path coefficients and total variance explained.

Table 7 – Fit indices for GPA 1 (models 1 – 5)

GPA 1	χ^2	df	χ^2 / df	CFI	RMSEA	RMSEA 90%	P value
Model 1	53.709	19	2.828	.829	.040	.028 - .053	.000
Model 2	48.180	18	2.677	.852	.038	.025 - .051	.000
Model 3	45.596	17	2.682	.859	.038	.025 - .052	.000
Model 4	28.155	16	1.760	.940	.026	.008 - .041	.030
Model 5	28.108	15	1.874	.936	.028	.011 - .043	.021

Figure 5 – GPA 1 model 4

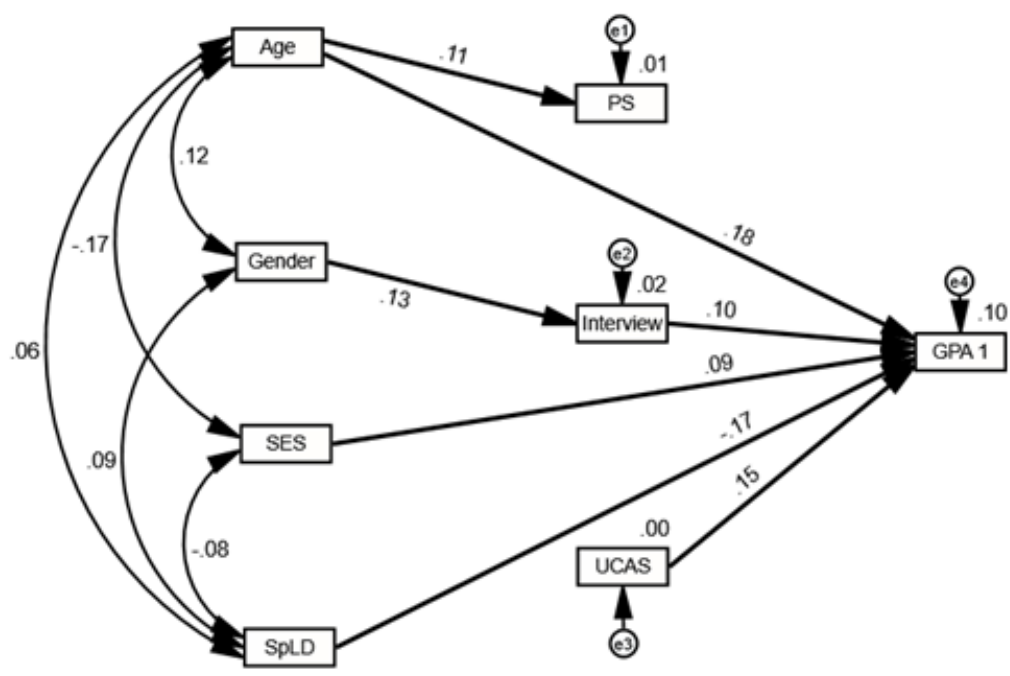


Table 8 – Fit indices for GPA 2 (models 1 – 5)

GPA 2	χ^2	df	χ^2 /df	CFI	RMSEA	RMSEA 90%	P value
Model 1	55.323	19	2.912	.777	.041	.028 - .053	.000
Model 2	49.803	18	2.767	.805	.039	.026 - .052	.000
Model 3	47.216	17	2.777	.815	.039	.026 - .053	.000
Model 4	29.770	16	1.861	.916	.027	.011 - .042	.019
Model 5	29.722	15	1.981	.910	.029	.013 - .045	.013

Figure 6 - GPA 2 model 4

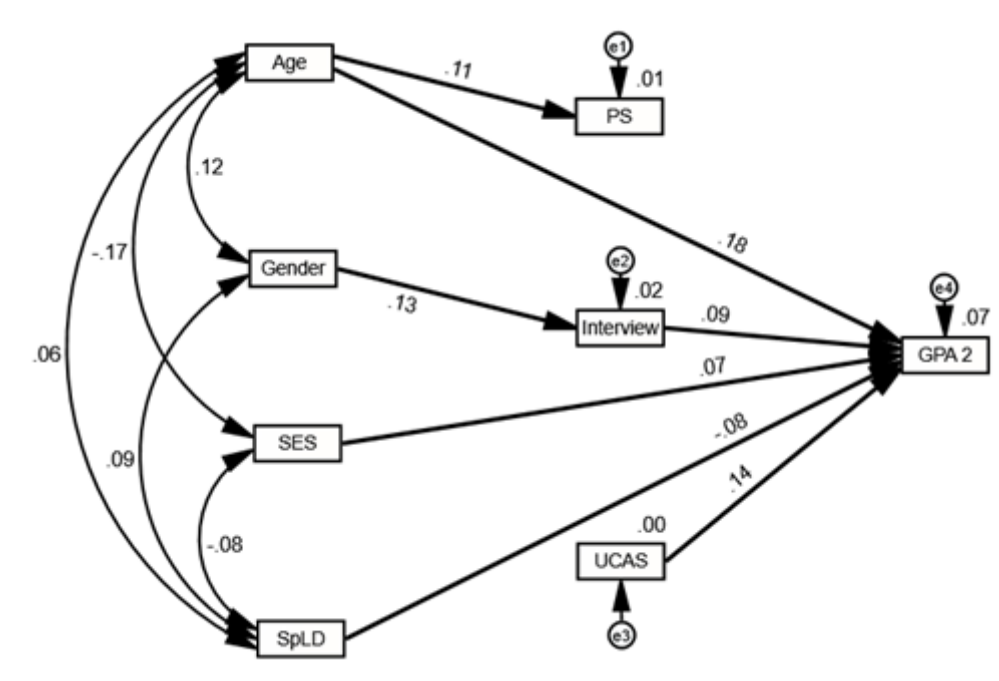
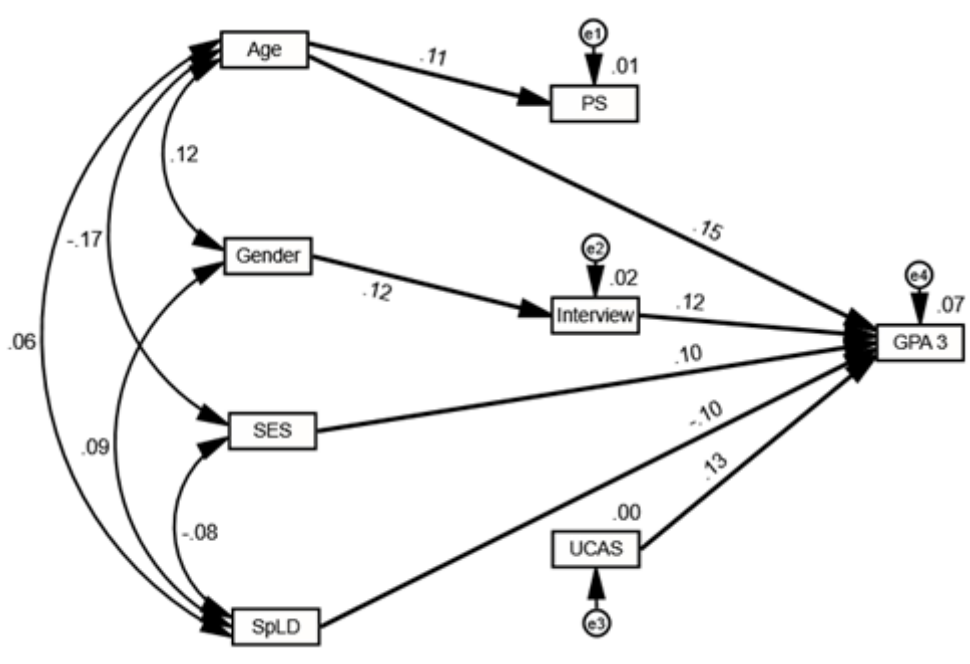


Table 9 – Fit indices for GPA 3 (models 1 – 5)

GPA 3	χ^2	df	χ^2 /df	CFI	RMSEA	RMSEA 90%	P value
Model 1	54.483	19	2.868	.785	.040	.028 - .053	.000
Model 2	48.905	18	2.717	.813	.039	.026 - .052	.000
Model 3	46.322	17	2.725	.822	.039	.026 - .052	.000
Model 4	28.894	16	1.806	.922	.026	.009 - .042	.025
Model 5	28.843	15	1.923	.916	.028	.012 - .044	.017

Figure 7 – GPA 3 model 4



The models show that age, SES, SpLD, interviews and UCAS scores have a direct effect with all three academic outcomes. In other words, as students get older and present from less deprived backgrounds, their academic grades increase across all three years of the programme. Those with SpLDs are more likely to have lower academic grades. As a students' UCAS scores and interview scores increase, so to do their academic grades. Gender was the only variable to have an indirect effect with programme outcomes through interview scores, with male students achieving higher interview scores. Gender did not predict any academic outcomes. Age predicted students who would attain a higher personal statement score but personal statement scores did not predict any academic outcomes.

The total variance explained for GPA 1 was 10%, and the totals for GPA 2 and 3 were 7% each. This means that model 4 GPA 1 has the highest level of predictability from student demographic characteristics and selection scores, but the relationships are weak.

Linear regression

Linear regression was employed to explore further the relationships between the outcome variables, GPA 1, 2 and 3 (tables 10 and 11).

Table 10 – Linear regression for outcome GPA 2

Variable	n	r	r ²	Std. Error	f	Sig
GPA 1	1076	.720	.518	5.578	1157.757	.000

Table 11 – Linear regression for outcome GPA 3

Variable	n	r	r ²	Std. Error	f	Sig
GPA 1	1053	.622	.387	6.488	633.466	.000
GPA 2	1053	.709	.503	5.847	1061.598	.000

The results show that GPA 1 is explaining 52% of the variance in GPA 2, and 39% of the variance in GPA 3. GPA 2 is explaining 50% of the variance in GPA 3. These are high proportions of variance and demonstrate that the most predictive factor of students' outcomes in years two and three are their academic performance in year one.

Discussion

This study aimed to investigate the predictive validity of the selection methods utilised for two pre-registration nursing programmes in the UK, and the influence that demographic characteristics have on academic performance.

The results demonstrated that there was a direct correlation between student age and academic grades across all three years of the programme in which increasing age was associated with enhanced academic performance. This finding supports those found by Donaldson et al. (2010), Rankin (2013) and Wray et al. (2017) and refute those reported by Timer and Clauson (2011) and Bulfone et al. (2021). The differences in findings may be explained by geographical location as all studies reporting a correlation between age and outcomes were conducted in the UK and the rest were conducted in Canada and Italy respectively. There is likely to have been differences in school outcomes across different nations. Hayden, Jeong and Norton (2016) explored the factors that affect mature student academic success in undergraduate nursing programmes. They reported several intrinsic and extrinsic factors that contribute to a mature students' academic success, such as life experience, resilience, persistence, self-control, help seeking, emotional intelligence, peer learning and motivation. Extrinsic factors included positive peer support systems with other mature students, family/friend support,

wishing to secure financial stability for their family and building relationships with dedicated academic staff. Wray et al. (2017) added that additional influencing factors could be the presence of dependents, a more settled lifestyle, or that they simply may have more to lose at that stage in life. It is possible that these behaviours and factors may have been present in the older students in our participants, but this was not explored in this study.

Gender did not predict any academic outcomes and these findings are supported by Wray et al. (2017). Our study offers further evidence that male and female students perform on par with one another academically and that gender is unrelated to their outcomes. Nevertheless, the literature is inconsistent with regards to differences in achievement between male and female nursing students. Bulfone et al. (2021) found that male nursing students did not perform as well academically as female nursing students, and Timer and Clauson (2011) stated that male nursing students were over-represented in the lower grade quartiles. The reasons for this are largely unknown, but Dante et al. (2016) offers an explanation that it may be to do with a male nursing students' 'minority status' within the profession. As the proportion of male students represented in undergraduate nursing programmes is low [approximately 11% in the UK (Clifton, Crooks, & Higman 2020)], they suggested that some male students may lack the support and friendship networks that female students have, a factor identified by Hayden et al. (2016) as crucial to success.

Better socio-economic status was an indicator of success, but the predictive relationship is so small that this is unlikely to have any practical meaning. Having specific learning difficulties also affected student outcomes, with students with specific learning difficulties achieving lower marks than those without. As these students were identified from the reasonable adjustments database, it is clear that the measures offered to these students to aid them with their learning warrants further exploration to identify why the attainment gap still prevails. The academic outcomes of nursing students with specific learning difficulties have not been explored in the nursing literature to make comparisons to other findings possible, but their outcomes have been considered across multiple academic disciplines. In a study conducted by Richardson (2015) students with specific learning difficulties were shown to have higher module failure rates, but their course completion rates and achievement of a good degree classification (considered to be a first or upper second-class Honours) showed no significant differences between students with or without specific learning difficulties. The research was conducted in the UK with a sample of 175924 students, however the programme delivery was online with no minimum academic entry requirements to enrol, meaning that the results are not readily transferable to other university settings with an in-person mode of course delivery. More research into the academic outcomes of students with learning difficulties is needed.

Other significant findings revealed that as students' UCAS scores and interview scores increased, so too did their academic grades. Prior academic achievement, specifically the secondary school GPA, has consistently been shown to predict clinical and academic achievement in nursing education (Timer and Clauson 2011, Rankin 2013, Hinderer et al. 2014, Tartavouille et al. 2018, Crawford et al. 2021). As far as we can ascertain, ours is the only study to explore the UCAS tariff point system in the UK for pre-registration undergraduate nursing programmes, and our results mirror those of other undergraduate programmes of study (Cheng & Catline 2015, Kale et al. 2020). This shows that UCAS scores can predict outcomes in nursing programmes, but the predictive power is weak. While academic entry requirements vary across nursing programmes in the UK, one method of ensuring that candidates are more likely to meet the academic rigors of a nursing programme would be to raise the minimum academic entry criteria. However, the risk associated with raising the academic bar would be the exclusion of people from backgrounds who typically do not perform well in academic examinations, including people from minority groups (Kelly, Patterson, O'Flynn, Mulligan & Murphy 2018), leading to a less diverse intake. Other high entry qualification programmes of study, such as medicine, have been criticised for this (Patterson et al. 2018).

Non cognitive selection methods such as interviews and personal statements are often hailed as alternatives or 'supplements' to academic selection. To date, our study is the only one to offer any evidence of the predictive power of interviews with academic outcomes in pre-registration nursing programmes. Although there is some evidence that they increase the diversity of nursing students who are selected (House et al. 2015), the evidence surrounding their predictive power to select students likely to thrive academically is sparse, with some studies reporting no correlation with student outcomes (Timer & Clauson 2011, Traynor et al. 2016, Tartavouille et al. 2018). Some of the differences may be explained by geographical location and differences in school outcomes (Timer & Clauson 2011, Tartavouille et al. 2018). However, that would not account for the findings reported by Traynor et al. (2016) whose research was conducted in the same UK nation as this study, albeit at a different university. Their study reported no correlations between interview scores and programme outcomes. The differences between these studies could be better explained by the types of interview questions, scoring system or differences in academic modules between schools, but the results are still surprising. These findings pose a question about the validity of interviews in selecting students for pre-registration nursing programmes, considering the resource intensiveness of conducting interviews for programmes that have more applicants than spaces available (RCN 2018). It may be worth exploring alternative forms of selection now that the requirement for face-to-face contact prior to selection is no longer required (NMC 2018b).

Personal statement scores had no predictive validity with any academic outcomes or course completion rates. This selection method is poorly explored in the nursing literature with conflicting

results thus far. One study supported a correlation between personal statement scores and academic grades (Traynor et al. 2016) and a second study did not (Timer & Clauson 2011). In non-nursing studies, Murphy, Klieger, Borneman and Kuncel (2009) conducted a meta-analysis into the predictive validity of personal statement scores. They found an average of $r = 0.13$ between personal statements and grade point averages and $r = 0.09$ between personal statements and faculty grading. They concluded that personal statements were weak indicators of academic success, with a particularly low correlation with grading by academic staff. This calls into question their use as part of the UCAS admissions process. If they provide no additional quality to the admissions process, they may in fact detract from it as potentially suitable candidates are screened out at an early stage without evidence to support this practice. UCAS state that personal statements give candidates the opportunity to share their desire to study a particular discipline at university. Murphy et al. (2009) suggested that personal statements could be used to match students with potential advisors with similar interests or identify students who need remedial support, but more research is required to substantiate these suggestions to identify if personal statements can be used effectively for non-selection purposes.

A summary of the use of demographic characteristics and selection scores as predictors of success could be concluded as follows. Students of increasing age without specific learning difficulties who perform better in interviews with higher UCAS points are more likely to achieve higher academic scores. Unfortunately, the low maximum variance in outcomes explained in these variables suggests that this model is unlikely to be successful in identifying students most likely to succeed nor those at risk of failure. Had the variance been higher, this would have provided a point at enrolment where students could be assessed and identified as high risk for early and intensive intervention to help them succeed. However, our findings indicated that year one was a potentially more viable time point to access students who were at high risk of failure, as year one performance was associated with academic achievement in years two and three. This finding is supported by Bulfone et al. (2021) who demonstrated a significant correlation between one first year clinical training examination and academic failure in third year. Attrition from nursing programmes is known to occur at its highest level in year one semester one, and subsequently many students may be missed for early and intensive intervention if they must wait until the end of first year to be assessed for being 'at risk'. This supports a proposition for supportive interventions as early as feasible in year one.

Academic staff must also determine what would be considered as criteria for support interventions in first year. In the UK, students are awarded an honours degree providing they pass all modules at 40% or above. Any student whose first-year academic average falls below this level should clearly be identified for intervention. Yet, the cohort of students who surpass this minimum standard, but who are not achieving their academic goals, may then not be identified for support. Other non-failing students should also be afforded the opportunity to avail of interventions that would assist them in

achieving their academic aspirations. One option would be to provide remedial classes to all students at enrolment, before failure has occurred. Wray, Aspland, Taghzouit and Pace (2013) investigated the impact that providing first-year nursing students with mandatory study skills classes would have on programme outcomes. They found that the rate of attrition decreased for this cohort in comparison to the previous year where study skills classes were only offered to students with suspected or diagnosed dyslexia. This supports the notion of early and intensive intervention, although Seidman (2012) does suggest that students who are not in need of assistance should not be made to take remedial classes. Identifying students considered 'at risk' may also have the unintended effect of making students feel like they are being singled out from their peers. This could be avoided if students self-selected to attend remedial classes that they felt would address their learning needs. Classes that are open to all would not single anyone out and would offer interventions and academic staff support at an early time point, rather than waiting until the end of year one. Therefore all students are offered a pathway for maximising their academic success, although it is possible that only the most dedicated students who want to succeed will attend.

Limitations

This study has several boundaries that must be factored into the interpretation of the results. Firstly, although the sample contained five cohorts, the research was conducted at only one university, which could influence the generalisability of the results. Secondly, the student clinical outcomes were not investigated due to the lack of variability in data in that almost everyone passes. Readers should take this into account when considering any changes in selection procedures.

Future research

Going forward, future research should focus on determining alternative forms of selection that correlate more closely with programme outcomes in order to increase the predictive validity of selection procedures for pre-registration nursing programmes. Exploring additional demographic characteristics of students, such as the presence of dependents and financial responsibilities, would aid understanding of the impact that such social factors may have on student success. The effect that specific learning difficulties have on nursing students academic outcomes also warrants further investigation. Beginning to address the total dearth of literature of research on students with specific learning difficulties, it would be valuable to explore the students' views of the reasonable adjustments and what additional factors they feel may aid them to perform better. Lastly, researchers should consider investigating the benefits of providing early remedial classes to nursing students, and the types of remedial classes that are likely to help students succeed.

Conclusion

Attrition and academic failure in nursing programmes pose a threat to the future availability of the nursing workforce. Having an understanding of the variables that can predict nursing student success and failure is important. This study found that as students age, affluence, UCAS scores and interview scores increased, so too did their academic grades, albeit that the relationships are weak. The results of this research have implications for identifying students at risk of failure or poor performance and who might benefit from early supportive interventions to help them succeed. We pose further question about the validity of the selection criteria currently being used to select students for pre-registration nursing programmes that must be addressed through further research. Educators must commit to recognising students who are in need of interventions at the earliest opportunity and encourage students to self-select for support that they feel would address their own learning needs.

Relevance to clinical practice

This study highlights the weak relationships that selection scores/demographic characteristics have with student outcomes for undergraduate nursing programmes. Alternative methods of selection should be considered and developed for use in pre-registration nursing programmes. Nursing students should be encouraged to avail of all academic support available to them at the earliest opportunity, preferably at or shortly after enrolment. This should help them achieve their academic goals throughout their undergraduate education and beyond.

Conflict of Interest statement

No conflict of interest has been declared by the authors.

What does this paper contribute to the wider global clinical community?

Universities should review their selection methods for pre-registration undergraduate nursing programmes to determine the selection methods that can predict students who will excel clinically and academically. Learning needs should be addressed at the earliest opportunity to aid nursing students to achieve their learning goals, at enrolment or as soon as possible, rather than waiting until after academic failure has occurred.

References

- Aiken, L. Sloane, D. Bruyneel, L. Van dan Heede, K. Griffiths, P. Bussel, R. Diomidous, M. Kinnunen, J. Kozka, M. Lessaffre, E. McHugh, M. Casbas, M. Rafferty, A. Schwendimann, R. Scott, A. Tishelman, C. Achterberg, T. & Sermeus, W. (2014). Nurse staffing and education and hospital mortality in nine European countries: a retrospective observational study. *The Lancet*, 383(9931), 1824-1830.
- Audet, L. Bourgault, P. & Rochefort, C.M. (2018). Associations between nurse education and experience and the risk of mortality and adverse events in acute care hospitals: A systematic review of observational studies, *International Journal of Nursing Studies*, 80, 128-146.
- Bird, E. (2017). Will nursing apprenticeships mark the end of the university nursing degree? (online) available at : <https://www.nursinginpractice.com/professional/will-nursing-apprenticeships-mark-the-end-of-the-nursing-university-degree/> [Accessed on 30/01/2022].
- Bulfone, G. D. E. Maria, M. Maurici, M. Macale, L. Sili, A. Vellone, E. & Alvaro, R. (2021). Academic failure and its predictors in baccalaureate nursing students: A longitudinal study. *Journal of Clinical Nursing*, 30, 1953 – 1962.
- Cheng, V. & Catline, J (2015). The role of resilience, delayed gratification and stress in predicting academic performance. *Psychology Teaching Review*, 21(1), 13-23.
- Clifton, A. Crooks, S, & Higman, J. (2020). Exploring the recruitment of men into the nursing profession in the United Kingdom. *Journal of Advanced Nursing*, 76, 1879 – 1883.
- Dante, A. Petrucci, C. & Lancia, L. (2013). European nursing students' academic success or failure: A post-Bologna Declaration systematic review, *Nurse Education Today*, 33(1), 46-52.
- Dante, A. Ferrao, S. Jarosova, D. Lancia, L. Nascimento, C. Notara, V. Pokorna, A. Rybarova, L. SkelaSavic, B. & Palese, A. (2016). Nursing student profiles and occurrence of early academic failure: Findings from an explorative European study. *Nurse Education today*, 38, 74-81.
- Donaldson, J. McCallum, J. & Lafferty, P. (2010). Can we predict successful completion of the common foundation programme at interview? *Nurse Education Today*, 30, 649 – 656.

Field, A. (2017). *Discovering statistics using IBM SPSS statistics*. 5th ed. London, Sage Publications.

Gravetter, F.J. & Wallnau, L.B. (2017). *Statistical Behavioral Sciences*. 10th ed. USA, Cengage.

Hair, J.F. Black, W.C. Babin, B.J. & Anderson, R.E. (2019). *Multivariate Data Analysis*. 8th ed. United Kingdom, Cengage.

Hayden, L.J. Jeong, S.Y. & Norton, C.A. (2016). An Analysis of Factors Affecting Mature Age Students' Academic Success in Undergraduate Nursing Programs: A Critical Literature Review, *International Journal of Nursing Education Scholarship*, 13(1), 127-138.

Hinderer, K. DiBartolo, M. & Walsh, C. (2014). HESI Admission Assessment (A2) examination scores, programme progression and NCLEX-RN success in baccalaureate nursing: An exploratory study of dependable academic indicators of success. *Journal of Professional Nursing*, 30(5), 436 – 442.

House, S. Sturgeon, L. Garrett-Wright, D. & Blackburn, D. (2015). BSN admission group interviews: Perceptions of students, faculty, and community nurses. *Nursing Education Perspectives*, 36(1), 58 – 59.

Ijpelaar, J. Power, T, & Green, B. (2017). Northern Ireland Multiple Deprivation Measure. *Journal of the Statistical and Social Inquiry of Ireland*, 48, 163-174.

Kale, S. Kamble, M.W. & Spalding, N. (2020). Predictive validity of multiple mini-interview scores for future academic and clinical placement performance in physiotherapy, occupational therapy and speech and language therapy programmes. *International Journal of Therapy and Rehabilitation*, 27(4), 1-13.

Kelly, M. Patterson, F. O'Flynn, S. Mulligan, J. & Murphy, A. (2018). A systematic review of stakeholder views of selection methods for medical school admission. *BMC Medical Education*, 18(139), 1 – 26.

Liao, L. Sun, X. Yu, H. & Li, J. (2016). The association of nurse educational preparation and patient outcomes: Systematic review and meta-analysis. *Nurse Education Today*, 42, 9 – 16.

McNeill, C. Erskine, A. Ellis, R. & Traynor, M. (2019). Developing nurse match: A selection tool for evoking and scoring an applicant's nursing values and attributes, *Nursing Open*, 6(1), 59-71.

Moss, S. (2016). Fit indices for structural equation modelling (online) Available at: <https://www.sicotests.com/psyarticle.asp?id=277> [Accessed 22nd March 2022].

Murphy, S. Klieger, D. Borneman, M. & Kuncel, N. (2009). The Predictive Power of Personal Statements in Admissions: A Meta-Analysis and Cautionary Tale, *College and University*, 84(4), 83-86.

Nursing and Midwifery Council (2018a). *Code of Conduct*. London, NMC.

Nursing and Midwifery Council (2018b). *Future Nurse: standards of proficiency for registered nurses*. London, NMC.

Pallant, J. (2020). *SPSS Survival Manual. A step by step guide to data analysis using IBM SPSS*. 7th ed. London, Open University Press.

Patterson, F. Roberts, C. Hanson, M. Hampe, W. Eva, K. Ponnampuruma, G. Magzoub, M. Tekian, A. & Cleland, J. (2018). Ottawa consensus statement: Selection and recruitment to the health care professions, *Medical Teacher*, 40(11), 1091-1101.

Rankin, B. (2013). Emotional intelligence: enhancing values-based practice and compassionate care in nursing. *Journal of Advanced Nursing*, 69(12), 2717 – 2725.

Richardson, J. (2015). Academic Attainment in Students with Dyslexia in Distance Education. *Dyslexia*, 21(4), 323-337.

Royal College of Nursing (2018). *The UK nursing labour market review*. London, Royal College of Nursing.

Seidman, A. (2012). *College Student Retention*. 2nd ed. United Kingdom, Rowman and Littlefield Publishers.

STROBE Statement (2022). STROBE Strengthening the reporting of observational studies in epidemiology. Available at: <https://www.strobe-statement.org/> [Accessed 30/01/22].

Tabachnick, B.G. & Fidell, L.S. (2019). *Using Multivariate Statistics*. 7th ed. USA, Pearson Education.

Tartavouille, T. Adorno, M. Garbee, D. Kensler, P. & Manning, J. (2018). Predictors of success in BSN students. *International Journal of Nursing Education Scholarship*, 15(1), 1 – 8.

Timer, J. & Clauson, M. (2011). The use of selective admissions tools to predict students' success in advanced standing baccalaureate nursing program. *Nurse Education Today*, 31(6), 601 – 606.

The Health Foundation (2019). How many nursing students are leaving or suspending their degrees before graduation? (online) Available at: <https://www.health.org.uk/news-and-comment/charts-and-infographics/how-many-nursing-students-are-leaving-or-suspending-their-degrees> [Accessed on 31/01/22].

Traynor, M. Galanouli, D. Roberts, M. Leonard, L. & Gale, T. (2016). Identifying applicants suitable to a career in nursing: a value-based approach to undergraduate selection. *Journal of Advanced Nursing*, 73(6), 1443-1454.

World Health Organisation (2020). Nursing and Midwifery fact sheet (online) Available at: <https://www.who.int/news-room/fact-sheets/detail/nursing-and-midwifery> [Accessed on 31/01/2022].

Wray, J. Aspland, J. Taghzouit, J. & Pace, K. (2013). Making the nursing curriculum more inclusive for students with specific learning difficulties (SpLD): embedding specialist study skills into a core module. *Nurse Education Today*, 33(6), 602-607.

Wray, J. Aspland, J. Barrett, D. & Gardiner, E. (2017). Factors affecting the programme completion of pre-registration nursing students through a three year course: A retrospective cohort study, *Nurse Education in Practice*, 24, 14-20.

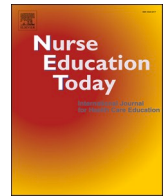
4.7 Objective five - Students with specific learning difficulties

Objective five - To track students with specific learning difficulties and compare their academic outcomes to students without specific learning difficulties.

Detailed results for objective five are presented in paper 3 which is available in the next section.

4.8 Published results (paper 3)

The outcomes of students with and without SpLDs were compared using Pearson's correlation, ANOVA and cross-tabulation which identified the differences and associations between each group of students. A total of 12.5% (n=114) of the students were identified as having a SpLD and were entitled to reasonable adjustments. The analysis demonstrated that their grade percent average was almost on par with the students without SpLDs, The largest attainment gap was in year one and this had almost dissipated by years two and three, and there was no difference between course completion rates for either group of students.



Research article

The academic journey of students with specific learning difficulties undertaking pre-registration nursing programmes in the UK: A retrospective cohort study

Caroline Crawford^{a,*}, Pauline Black^b, Vidar Melby^b, Ben Fitzpatrick^c

^a University of Ulster, Faculty of Life and Health Sciences, Northland Road, Derry, BT48 7JL, United Kingdom of Great Britain and Northern Ireland

^b University of Ulster, School of Nursing, Northland Road, Derry, BT48 7JL, United Kingdom of Great Britain and Northern Ireland

^c University of Ulster, School of Sport, Northland Road, Derry, BT48 7JL, United Kingdom of Great Britain and Northern Ireland



ARTICLE INFO

Keywords:

Student nurse
Nursing student
Specific learning difficulty
Higher education
Reasonable adjustments

ABSTRACT

Background: The prevalence of nursing students with specific learning difficulties enrolled on pre-registration nursing programmes and the impact that this diagnosis has on their programme outcomes are currently unknown.

Objectives: The aim of this paper is to report on data that explored and compared the academic journey of students with and without learning difficulties on pre-registration nursing degree programmes.

Design: A retrospective cohort design.

Settings: One university in the UK offering BSc Honours Degree programmes in Adult and Mental Health Nursing.

Participants: Pre-registration adult and mental health nursing students ($n = 1152$) enrolled in the programmes between 2012 and 2016.

Methods: Pearson's Correlation, ANOVA and crosstabulation were used to identify the differences and associations between each group of students with the outcome variables grade percent average and programme completion.

Results: A total of 12.5% of the students were identified as having a diagnosed specific learning difficulty and were entitled to reasonable adjustments. The analysis shows that their grade percent average and completion rates are equivalent to students without a specific learning difficulty.

Conclusions: The differences between students with a specific learning difficulty and those without are small across the variables measured. Reasonable adjustments appear to mitigate the learning difficulties that students with specific learning difficulties have. Educators need to continue to promote ways of identifying students with specific learning difficulties as early as possible in the student's academic journey. Responsive adjustments in teaching and assessment in theory and practice components should be implemented to ensure that all students' opportunities to succeed are maximised.

1. Introduction

There are many reasons why people of all abilities should be encouraged to apply for university courses. Higher education is known to lead to better job security, improved job prospects and a higher salary (Seidman, 2012). It is an important vehicle for 'closing the gap' of health and wealth disparities between those with disabilities and those without (Clouder et al., 2020).

A specific learning difficulty (SpLD) is an umbrella term covering a

range of neurological conditions that affect the way that information is processed and learned (British Dyslexia Association, 2020). SpLDs are considered disabilities and include, but are not limited to, dyslexia (the most common SpLD), dyspraxia, dyscalculia, dysgraphia, attention deficit hyperactivity disorder (ADHD) and other auditory or processing disorders. It is thought that approximately 10% of the population in the UK have dyslexia, 3–6% have dyscalculia and 1–4% have ADHD (British Dyslexia Association, 2019). Every presentation is unique but common traits include problems with reading, writing, concentration,

* Corresponding author.

E-mail addresses: c.crawford@ulster.ac.uk (C. Crawford), p.black@ulster.ac.uk (P. Black), v.melby@ulster.ac.uk (V. Melby), bl.fitzpatrick@ulster.ac.uk (B. Fitzpatrick).

<https://doi.org/10.1016/j.nedt.2022.105318>

Received 14 June 2021; Accepted 1 March 2022

Available online 3 March 2022

0260-6917/© 2022 Elsevier Ltd. All rights reserved.

organisation and short-term memory (Lewandowski et al., 2013; Wray et al., 2013; Crouch, 2019). SpLDs are not associated with intelligence and have lifelong presentations in which appropriate interventions can positively mitigate the effects that SpLDs have on everyday functioning (Evans, 2015).

The number of students with SpLDs in higher education is currently unknown. The Higher Education Statistics Agency (2019) stated that approximately 6% of students in higher education had SpLDs, yet one study found an incidence of 12% in their nursing programme (Wray et al., 2012). It is unknown how many students with SpLDs go unassessed and unrecorded through the entirety of their university courses. More rigorous methods of recording the number of students with SpLDs are required (Wray et al., 2012), but there is consensus that the incidence of SpLDs has been increasing in recent years (Olofsson et al., 2015; Harris, 2018; L'Ecuyer, 2019; Clouder et al., 2020). This has been attributed, in part, to policies aiming to widen and promote access to higher education to applicants from disadvantaged populations, who are generally underrepresented in UK universities (Henderson, 2017; Crouch, 2019). This includes people with disabilities, both seen and unseen. People with SpLDs have been recognised for their excellent interpersonal, problem solving, creative thinking and observation skills, as well as their high levels of empathy for others (Sanderson-Mann et al., 2012). They are known to enter professions such as nursing that centre around people (Morris and Turnbull, 2006; Wray et al., 2012; Crouch, 2019).

The Nursing and Midwifery Council, the nursing and midwifery regulator for the UK, specified that all newly registered nurses must have completed a bachelor's degree in nursing prior to registration, comprising 2300 clinical practice hours and 2300 hours of theoretical learning in a university setting (Nursing and Midwifery Council, 2018a). Universities are required to make reasonable adjustments and offer alternative approaches to teaching and assessment to people with disabilities (Disability Discrimination Act, 1995; The Equality Act, 2010). Reasonable adjustments are designed to remove any disadvantage students with a disability may face, so that they have the same opportunities to succeed as those without a disability. Adjustments can be applied to clinical and classroom learning settings depending on the needs of the individual student, providing that they do not compromise patient safety (L'Ecuyer, 2019). While educators are discovering new and creative ways of accommodating different learning styles in teaching and assessment to meet the educational needs of all students, little is known about the effects this has on progress outcomes for students with SpLDs in nursing education (Schabmann et al., 2020).

2. Background

2.1. Requirements and implications of disclosure of SpLDs

To be eligible for an assessment for reasonable adjustments, students must first disclose (fully or in part) the nature of their abilities to their university or clinical placement setting (Schabmann et al., 2020). Reasonable adjustments can include the allocation of additional time in examinations and permission to use equipment to aid reading and communication such as dictaphones or note-takers (Pino and Mortari, 2014; Asghar et al., 2018).

Disclosing a disability is a choice, especially in the case of unseen disabilities. Students exercise their right to non-disclosure for many reasons including a fear of stigma, isolation, being considered intellectually inferior or having their fitness to practise called into question. Some students with disabilities may not feel that they experience any difficulty and therefore do not disclose (Wray et al., 2012; Evans, 2015; Harris, 2018; Schabmann et al., 2020) and others believe that they do not have a disability (Pino and Mortari, 2014; Clouder et al., 2020).

Not all students who have SpLDs will be diagnosed when they commence higher education, and some will experience a delayed diagnosis until they reach the 2nd or 3rd year of their programme

(Henderson, 2017). This is perhaps due to the excellent compensatory mechanisms that they have had to develop to navigate course materials (Wray et al., 2012; Schabmann et al., 2020). Suspicions about potential SpLDs often emerge when the results of students' assessments do not match their expected performance levels (Henderson, 2017).

Educators should promote and embrace the assessment and disclosure of SpLDs in a helpful and meaningful way (Evans, 2015). Fear of negative consequences associated with disclosure can lead to a delay in diagnosis or asking for help (Wray et al., 2012), which may put people with SpLDs at risk of poor performance and early university exit (Morina and Orozcol, 2020). Prompt access to timely and continuing support is vital to successful educational development and outcomes (Wray et al., 2013).

2.2. Reasonable adjustments in clinical placements

Students with SpLDs use a range of measures to adapt in clinical practice, such as using a calculator to work out drug calculations or using pre-prepared handover sheets (Sanderson-Mann et al., 2012). Discrimination has been noted in clinical practice and it is not unique to the field of nursing (Stanley et al., 2007; Shaw and Anderson, 2018). Students with SpLDs have reported that they felt they had to work harder than their peers and constantly had to prove themselves (Evans, 2015). They can have such a lack of confidence in their ability that they feel that having their fitness to practise questioned is often justified (Crouch, 2019). Based on guidance from the Nursing and Midwifery Council (2018b), the presence of a disability should not automatically call nursing students' fitness to practise into question if they are able to practise safely and effectively, and clinical assessments should focus on students' abilities and not their disabilities (Wray et al., 2012; Evans, 2014). Medicine calculations are frequently highlighted as a potential problem, although numeracy skills are not solely an issue for nursing students with SpLDs (Sanderson-Mann et al., 2012; Wray et al., 2013). There is no evidence to suggest that patient safety is being compromised by nurses and students with disabilities (Morris and Turnbull, 2006; Wray et al., 2012).

Some clinical settings appear to be unaware of their legal obligation to provide reasonable adjustments or alternative forms of assessment, with some nursing lecturers even using the derogatory term 'babysitting' while referring to students with additional needs on placement (Evans, 2014). The attitudes of registered nurses are recognised as central in the support of nursing students in assessment as well as in enhancing students' confidence and sense of self-value (Major and Tetley, 2019). In a study by Sanderson-Mann et al. (2012), some clinical assessors felt that they lacked the knowledge and skills to help students with SpLDs and expected reasonable adjustments to be in place when the student arrived on placement. Yet the expectation was, regardless of disability, that students would take responsibility for their own learning needs.

2.3. Academic achievement

One study conducted in Sweden looked at the academic outcomes of students with dyslexia in social science courses (n = 50) (Olofsson et al., 2015). Thirteen of the students were enrolled on the nursing programme. Students' academic outcomes were measured by the number of completed academic credits, obtaining a degree and the dropout rate. The results showed that students with dyslexia were achieving outcomes consistent with the average performance indicators in Sweden. The authors suggested that this may be due in part to every participant having an upper-secondary level education (the equivalent of a grammar school in the UK) which may have prepared them intentionally for university study. As this study focused only on students with dyslexia and not students with other SpLDs, these findings cannot necessarily be generalised to the wider population of students with SpLDs.

Richardson (2015) looked at the academic attainment (completion rates, pass rates and academic grades) of distance learners in higher

education. This study was conducted at one university in the UK (the Open University) with a sample of 175,924, which was the entire number of students who had registered for one or more modules in that year. At enrolment, 4961 students stated that they had dyslexia or another type of SpLD. This was self-reported by the student and no evidence was required of diagnosis, although each student was contacted following disclosure to identify what additional learning support they would require with their studies. The results indicate that students with SpLDs were just as likely as students without SpLDs to complete their programme of study. Nevertheless, they had a higher rate of module failure and were less likely to obtain a first or upper-second degree classification (min. 60% grade average in final year) compared with the total population, and the difference was statistically significant. This study is difficult to generalise to other higher education institutions as it focused on distance learning only and the university had no formal or minimum entry requirements. There was no indication of how many students in the sample were enrolled on the university's nursing programme, nor did the study account for students who were diagnosed with SpLDs after enrolment.

2.4. Study rationale

The 50% clinical and 50% academic structure of nursing programmes makes comparisons to non-nursing programmes difficult. The nursing literature is dominated by qualitative research into the journey of nursing students with SpLDs on clinical placements and the perspectives of their clinical assessors and lecturers. As clinical practice learning accounts for only 50% of the total learning experience, there is an obligation on educational researchers to additionally explore the academic journey of students with SpLDs in relation to their academic outcomes.

3. Methodology

3.1. Study design - a retrospective cohort study

The aim of this paper is to report on data that explored the academic journey of students with SpLDs on Bachelor of Science (BSc) Honours Nursing (Adult and Mental Health) programmes at one university in the UK. The PICO framework (Fig. 1) was used to develop the study concept and the following research questions were devised.

1. What is the prevalence of students with SpLDs in the nursing programmes?
2. What are the demographic characteristics of students with SpLDs and how do they compare to students without SpLDs?
3. What are the differences between the academic outcomes of students with SpLDs and those without SpLDs?

Setting – The study was conducted in one university in the UK which is commissioned by the Department of Health, Social Services and Public Safety to deliver the pre-registration BSc Honours Adult and Mental Health Nursing programmes. The fulltime courses consist of nine semesters delivered over three calendar years, with students completing six equally weighted modules per year. Academic outcomes are assessed through a blend of examinations and assignments. Marks are awarded as a percentage for each module and range between 0 and 100% and the pass mark is set at 40%.

The assessment of SpLDs and subsequent decisions on reasonable adjustments are undertaken by student support services. To qualify for an assessment a student must provide a written diagnostic report as evidence of their diagnosis of a SpLD(s) or undertake an online assessment which, depending on the results, leads to an appointment with an educational psychologist who assesses their individual needs. A full list of reasonable adjustments is presented in Table 1.

Ethics - Ethical approval was granted under arrangements for

<p>Participants – All students who enrolled on the BSc Honours Degree programmes in Adult and Mental Health Nursing between 2012 and 2016.</p> <p>Indication – Students who have:</p> <ol style="list-style-type: none"> 1. Been professionally diagnosed by an educational psychologist as having a SpLD(s) of any type including dyslexia, dyspraxia, dyscalculia or ADHD. 2. Have disclosed their diagnosis to the university. 3. Have had their educational needs assessed by student support and are entitled to reasonable adjustments. <p>Comparison – Students who have not been professionally diagnosed by an educational psychologist as having any type of SpLD(s) or have not disclosed that they have a SpLD(s) and are therefore not entitled to an assessment by student support for any reasonable adjustments.</p> <p>Outcome – Student academic outcomes throughout the programme:</p> <ol style="list-style-type: none"> 1. The GPA of years 1, 2 and 3 comprising a mixture of sessional examinations and coursework assignments. 2. Completion of the programme. Completion of the programme means that a student has been awarded a BSc Honours Degree in Adult or Mental Health Nursing. Those who are not awarded this qualification are not eligible to apply to join the Nursing and Midwifery register and are classed as non-completion.
--

Fig. 1. PICO Framework.

Table 1
Reasonable adjustments for students with SpLDs.

Receive lecture resources in advance
Permission to use audio recorder in lectures, seminars and tutorials
Permission to have support workers in lectures and seminars
Sympathetic consideration for spelling or grammatical errors
Alternative assessment
Additional information
Extra time for completion of assignments
Consideration for flexible deadlines
Sympathetic consideration for classes missed due to appointments
Advance notice if required to read out loud in class
Flexibility to leave class for comfort breaks
Extra time in examinations
Smaller venue with other students for examinations
Smaller venue with other students with computer and printer for examinations
Individual room for examinations
Individual room with computer and printer for examinations
Permission to leave exam venue for comfort breaks
Amanuensis
Audio version of exams arranged by module coordinator
Exam papers in bold print
Exam papers printed on coloured paper
Sympathetic consideration for spelling errors
Electronic spellchecker
Exam papers read out loud by invigilator or an allocated examination reader
Viva voce as well as, or instead of, examination
Examination paper modification arranged by student support
Use of a coloured ruler
Enhanced library borrowing entitlements
Access to individual sessions with subject librarian
Dyslexia coach
Proof-reader
Note taker in lectures or seminars
Access to a scribe

research governance at the university and permission to conduct the research was given by the Head of the School of Nursing.

All nursing students who enrolled on the BSc Honours Nursing Adult and Mental Health programmes between 2012 and 2016 were included in the study. The demographic variables included in the study were age, gender, entry route to university (see Fig. 2) and socio-economic status (SES) and were obtained from the school admissions department. SES was determined using the students' postcodes to identify their Multiple Deprivation Measure (MDM). The Northern Ireland MDM gives each postal area in the region a rank position between 1 and 890, with 1 being the most deprived and 890 being the least deprived. The rank position is

derived from a combination of components including income deprivation, employment deprivation, health deprivation and disability, education and training deprivation, access to services, living environment and levels of crime/disorder (Ijpelaar et al., 2017).

Students with SpLDs were identified from the university Reasonable Adjustments database.

Academic outcomes were available from faculty records and were measured by grade percent averages (GPA) at the end of 1st, 2nd and 3rd year and their programme completion rate. Programme completion was defined as passing all module assessments and clinical placements and subsequently being eligible to apply to register with the Nursing and Midwifery Council. Reasons for non-completion included clinical or academic failure, or taking leave of absence without returning. Students may leave for multiple reasons and as some are unknown it is difficult to identify all reasons for individuals' non-completion. To enable students to gain academic credit for modules completed, students who completed a minimum number of 120 credits were able to exit with an alternative qualification, such as a Certificate in Health Sciences.

Data were retrospectively extracted from faculty records and no communication between students and researchers was necessary. At the time of data collection (2019), most students had completed the programme.

3.2. Analytical strategy

The data were manually entered into Excel spreadsheets, coded, anonymised and transferred into SPSS v 26 for analysis. Ten percent of randomly selected students had data extracted from one variable checked independently by another researcher against faculty records. Data checking was 98.5% accurate and further verification was not considered necessary.

Descriptive statistics were applied to the demographic characteristics of the sample and the prevalence of SpLD within the cohorts was calculated as a percentage. Pearson's correlation was used to measure the strength of the relationship between continuous variables (or one continuous and one dichotomous variable) and ANOVA/cross tabulation used to determine the differences between groups (see Table 2 for variable categories). The significance level for the study was set at 5%. Missing values were managed in SPSS on an analysis-by-analysis (pair-wise) basis, thus maximising the sample size for all statistical tests (Tabachnick and Fidell, 2019; Pallant 2020).

Qualification	Description
Advanced (A) - Level	A level three school leaving qualifications which uses examination, coursework or a final piece/performance to test students in one or more subjects chosen by the individual student.
Access to Higher Education (Access) Diploma	A level three qualification aimed at adults who wish to pursue study at higher education and is usually studied at a technical college or through distance learning.
BTEC	A level three vocational or technical qualification usually studied at a technical college.
Higher National Certificate (HNC)	A level four qualification usually studied at a technical college or university.
Higher National Diploma (HND)	A level five qualification usually studied at a technical college or university.
Degree	A level six academic qualification awarded by a university for study at undergraduate level.
Other	Other qualifications including Irish Leaving Certificate and international qualifications.

Fig. 2. Description of entry routes.

Table 2

Variable categories.

Categorical	Continuous	
Dichotomous (2 groups)	Entry route;	Age
Gender (male, female)	-A-levels	SES
SpLD (yes, no)	-Access Diploma	GPA 1, 2 & 3
Programme completion (yes, no)	-BTEC	
	-HNC	
	-HND	
	-Degree	
	-Other	

4. Results

Profiles were available for 1152 students from the five year-cohorts in the sample. Student numbers in the sample decreased slightly each year due to attrition. No students were lost to follow up as 'programme completion' was one of the outcome measures for the study. At the end of the programme, 12.5% (n = 144) of students had been identified as having one or more SpLDs and were entitled to reasonable adjustments.

Ages were available in 1147 cases. The mean age for all students with SpLDs was 25 and 24 for those without (Table 3). A Pearson's correlation shows that the difference was statistically significant, but the effect size was very small ($r = 0.059$, $p = .047$).

SES scores were available for 1026 students and ranged from 1 to 890 with students represented across all ranks of the MDM, with a slightly higher representation in the more deprived areas of Northern Ireland (Fig. 3). The mean SES score for students with SpLDs was 361 and 308 for students without SpLDs indicating a higher incidence of deprivation for the students with SpLDs (Table 4). A Pearson's correlation showed that the difference was significant, but the effect size was very small ($r = -0.078$, $p = .012$).

Gender was available for all 1152 students; 8.9% were male (n = 102) and 91.1% were female (n = 1050). The incidence of SpLDs among male students was 22.5% (n = 23) and 11.5% (121) among female students. This was explored further using a Chi-square Test for Independence (with Yates' Continuity Correction) which showed that the difference was significant, but the effect size was very small [χ^2 (1, n = 1152) = 9.349, $p = .001$, $\phi = 0.095$].

Entry routes were available in 1140 cases (Table 5). The most common entry route for students with SpLDs was the Access Diploma, followed by the BTEC Diploma and A-Level grades. For students without SpLDs the most common entry route was the Access Diploma, followed closely by A-Levels then the BTEC Diploma. A Chi-square Test for Independence showed that the difference was non-significant [χ^2 (6, n = 1140) = 10.958, $p = .098$].

The mean GPA grades for years 1, 2 and 3 for both groups of students are shown in Table 6. One-way ANOVA was used to detect significant differences between the mean grades in years 1, 2 and 3 for students with and without SpLDs. The Levene's Test of Homogeneity revealed equal variance between groups. The results indicate that there are significant differences between the scores of students with and without SpLDs at all three timepoints, but the effect sizes are small: GPA 1: [F = (11128) = 32.605, $p = .000$, $\eta^2 = 0.03$], GPA 2: [F = (11074) = 6.019, $p = .014$, $\eta^2 = 0.01$], GPA 3: [F = (11051) = 10.950, $p = .001$, $\eta^2 = 0.01$].

Out of a total 1152 students who enrolled between 2012 and 2016, 88% completed the programme (n = 1015). Three students had taken a

Table 3

Age.

Age on application			
SpLDs declared	Mean	N	Std. deviation
Yes	25.146	144	7.255
No	23.944	1003	6.756
Total	24.095	1147	6.829

leave of absence and had not yet returned at the time of analysis leaving three missing values. A Chi-square Test for Independence (using Yates' Continuity Correction) showed that there was no difference in programme completion rates between students with or without SpLDs [χ^2 (4, n = 1149) = 1.13, $p = .287$].

5. Discussion

This study aimed to identify and compare the prevalence, demographic profile and programme outcomes of students with and without SpLDs enrolled on the BSc Honours Adult and Mental Health Nursing programmes in one university in the UK.

A 12.5% prevalence of SpLD was found across the entire student population, which is similar to that found by Wray et al. (2012) in their nursing programme, but twice as high as that reported by the Higher Education Statistics Agency (2019). The difference could be explained by the timing of data collection. Our study aimed to capture every student who had been diagnosed with and disclosed a SpLD at any time point of the programme. The HSEA study captured students who had been diagnosed with and disclosed a SpLD at enrolment in higher education, failing to include students who may have been diagnosed later in their programme of study. Our study and that conducted by Wray et al. (2012) may offer evidence that people with SpLDs do prefer courses that centre around people (like nursing) which could explain the higher prevalence than the national average.

Student demographic profiles identified differences in age, gender and SES, and while these differences were statistically significant, the associations are small which means that they have little practical, or in this case, educational implications (Pallant 2020). In this study, the demographic profile of students with SpLDs appear to be similar to the rest of the student population, and there seems to be no characteristics that would help universities to identify those with undiagnosed SpLDs for targeted intervention or additional support.

The students with SpLDs had lower grade averages in all three years of the programme, but the differences were small; a 5% difference in 1st year and 2% difference in subsequent years. There were no differences in programme completion rates between students with or without SpLDs. These results corroborate the findings of Olofsson et al. (2015) and Richardson (2015) who report that students with various types of SpLDs seem to have an academic performance equivalent to that of their peers.

The similar academic outcomes may be partly due to the successful effect that reasonable adjustments have had on their educational journey, suggesting that interventions are appropriate and individually designed for student needs. The larger difference in GPA in year one merits further consideration. It offers evidence of the possibility that some students would not have been aware that they had a SpLD in first year and would not have been offered adjustments or other support mechanisms until they were diagnosed later in the programme, reflected in their poorer results in year one. Typically, students who are unaware that they have a SpLD are identified by academic staff following failures or poor performance in coursework or examinations. Early academic failures can be very disappointing and upsetting for students and lead to additional workloads for students and staff associated with repeat coursework assignments and examinations. This underlines the importance of early screening, referral and identification of people with SpLDs to ensure they receive the support they need to thrive in their academic career (Seidman, 2012; Wray et al., 2013).

Without screening every student at enrolment, it can be difficult to distinguish those who need support from those who do not, without any type of academic assessment. The alternative could be to encourage students who have previously struggled with academic work (prior to university) and have never been assessed by an educational psychologist, to come forward and request screening. This puts the onus on educators to raise awareness of undiagnosed SpLDs in higher education and create an open culture where diverse learning needs are anticipated, thus creating a supportive environment for students to feel empowered

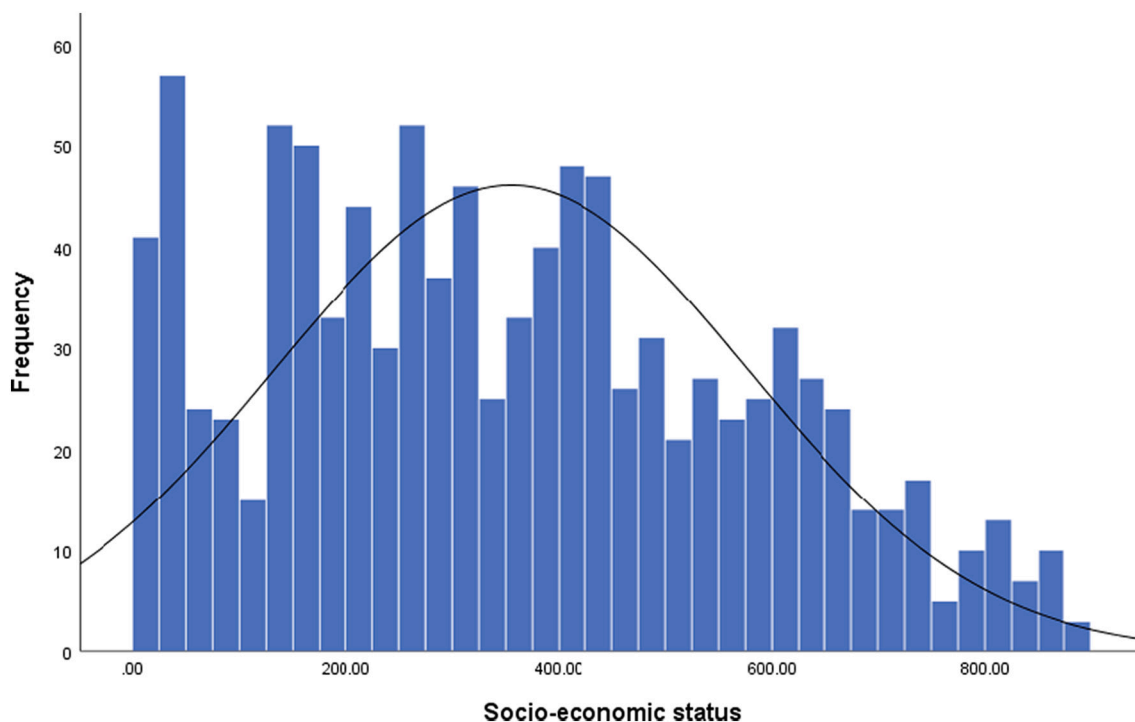


Fig. 3. SES histogram
Socio-economic status is determined by postcode ranking on the Northern Ireland Multiple Deprivation Measure.

Table 4
SES.

SES score	N	Mean SES score	Std. deviation
Students without SpLDs	904	361.481	222.136
Students with SpLDs	122	308.074	214.230

Socio-economic status is determined by postcode ranking on the Northern Ireland Multiple Deprivation Measure.

Table 5
Entry routes.

	SpLD	Frequency	Percent (with category)
A-Level	Yes	23	7%
	No	283	93%
Access Diploma	Yes	48	14%
	No	296	86%
BTEC	Yes	36	15%
	No	201	85%
HNC	Yes	12	16%
	No	65	84%
HND	Yes	9	16%
	No	47	84%
Degree	Yes	13	13%
	No	91	87%
Other	Yes	3	19%
	No	13	81%

to come forward to get the support they need. Although students do not always avail of the reasonable adjustments and resources available to them (such as utilising the entire extra time given for an examination), having access to such adjustments can be reassuring none the less. Knowing that additional support mechanisms are in place to be used if needed can mitigate the pressure of assessment and make the experience less stressful (Harris, 2018; Shaw and Anderson, 2018; Clouder et al., 2020).

Table 6
GPAs.

GPA year	SpLD	N	Mean	Std. deviation	Minimum	Maximum
GPA 1	No	986	59.022	8.9811	24.00	86.00
	Yes	144	54.486	8.3616	31.00	77.00
GPA 2	No	940	58.833	8.0953	20.00	83.00
	Yes	136	57.029	7.4156	39.00	75.00
GPA 3	No	921	61.229	8.3126	25.00	87.00
	Yes	132	58.689	7.7697	44.00	78.00

5.1. Limitations

This study considered the important topic of academic outcomes for students with SpLDs enrolled on pre-registration nursing programmes. More information could be obtained by investigating the different outcomes of students with specific types of SpLDs rather than grouping them together (e.g. dyslexia only), but this was beyond the scope of this investigation. As some students choose not to disclose their diagnosis, it is likely that some students with SpLDs were not captured in this study.

5.2. Further research

This study did not explore the uptake of reasonable adjustments or interventions by students with SpLDs or consider the assessment and decision-making processes of student support services on how these reasonable adjustments are decided. Finally, this study did not consider students' perceptions and experiences of the range of support interventions they received. This are obvious foci for further research.

6. Conclusion

This study adds a unique perspective from a nursing viewpoint into the academic performance of nursing students with SpLDs, in comparison to students without SpLDs. The differences between students with SpLDs and those without are small across the variables measured, and it

can be concluded that reasonable adjustments appear to mitigate the learning difficulties that students with SpLDs have.

Educators need to continue to promote inclusive ways of identifying, teaching and assessing students with all types of abilities. This can be aided by early and rapid identification of students who are struggling and putting in place responsive adjustments in theory and practice to ensure that all students' opportunities to succeed are maximised.

This study was the first of its kind in the field of nursing that considers the academic journey of students with SpLDs in nursing programmes; other studies have mostly focused on clinical experiences. It is hoped that it will stimulate further research into the learning experiences of students with SpLDs in nursing as well as non-nursing programmes.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

CRedit authorship contribution statement

Caroline Crawford: Conceptualisation, data curation, formal analysis, investigation, methodology, writing - original draft, review & editing, visualisation, project administration.

Pauline Black: Conceptualisation, writing - review & editing.

Vidar Melby: Conceptualisation, writing - review & editing.

Ben Fitzpatrick: Conceptualisation, methodology.

Declaration of competing interest

None.

References

- Asghar, Z.B., Siriwardena, A.N., Elfes, C., Richardson, J., Larcombe, J., Neden, K.A., Salim, A., Smally, D., Blow, C., 2018. Performance of candidates disclosing dyslexia with other candidates in the UK medical licensing examination: cross-sectional study. *Postgrad. Med. J.* 94, 188–203.
- British Dyslexia Association, 2020. Available at: <https://www.bdadyslexia.org.uk/dyslexia/neurodiversity-and-co-occurring-differences>. Accessed on 08/10/2019.
- British Dyslexia Association, 2019. Understanding neurodiversity; a guide to SpLDs. Available at: https://cdn.bdadyslexia.org.uk/documents/Dyslexia/A_Guide_to_SpLD_2nd_ed.pdf?mtime=20190410221939&focal=none. Accessed on 26/04/2021.
- Clouder, L., Karakus, M., Cinotti, A., Ferreyra, M.V., Fierros, G., Rojo, P., 2020. Neurodiversity in higher education: a narrative synthesis. *High. Educ.* 80, 757–778.
- Crouch, A.T., 2019. Perceptions of the possible impact of dyslexia on nursing and midwifery students and of the coping strategies they develop and/or use to help them cope in clinical practice. *Nurse Educ. Pract.* 35, 90–97.
- Disability Discrimination Act, 1995. <https://www.legislation.gov.uk/ukpga/1995/50/contents>. Accessed 11/11/2020.
- Evans, W., 2014. "If they can't tell the difference between diphthalac and digoxin you've got patient safety issue". *Nurse Lecturers' constructions of students' dyslexic identities in nurse education. Nurse Educ. Today* 34 (6), 41.
- Evans, W., 2015. Disclosing a dyslexic identity. *Br. J. Nurs.* 24 (7), 383–385.
- Harris, C., 2018. Reasonable adjustments for everyone: exploring a paradigm change for nurse educators. *Nurse Educ. Pract.* 33, 178–180.
- Henderson, P., 2017. Are there delays in reporting dyslexia in university students? Experiences of university learning support staff. *J. Furth. High. Educ.* 41 (1), 30–43.
- Higher Education Statistics Agency, 2019. Available at: <https://www.hesa.ac.uk/data-and-analysis/students/table-15>. Accessed 11/11/2020.
- Ijpelaar, J., Power, T., Green, B., 2017. Northern Ireland multiple deprivation measure. *J. Stat. Soc. Inq. Ireland.* 48, 163–174.
- L'Ecuyer, K.M., 2019. Clinical education of nursing students with learning difficulties: an integrative review (part 1). *Nurse Educ. Pract.* 34, 173–184.
- Lewandowski, L., Gathje, R.A., Lovett, B.J., Gordon, M., 2013. Test-taking skills in college students with and without ADHD. *J. Psychoeduc. Assess.* 31 (1), 41–52.
- Major, R., Tetley, J., 2019. Recognising, managing and supporting dyslexia beyond registration. The lived experiences of qualified nurses and nurse academics. *Nurse Educ. Pract.* 37, 146–152.
- Morina, A., Orozcol, I., 2020. Facilitating the retention and success of students with disabilities in health sciences: experiences and recommendations by nursing faculty members. *Nurse Educ. Pract.* 49, 1–8.
- Morris, D., Turnbull, P., 2006. Clinical experiences of students with dyslexia. *J. Adv. Nurs.* 54 (2), 238–247.
- Nursing and Midwifery Council, 2018. *Realising Professionalism: Standards for Education and Training*. London.
- Nursing and Midwifery Council, 2018. *Future Nurse: Standards of Proficiency for Registered Nurses*. London.
- Olofsson, Å., Taube, K., Ahl, A., 2015. Academic achievement of university students with dyslexia. *Dyslexia* 21 (4), 338–349.
- Pallant, n.d., Pallant, J. *SPSS Survival Manual. A step by step guide to data analysis using IBM SPSS*. 7th edn. Open University Press, London.
- Pino, M., Mortari, L., 2014. The inclusion of students with dyslexia in higher education: a systematic review using narrative synthesis. *Dyslexia* 20, 346–369.
- Richardson, J.T.E., 2015. Academic attainment in students with dyslexia in distance education. *Dyslexia* 21 (4), 323–337.
- Sanderson-Mann, J., Wharrad, H., McCandless, F., 2012. An empirical exploration of the impact of placement-based learning, and a comparison with non-dyslexic students. *Diver. Equal. Health Care* 9, 89–99.
- Schabmann, A., Eichert, H., Schmidt, B.M., Hennes, A., Ramacher-Faasen, N., 2020. Knowledge, awareness of problems, and support: university instructors' perspectives on dyslexia in higher education. *Eur. J. Spec. Needs Educ.* 35 (2), 273–282.
- Seidman, A., 2012. *College Student Retention*, 2nd edn. Rowman and Littlefield Publishers, United Kingdom.
- Shaw, S.C.K., Anderson, J.L., 2018. The experiences of medical students with dyslexia: an interpretive phenomenological study. *Dyslexia* 24 (3), 220–233.
- Stanley, N., Ridley, J., Manthorpe, J., Harris, J., Hurst, A., 2007. *Disclosing disability: disabled students and practitioners in social work, nursing and teaching*. In: Disability Rights Commission, United Kingdom.
- Tabachnick, B.G., Fidell, L.S., 2019. *Using Multivariate Statistics*, 7th edn. Pearson Education, USA.
- The Equality Act, 2010. Available at: <https://www.legislation.gov.uk/ukpga/2010/15/contents/enacted>. Accessed on 08/10/2019.
- Wray, J., Aspland, J., Taghzouti, J., Pace, K., Harrison, P., 2012. Screening for specific learning difficulties (SpLD): the impact upon the progression of pre-registration nursing students. *Nurse Educ. Today* 32 (1), 96–100.
- Wray, J., Aspland, J., Taghzouti, J., Pace, K., 2013. Making the nursing curriculum more inclusive for students with specific learning difficulties (SpLD): embedding specialist study skills into a core module. *Nurse Educ. Today* 33 (6), 602–607.

4.10 Summary

This chapter presented the results of this study. The first section reported on part one of the study which explored the differences between applicants who successfully enrolled on the programmes and those who did not, which answered objective two. The next section reported part two of the study which investigated the predictive validity of the demographic characteristics and selection scores of students who commenced the programme with their progress outcomes. The next two sections were presented in paper format and included the identification of a model designed to predict the academic outcomes of students enrolled on the programmes and the differences in academic attainment between students with and without SpLD(s). These papers answered objective four and five of the study. This thesis will proceed to a presentation of key findings incorporated throughout a comprehensive and collective discussion of all the results in the PhD study.

5 Chapter five - Discussion

5.1 Introduction

The aim of this study was to investigate the predictive validity of selection methods for pre-registration nursing programmes and to review the demographic, selection and progress data of pre-registration undergraduate nursing students at Ulster University. Although the discussion for objectives one, three, four and five are discussed in the study papers, this chapter will provide an overall discussion of all findings.

Please note that part one has a focus on all ‘applicants’ (objective two) while the discussion in part two is focused on those who enrolled in the programme and are subsequently referred to as ‘students’ (objectives three, four and five).

5.2 Objective one: To conduct a systematic review focusing on the predictive validity of selection methods on progress outcomes for undergraduate nursing programmes.

The results revealed an array of entry criteria being used to select students for undergraduate nursing programmes. Study outcomes tended to focus on the academic outcomes of nursing students’ performance, although clinical outcomes did feature in some studies. The variability of study outcomes and time points suggested a lack of consistency into the assessment of student performance. This made comparisons across different studies difficult and inhibited the identification of an evidence informed approach to predictive selection. Nevertheless, distinct themes did emerge from the literature which will be presented under the following headings: cognitive screening, non-cognitive screening and combined screening.

Cognitive screening

The findings of our systematic review suggested that cognitive selection is a valid predictor of undergraduate nursing students clinical and academic outcomes and thus supports the data from existing systematic and other literature reviews (Twidwell and Records 2017, Al Alawi et al. 2020). While GPAs and admissions tests are consistently predictive of success, we suggest caution in using cognitive methods as the only measures of selection. Firstly, prior academic achievement (such as a high school GPA) may not be comparable across schools as

these schools represent different demographic populations of students (Al Alawi et al. 2020). Secondly, cognitive selection cannot guarantee selection of candidates who are thought to embrace the professional personal characteristics suitable for a career in nursing. Although the desired characteristics in a nurse are yet to be agreed upon (Zamanzadeh et al. 2020), Al Alawi et al. (2020) argues that selection criteria should be holistic and examine non-academic attributes such as character and desire to nurse. However, there is little evidence in the literature as to the best way to achieve this.

Non-cognitive screening

Interviews are commonly used to assess communication skills and teamwork abilities as part of selection for pre-registration nursing programmes despite their bias and subjectivity (Zamanzadeh et al. 2020) and lack of predictive validity (Crawford et al. 2021). They have also been criticised for being time consuming and resource intensive (Al Alawi et al. 2020). MMIs have previously been cited in healthcare literature as an alternative to traditional interviews, with higher levels of predictive validity (Pau et al. 2013). Their use in nursing selection is uncommon and research findings are conflicting (Crawford et al. 2021) as our systematic review only found four studies which reported the relationship between MMIs and nursing student outcomes, two of which found them to be successful in predicting student outcomes (Gale et al. 2016, Callwood et al. 2020) and two that did not (Traynor et al. 2016, Callwood et al. 2018). MMIs are also cost and resource intensive but have been noted to be less prone to bias or influence by prior coaching (Pau et al. 2013, Zamanzadeh et al. 2020).

Selection using emotional intelligence (EI) tests was found as an emerging theme in the literature. Although EI tests are not currently being used as selection criteria to nursing programmes, their use is being tested by some universities, as evidenced in our systematic review. Rankin (2013) and Sharon and Grinberg (2018) found EI tests to be predictive of academic grades in first and second year and clinical attainment and retention at the end of first year. However, Cheshire et al. (2015) and Strickland and Cheshire (2017) report no correlation between EI scores and any academic outcomes. The difference may be explained by the type of EI test utilised in the research as both Cheshire et al. (2015) and Strickland and Cheshire (2017) used the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) and found no correlations, and Rankin (2013) and Sharon and Grinberg (2018) used the Schutte Self-report Inventory (SSI) and found correlations with student outcomes. The SSI is a self-

reporting scale which may have influenced the answers that students gave, as students may have felt discouraged to give truthful answers out of fear of being penalised if they perceived that their honest responses were unfavourable.

Other non-cognitive selection methods such as personal statements, prior healthcare experience and psychometric tests were reported so infrequently in the literature that conclusions could not be reached as to their predictive validity as selection methods.

Combined screening

No single method of selection is sufficient on its own (Hendricks and Krothe 2014) and using a combination of selection methods that are evidence-based and weighted accordingly is more effective than using tradition or expert opinion to design a selection process (Cunningham et al. 2014). This was demonstrated in two studies in the systematic review which tested a model of selection using a combination of entry requirements including prior GPA and admissions test scores (Hinderer et al. 2014) or prior GPA, GPA in science, admissions test scores and the number of completed academic prerequisites (although the details of these prerequisites were not reported in the paper) (Cunningham et al. 2014). The authors found that the combination of these four entry variables predicted a higher proportion of variance (20%) across multiple academic outcome measures, which was twice as high as that found by the path model in this PhD study.

There does appear to be an acceptance across the literature that selection methods should not only be capable of selecting the best candidates for nursing programmes, but that they should also be capable of identifying ‘at risk’ students to help them thrive academically and meet their learning goals (Donaldson et al. 2010, Elkins et al. 2015, Pitt et al. 2015), or help them come to a decision about whether or not nursing practice is for them (Rankin 2013).

Some studies failed to measure student outcomes across all years of the programmes by choosing only to focus on first year outcomes (Donaldson et al. 2010, Shulruf et al. 2011, Rankin 2013, Lui et al. 2018). Nevertheless, investigating predictors of success in the early stage of the programme may be beneficial as it gives academic staff the opportunity to identify students at risk of failure at an early time point. It is important to establish if selection methods can predict ongoing success. It is possible that they are predictive of early or later outcomes only, which was seen in Callwood et al. (2018) and Callwood et al. (2020),

where no statistically significant relationship between MMIs and outcomes were reported in first year, but a statistically significant relationship was reported with outcomes in third year with the same group of students.

In summary, the systematic review demonstrated some clear gaps in our knowledge of nursing student selection that could be explored further to help advance the research evidence base. Firstly, no studies were found that investigated the commonly used UCAS score system for admission to nursing programmes, and there was a distinct dearth in the literature as to the predictive validity of non-cognitive selection methods like interviews and personal statements. Despite two studies testing the validity of a model of selection using two or more methods of selection, no studies explored a combined model which included elements of cognitive and non-cognitive screening. Evidently, more research is required to test the validity of some commonly used methods of selection for undergraduate nursing programmes.

5.3 Objective two: To review the demographic characteristics and entry routes of those who apply for a position on the pre-registration nursing programmes at Ulster University.

The ratio of applicants to places available of 5:1 is far greater than the UK average of 2:1 (The Health Foundation 2019). The number of applications to nursing programmes in the UK have dropped in recent years, with some universities experiencing a reduction in applications of up to 31% (Clifton et al. 2020). This has largely been accredited to the removal of the nursing student bursary, a sum of approximately £400 per month given to each student to aid them with their living expenses. This bursary has not been removed in Northern Ireland, which may explain why applications to the nursing programme at Ulster University remained high. It is possible that it is the bursary that attracts people to nursing education, rather than the profession, although it is also possible that the bursary makes studying nursing ‘possible’ for individuals who would otherwise not be able to afford to do so due to financial constraints. Findings related to each variable will now be discussed.

Age

The vast age range of individuals applying to do nursing (age 17 – 59) offers evidence that applicants for these programmes are not deterred by age. The implementation of the widening

access and participation agenda has meant that applicants are able to follow a range of pathways into nursing education. The introduction of a graduate entry point has allowed individuals undertaking other degrees to make the transition into nursing education by being eligible to apply for these programmes also.

The average age of those who enrolled was consistent with the average age found in the systematic review (undertaken in objective one) which found that the majority of nursing students were in their early twenties (Crawford et al. 2021). The difference in age between applicants and students was small but merited further discussion. An integrative review by Glerean et al. (2017) reported that younger people, the majority of whom were teenagers, perceived nursing as a career with poor working conditions and limited autonomy. They considered the nurses' role to be inferior to doctors, and that nurses had a low standing in society. The report stated that this perception of nursing was influenced by the media, friends, family and personal factors. Neilson and Lauder (2008) reported that high-achieving school age students do not see nursing as a desirable career. Those who had considered it and subsequently decided on other programmes of study, stated that other health care professions such as medicine were more prestigious and important and therefore a better use of academic qualifications. Yet the number of school leavers applying to Ulster University has remained high, and it is important to consider that if younger applicants are not interested in nursing then it is unlikely that they would submit an application to be considered in the first instance.

Our findings suggested that younger applicants were less likely to be offered a position on the programmes based on their selection scores. The selection process at Ulster University comprised three main elements: personal statement screening, minimum requirement of UCAS scores, and an interview. Applicants were not offered additional weighting in the application process if they obtained higher UCAS scores than the minimum required, unlike the personal statement and interview components in which students were rank ordered based on the score awarded. The applicants with the highest personal statement scores were invited for interview, and the applicants with the highest interview scores were offered a position. This offered evidence that as an applicant's age increased, they were more likely to be awarded higher marks in personal statements and interviews, but further research (undertaken in objective three) would be required to verify these claims.

Hayden et al. (2016) conducted a critical literature review into the factors affecting mature students' academic performance in undergraduate nursing programmes. They found that

mature students performed at a higher level academically than their younger counterparts. It is difficult to judge the reliability of comparisons as ‘maturity’ is so poorly defined in the studies. It is possible that each author defined older students using their own institution’s definition of ‘mature’, but this is not clear from how the studies were reported in the literature review. The differences in outcome were attributed, in part, to the internal factors of motivation, life experience and emotional intelligence, although these concepts were not well defined. Rankin (2013) and Stenhouse et al. (2016) stated that emotional intelligence is a person’s ability to recognise and respond to their own emotions, and the emotions that others are experiencing. Rankin (2013) found that as students’ ages increased, so too did their emotional intelligence scores suggesting a link between age and emotional intelligence. This PhD study has no metrics to consider the influence of emotional intelligence or motivation, but it is possible that it played a key part in the outcomes of successful applicants. Volkert et al. (2018) stated that motivation to complete the university course is a fundamental component of success. Nagelsmith et al. (2012) found that motivation was a significant predictor of nursing student academic success and Mahdavi et al. (2021) found that there was a significant correlation between students’ achievement motivation and academic outcomes on undergraduate medical programmes such as medicine and paramedic sciences. The results reported by Hayden et al. (2016) may go some way to explain why older applicants are more likely to be successful as these internal factors may be aiding them to navigate the selection process. For example, applicants’ motivation to study nursing may be apparent in their personal statements and help them to obtain higher scores. Their life and work experience may help them understand teamworking or an appropriate action in situational judgement, which would aid them in interviews.

Gender

In our study, the proportion of male students admitted to the course was the same as the proportion of male applicants which was 9%. The percentage of male applicants enrolling on the programme matched the findings in our systematic review. There are approximately 11.4% male nurses on the NMC register, and typically the number of male nurses in nursing education mirrors this figure (Williams 2017). The proportion of men enrolled on this programme are slightly lower than the UK average. In the last decade the number of 18-year-old males applying to nursing programmes has increased across the UK but remained static in Northern Ireland (Lauder 2019). While no explanation was put forward by the author, there

are several reasons why men may feel discouraged to enter the nursing profession. Firstly, females make up the largest proportion of nurses in what is perceived by many as ‘women’s work,’ and promoted as such by one of the most influential leaders to shape the nursing profession, Florence Nightingale. This occurred a long time ago, and nursing has developed in many ways since then, and despite being rebranded as a gender-neutral profession, this perception of nursing being a woman’s job remains (Clifton et al. 2020). Secondly, there is evidence that some male nurses face discrimination or gender-associated restrictions at work. For example, hospital policies that require female chaperones when male nurses provide personal care to female patients (Parish 2006, Clifton et al. 2020), or hospital policies that prevent male nurses from carrying out catheterisation on female patients but have no restrictions for female nurses caring for male patients (Chang and Jeong 2021).

There are many benefits to addressing the gender balance in nursing. Some patients prefer male nurses (Budu et al. 2019), and the recruitment of men into the profession may help to fill some of the vacancies in undergraduate programmes and nursing positions at universities that struggle to recruit people onto their nursing programmes (McLaughlin et al. 2010). There is work to be done in Northern Ireland to encourage more men into the nursing profession. Clifton et al. (2018) conducted a survey of higher education institutions providing NMC accredited courses in the UK. Thirty-six institutions were approached to complete a survey, and from the 42% who responded, 95% felt that universities should take more responsibility in increasing the number of male nurses entering the profession. While details of what this responsibility should entail were not provided in the paper, it is likely that this should be individualised within each university to address their own nursing student shortfalls. The study did not indicate who the respondents were, for example, academic staff or managers, thus some caution is advised in the interpretation of the findings.

Part of the focus of the Athena Swan Charter which is used at Ulster University is to address under-representation of male students in nursing. The aim is to promote gender equality in undergraduate and postgraduate programmes and move away from traditional gender stereotypes in nursing (Ulster University 2022c). To avoid practices that would see men get priority admission over women, interventions that aim to enhance the recruitment of males must be focused on the recruitment phase and may mean that recruitment strategies need to be revised. At Ulster University, interventions targeted at male applicants started in 2016 and involved an increase in the profile of males in marketing campaigns using pictures of male

students in advertising and inviting male students and male academic staff to help at university recruitment events. In addition to this, a *Men in Nursing* widening participation project was commenced in 2019 (Stephanie Dunleavy, personal communication, 17/02/2022). Targeting underrepresented groups prior to application (e.g., in secondary school) through careers days and careers advice are a low-cost intervention that helps to widen participation. Targeted interventions should start early in secondary students' academic life to be likely to achieve a successful outcome (Robinson and Salvestrini 2020).

Entry route

The increase of students applying to university with alternative qualifications to A-levels, particularly BTECs has been noted in the literature (Gill and Vidal Rideiro 2014). Widening access and participation in higher education aims to increase the numbers of under-represented students in university through targeted recruitment, resourcing and outreach (Ulster University 2022). Brimble (2013) argues that nurses in the UK do not typically enter nursing education via the traditional A-level route, and complementary access options have been developed to aid people to meet the entry requirements to enrol on nursing programmes. Such access options include, but are not limited to, encouraging applications from people undertaking less traditional secondary educational courses. This helps to explain the large number of entry routes that were found in the applications and offered evidence that widening access and participation interventions are having the desired effect. However, the statistical analysis showed that students with A-levels and ILCs were under-represented in the applicants who enrolled, and those with the Access Diploma, BTEC, HNC and HND were over-represented. It may be possible that the academic staff leading further education programmes (such as the Access Diploma) may prepare their students well to navigate the selection process, with nursing specific course content or additional support to prepare their personal statements and potential interview answers. There is no evidence in the literature or in our results to support these claims. Yet the Northwest Regional Further Education College in Northern Ireland website states that their healthcare programmes are designed to facilitate entry to nursing or other healthcare related programmes of study (Northwest Regional College 2022). The Belfast Metropolitan College of Further Education states on its website that their health courses are designed to help students develop knowledge of the values, principles, legislation, policy and skills required to work in health-related disciplines (Belfast Metropolitan College 2022). It is therefore possible that the health-related content of these

programmes may be a contributing factor to their students' success in applying to health-related courses.

As the differences in applicants for undergraduate nursing programmes have not been explored previously, there were no equivalent research to which we could compare our findings. While not directly comparable, Gallagher et al. (2009) investigated the demographic profile of applicants for undergraduate medical and dental degrees in the UK and compared those who were successfully enrolled and those who were not. They considered applicants' gender, age, social class, minority ethnic status, school, disability status and whether or not they had attended further or higher education. This study was conducted on 21521 participants, using UCAS applicants' data from across the UK. Multiple logistic regression was used to model the predictions of those who would be successfully offered a position and those who would not. They found that applicants who were older, male, from an ethnic minority, had a lower social class and who had previously attended further/higher education institutions were less likely to be offered a position on either the dental or medical programmes. Disclosing a disability did not influence whether or not an individual would be accepted. The authors only analysed the applications of those who had put medicine or dentistry as their first choice of programme. The researchers raised questions about the lack of diversity of these programmes as the majority of successful applicants for medical and dentistry programmes were from a higher socio-economic background. A lack of diversity in medicine was also noted in the Owatta Report (Patterson et al. 2018). Without this data in this nursing study it is not possible to compare the diversity of applicants being accepted for the programme for the nursing course to compare like for like. This comparison of results highlights the vast differences in nursing and medicine/dentistry acceptance.

In summary, the results of this section of the study demonstrated that applicants from different age groups and educational backgrounds apply for the adult and mental health nursing programmes at Ulster, with ratio of applicants to places available well in excess of the UK average, although the ratio of male/female applicants fell slightly below the UK average. Applicants of increasing age and who had undertaken courses provided through further education colleges were more likely to be successful than applicants who had completed A-levels and ILCs, but the reasons for this are unclear and require further exploration. An applicant's gender did not predict enrolment.

5.4 Objective three: To identify any correlations between demographic characteristics, university selection criteria and student outcomes for the undergraduate pre-registration nursing programmes at Ulster University.

The research methodology and findings related to this objective are presented in paper two and an overview of the findings are presented here. The variables under investigation were age, gender, entry route, socio-economic status, specific learning difficulties, personal statement scores, UCAS scores, interview scores, results in years one, two and three and course completion rate. Age or any other non-modifiable characteristics such as gender cannot be used for selection due to equality and discrimination policies, but there is value in exploring the ability of these variables to predict those who are likely to be successful or unsuccessful in their academic work. Findings from such investigations could support universities in designing and implementing appropriate academic and other support mechanisms that would improve students' chances of academic success (Al-Alawi et al. 2020, Crawford et al. 2021).

Eighty-eight percent of students completed the programmes and were eligible to apply to join the NMC register which is consistent with completion rates in Northern Ireland universities providing the undergraduate nursing programme (The Health Foundation 2019). Student retention is important in all courses, but it could be argued that it is particularly important in nursing as there is a substantial shortage of nurses within global healthcare systems. Although some level of attrition is expected from nursing programmes, for example a student who has made the wrong career choice (Rankin 2013), a substantial part of attrition is attributed to academic and clinical failure (Freeman and Ali 2017). Evidence that can inform universities and programme providers on how to intervene to maximise retention is crucial in the aim to support nursing employment within healthcare services.

Age

The findings between increasing age and increasing grades are supported by some studies (Donaldson et al. 2010, Rankin 2013, Wray et al. 2017) but contradicted in other studies (Timer and Clauson 2011, Bulfone et al. 2021). The difference in findings may be explained by geographical location as all studies reporting a correlation between age and outcomes were conducted in the UK, which could indicate similarities in the way the course is delivered, and therefore have a cultural influence.

Seidman (2012) states that factors associated with completing university courses include social support, financial stability, and academic preparation. Some of these factors were explored in a critical literature review by Hayden et al. (2016). They focused on the characteristics that affect mature students' academic outcomes in undergraduate nursing programmes. Positive peer support systems with other mature students alongside friends and family were reported as influential external reasons having a positive influence on mature students' academic performance. They were also more likely to seek learning support, build relationships with academic staff and avail of one-to-one tutorials to advance their academic skills. Wray et al. (2017) adds that additional influencing factors could be the presence of dependents, a more settled lifestyle or that students may simply have more to lose at that stage in life. It is possible that these behaviours and factors may have been present in the older students in our study and would help explain their higher academic results in year one, two and three.

Kenny et al. (2011) stipulated that mature students should be targeted for recruitment given their high success rates and ability to outperform their younger counterparts. Nevertheless, it is worth recognising that mature students will have shorter career paths, may work less hours per week and will reach retirement age sooner than school leavers, which may compound graduate nurse shortages (Hayden et al. 2016). This will have implications for recruitment strategies, however, the students in this investigation have an average age on application of 24 which is only six years above that of a school leaver, which is unlikely to have much influence on recruitment intervention.

Gender

Our findings are supported by other research (Pryjmachuk et al. 2009, Díaz et al. 2012, Brimble 2013 and Wray et al. 2017) and offer further confirmation that male and female students can perform on par with one another academically. In spite of this, the literature reports inconsistent findings with regards to differences in achievement between male and female nursing students. Bulfone et al. (2021) found that male nursing students did not perform as well academically as female nursing students and Timer and Clauson (2011) found that compared with female students, male students were over-represented in the lower grade quartiles. While both studies suggested that more research is required to help explain these differences in achievement between male and female nurses, Dante et al. (2016) indicated that male nurses performing below female students may be to do with the lack of

male nurses within the profession. They suggested that male students may lack the support and friendship networks that female students have, a factor identified by Hayden et al. (2016) as crucial to a student's success.

Entry route

The entry routes were identified in objective two and were A-levels, the Access Diploma, the BTEC, HNC, HND and a previous degree. BTEC, HNC and HND categories had the lowest interview scores, yet the difference between the highest and lowest interview score was just one point and probably has little educational significance. Students with a previous degree performed best academically, achieving between 8-10% higher grades across all three years of the programmes. This may be because they have experience in studying at higher academic level and have acquired the study skills needed to successfully complete a degree programme. Whambuguh et al. (2016) found no correlation between prior degree level study and course completion. This may be because two categories (completion vs. non-completion) alone may not have been sufficient to detect real changes in academic outcomes for those with previous degrees.

Students entering with BTEC and HNC qualifications achieved the lowest academic results in all three years, although the differences were small. These results are supported by Gill and Vidal Rodeiro (2014), who found that students entering higher education with BTEC qualifications were less likely to obtain a first or upper second-class honours degree classification. Although their study was not conducted on a nursing programme, the results are still comparable. The authors concluded by saying that as a BTEC is a vocational qualification, it is possible that students who undertake this award are not as prepared to undertake academic study at university level. This may be due to differences in course structure and the level of theory/practical work at further education colleges. Discrepancies in academic preparation can be mediated by early interventions by universities to ensure that students are prepared to meet the academic rigors of studying at university.

In contrast, Brimble (2013) found that nursing students who entered university with BTEC qualifications were the most likely group to get a first-class honours degree, compared with those who had undertaken the Access Diploma who were more likely to be awarded a third-class honours degree. This study excluded all students who had obtained UCAS scores below or in excess of 240, in an attempt to compare 'like for like' grades at admission. Had the

entire student cohort been included with the full range of UCAS points achieved, the findings may have been different. This may explain the discrepancy found between the results in the study by Brimble (2013) and this PhD study.

There was no association between entry route and course completion, indicating that widening access and participation policies to increase the entry routes to universities have not had any impact on course completion rates in this study. Similar findings are reported by Craft (2018).

Socio-economic status

Ulster University (Magee Campus) is situated in a geographical area that contains five of the top 10 most deprived socio-economic status constituencies in Northern Ireland. Although the exact location of each student was not recorded due to time constraints, it is likely that the university's geographical location has influenced the students who apply and are subsequently offered a position on the course. The positive skew tells us that there were more students from lower socio-economic status backgrounds enrolled in the programme than from higher socio-economic status backgrounds. The socio-economic status was derived from the student's postcode, which was most likely the parental home for younger students, which may not have been their term time address, but their permanent one. Their term time address may have indicated a different level of socio-economic status, but this is not captured in our data.

The results show that socio-economic status had no significant correlations with any of the selection scores. It did have very small positive correlations with performance in years one and three and course completion with increasing affluence associated with increasing grades, but correlations are very small and are unlikely to have any educational significance. Craft (2018) showed that socio-economic status had no influence on student academic outcomes, supporting these findings.

The nursing student bursary which is provided by the Department of Health who commission these courses may offer valuable support to students from lower socio-economic status backgrounds as the economic hardship associated with university study may be negated with this financial assistance. Having said that, the amount awarded falls grossly below the actual cost of living, and in effect deprives students of other benefits such as loans, grants, free

childcare resources, and free university resources such as a laptop. Its value remains to be seen in some student cohorts, nevertheless, the bursary may act as an incentive to encourage students from more deprived areas to persist with course completion and studying hard to achieve their desired academic outcomes. The desire to provide for family (Hayden et al. 2016) through a stable job as a nurse, the ultimate outcome of successful completion, may also influence completion rates.

Specific learning difficulty

Thirteen percent of our students had specific learning difficulties, similar to that found by Wray et al. (2012) in their nursing programme. It is estimated that approximately ten percent of the population in the UK have dyslexia, three to six percent have dyscalculia and one to four percent have ADHD, with many individuals displaying traits of several of these neurodivergent conditions (British Dyslexia Association 2019). It is encouraging to establish this 'like for like' prevalence of students with specific learning difficulties enrolled in university as it demonstrates that students are not discouraged from applying to these nursing programmes because of their conditions. The common characteristics that these individuals display such as excellent interpersonal, problem solving, creative thinking and observation skills, as well as their high levels of empathy for others (Sanderson-Mann et al. 2012), should effect a positive influence within the teams involved in the provision of patient care, and therefore their applications should be welcomed.

Our findings evidence that students with or without specific learning difficulties obtain similar academic outcomes. Those with specific learning difficulties achieved five percent below their peers in year one, two percent in year two and three, and there was no difference in course completion rates. The majority of research thus far has focused on nursing students with specific learning difficulties in practice learning settings. To the best of our knowledge, this is the first study to compare the academic outcomes of students with and without specific learning difficulties in nursing education. Nevertheless, the results are comparable across other programmes of study. The results corroborate the findings of Olofsson et al. (2015) and Richardson (2015) who reported that students with various types of specific learning difficulties had an academic performance equivalent to that of their peers. The larger attainment gap in year one warrants further consideration and is explored further in paper three and presented under objective five.

Personal statements

Timer and Clauson (2011) found that personal statement scores did not correlate with students' overall course grade average. This study used a personal statement and structured résumé to work out an average personal statement grade, which is not reflective of how personal statement scores were calculated at Ulster University, making the findings difficult to compare. Traynor et al. (2016) indicated that personal statement scores had a positive correlation with nursing student outcomes. The difference in results here is surprising, considering the geographical location of this university (Queens University Belfast). Despite being different institutions, both universities are located in the same UK nation and use similar selection methods for all applicants. It is possible that the differences are due to how marks were allocated. However, their results supported the meta-analysis performed by Murphy et al. (2009) who concluded that personal statement scores were correlated with university students grade point average, however the relationship found in this study was weak.

The results of our study evidence that personal statement scores hold no value in terms of predicting student academic success at Ulster University, or the likelihood of a student completing the programme. Therefore, it is concerning that personal statement scores were used as the principal selection criterion for identifying students for interview. It is possible that applicants who could have performed well at interview, given the chance, could have been selected for the programme, but were eliminated from selection based on the personal statement scores. The recommendation to use personal statement scores to streamline the application process to enable the identification of appropriate applicants for interview was made by NIPEC on behalf of the Department of Health (2014). If personal statement scores provide no additional quality to the admissions process, they may in fact detract from it, as potentially suitable candidates are screened out at an early stage without evidence to support this practice.

As the evidence suggests that personal statements are not a valid indicator of student success, we question why universities use them. At present, they remain part of the UCAS application system, and UCAS state on their website:

‘personal statements are an important part of the application process, allowing potential candidates to demonstrate their experience, skills, ambition and articulate why they would wish to study a particular subject, [like nursing], to faculty staff reviewing the application.’

UCAS offers no claims or evidence around predictive validity (UCAS 2022). While they form part of the application, there is no requirement for universities to review their content as part of their screening process, hence the value put upon it by universities is inconsistent and thus its inclusion in the UCAS application should be reviewed.

UCAS score

The average UCAS score was 355 which was considerably higher than the minimum required of 280. Achieving in excess of the minimum requirement is seen in applications to other courses such as medicine (Powis et al. 2007), demonstrating the popularity of these courses and evidencing that higher achievers are indeed interested in studying nursing, contrary to the findings presented by Neilson and Lauder (2008).

The academic entrance requirements to undergraduate pre-registration nursing programmes are different across the UK and range from a minimum of AAB at A-level or equivalent, to a grade C in maths only. At Ulster University the minimum academic entry requirement is BBC or equivalent, 20 UCAS points below other health courses at this university which have a minimum requirement of BBB (Dietetics, Occupational Therapy, Pharmacy, Physiotherapy, Podiatry and Radiotherapy). Raising the academic entry requirement would have resulted in many of our students not being given a position on this course. A positive but small correlation suggested an association between increasing UCAS scores with better performance in all three years of the programme, albeit by only a few percent. This is possibly because students with higher prior grades are better prepared to undertake the rigors of degree level education. The correlation seen between UCAS scores and course completion was so small that it is unlikely to have any educational meaning.

In this PhD research, no other studies were found that explored the predictive validity of UCAS scores in undergraduate nursing programmes in the UK. Yet the results are mirrored by studies of non-nursing programmes (Barmby et al. 2012, Cheng and Catline 2015, Kale et al. 2020). Our systematic review revealed a large number of studies that investigated the predictive validity of prior academic achievement in undergraduate nursing programmes

using prior GPA. Most studies predicted student academic and clinical outcomes, both early and with continued success within the programmes. Our research reflects this by showing that higher prior academic achievement is associated with better performance in first, second and third year of undergraduate nursing programmes.

One option that would potentially enhance the selection process to the nursing programmes would be to raise the minimum academic entry criteria. In this case, it could be raised to the same UCAS tariff points as the other undergraduate health sciences courses provided at Ulster University. However, one risk associated with raising the academic bar would be the potential exclusion from individuals who traditionally do not perform well in academic assessments, such as people from minority groups (Kelly et al. 2018). This could lead to a less diverse student intake (Zerwic et al. 2018) as seen in other high entry programmes such as medicine (Patterson et al. 2018). Any change to the selection process must be carefully considered from an inclusion policy perspective alongside its impact on widening access and participation policies.

Interview scores

Interviews are thought to assess applicants' non-academic attributes such as communication skills and team working abilities, and are thought to indicate whether or not they are suitable to undertake a nursing programme (House et al. 2015, Zamanzadeh et al. 2020). The interview scores in this study could not be compared with clinical outcomes as almost all students pass placements, thus the overall course completion 'status' tells us that clinical placements have been passed at the minimum standard required, otherwise a student would not have finished the course.

Interview scores were associated with better performance across all three years. The correlation was positive but small and the differences in grades were only by a few percent. Our study is the only one to report a positive correlation between interviews and student academic performance, acknowledging that the correlation was small. Traynor et al. (2016) reported that interview scores did not correlate with first-year academic module results. Timer and Clauson (2011) found that interview scores were not significantly correlated with participants' final GPA at course completion. Donaldson et al. (2010) found a small significant correlation between interview score and participants who successfully completed first year, but only reported the score awarded for the communication aspect of the interview,

rather than the overall interview score. Such differences may be explained by the types of questions asked at interview, the scores allocated for content as well as how the interviews were marked. Unfortunately interview questions are not typically published as part of research findings, thus we were unable to review the questions to ascertain reasons for the discrepant results. It should be noted though, that in this PhD study, the relationship between interviews and academic outcomes was small. The greater a sample, the more likely the relationship is to be significant, so caution must be applied when analysing the results of such a large sample.

Although there was a statistically significant relationship between interviews and academic performance, interviews had no correlation with course completion rates. A similar finding was reported by Hendricks and Krothe (2014), although they did not assess for correlations but monitored the nursing student retention rate following the introduction of interviews, which did not change. It is postulated by some authors that interviews increase the likelihood of selecting individuals who are suitable to enter their chosen profession with the right attributes to excel in their field (Talman et al. 2018). Yet, there is no evidence to support this statement (Crawford et al. 2021). Interviews are unlikely to have the psychometric precision required to evaluate a person's suitability for a programme (Timer and Clauson 2011). They are subjective in nature and prone to interviewer bias and candidate coaching (Pau et al. 2013, Zamanzadeh et al. 2020) with some authors stipulating that 'any person can be nice and look presentable for 20 minutes in front of an applicant panel' (House et al. 2015 p. 59). Yet, applicants for nursing programmes have previously reported that they value interviews as an opportunity to present themselves as more than their prior academic performance. It gives them the opportunity to display their desire for a career in nursing (House et al. 2015) and therefore it could be considered that this helps to justify their use. Knowledge of the nursing profession that comes across at interview may be indicative of interest in nursing, or it may simply demonstrate a person's ability to 'rote learn' material to repeat at interview. Those who have no caring experience may be at a disadvantage also, depending on the nature of the questions and whether or not they are related to care experience. Interviews are very time consuming and resource intensive (Al Alawi et al. 2020). Ulster University made a commitment to interviewing every applicant who was eligible to apply after screening their personal statement, regardless of whether their academic results were still pending. This means that approximately 1500 interviews were

conducted per year by multiple panels comprising academic and clinical staff, over many days and at multiple locations.

The NMC requirement for face-to-face contact with potential students has been removed, and although it is still a requirement from the Department of Health who commissions the programme (NIPEC 2014), this practice should be reviewed. Its usefulness should be considered, and indeed the ethical ramifications, for such a weighty selection process, that adds so little value to predict academic achievement or course completion. Although there is some evidence that they increase the diversity of nursing students who are selected (Trice and Foster 2008, House et al. 2015), the evidence surrounding their predictive power to select students likely to thrive academically is sparse.

Although UCAS and interview scores both have small and almost equal correlations with academic achievement, UCAS scores have a slightly stronger correlation with academic success in years 1 and 2, and interviews are a slightly stronger indicator of academic success in 3rd year. The differences are very small, which means the differences have no educational significance. Assessing the inter-rater reliability of the data of the interview panel members was not possible as this information was not gathered as part of the interview process at Ulster University. This decreases the reliability of interviews further as they are not moderated, unlike secondary school examinations or further education courses which are subject to a rigorous moderation system of examinations and coursework. Yet, interview scores are ultimately the determining factor in the selection process at Ulster University as to whom is offered a place. Our data do not support retaining interviews as a major criterion for selection, but rather suggest that both UCAS scores and interview scores have equal value (50:50) in terms of their predictive validity for academic performance. Therefore they should both be given an equal weight of 50 percent in the rank order of who is offered a position on the programmes.

Following the publication of the Francis Report (2013), Values Based Recruitment (VBR) was introduced into the selection processes for publicly funded healthcare roles in the UK, whereby the values of candidates must be aligned with the National Health Service Constitution (2021). The Northern Ireland Practice Education Council (NIPEC) (2014) *Gateway to Nursing Report* stated that the attributes that are considered 'valuable' in a nurse are trust, integrity, accountability, a commitment to personal development and person-centredness. Arguably, these are the attributes that interviews seek to assess rather than an

applicant's academic ability. While each of these attributes are valued in the theoretical aspect of nursing education, their values also apply to the clinical practice component of their education. This PhD study was unable to explore the predictive validity of interviews in relation to how these attributes are demonstrated in clinical practice as these data were not available to our research team, and, ultimately, almost all students on the courses complete successfully thus such values must have been demonstrated by the students.

Out of all five cohorts under investigation, the lowest interview score from an applicant that was accepted onto the nursing programmes was 9/25. It could be argued that implementing a minimum interview score or 'not appointable' option could aid the School of Nursing in selecting students most likely to succeed. Yet, this individual completed their nursing programme within three years with an upper second-class honours degree. Considering that interviews have no power to predict those who will and will not complete the programme, this finding shows that even students with low interview scores can be successful in the programmes of study. This asks further questions about the reliability and validity of interviews for nursing programmes.

Selection for nursing programmes is an evolving issue, and the way in which interviews are conducted at Ulster University has changed since the data for this study was collected. Firstly the selection has changed from a face-to-face two panel interview, to an online recorded interview. The interview questions are less focused on prior health care experience and are based instead on the desirable attributes of a nurse which were identified by NIPEC (2014). This helps to ensure fairness for applicants with no prior health care experience. No online interview platform was being used by any nursing programme identified in the systematic review (Crawford et al. 2021) so it is not possible to ascertain the predictive validity of this method, yet the interview structure, comprising an applicant providing answers to predetermined questions, remains the same. It is therefore possible that the switch to an online interview has not changed the predictive validity of the interviews at Ulster University, although further statistical analysis using interview scores from these latest cohorts would be required to validate this claim.

Secondly, the screening of personal statements has been removed from the selection process. This means that applicants with low personal statement scores are no longer screened out, and considering that personal statements have no predictive validity with any programme outcomes, this is a welcome change. However, it means that there is now no initial filtering

system to reduce the numbers of applicants that are invited for an interview. Interviewing every applicant for these nursing programmes requires vast amounts of human resources to complete and places immense pressure on clinical and academic staff. This is further exasperated by the many applicants in Northern Ireland applying to both Queens University Belfast and Ulster University. However, within the new system, applicants do one interview and can still be considered as a candidate for both universities. The workload is now shared between interviewers across both universities, making this new process more efficient.

Student performance outcomes correlations

Although it was not initially part of the study design, this incidental finding evidenced that there were strong positive correlations between academic grades. The strongest correlation was between year one and three. This indicates that students' first-year grades is the best predictor for students' performance in year three.

This tells us two things. Firstly, it tells us that year one is the critical period for identifying and supporting students at risk of poor performance or failure. Attrition from nursing programmes is known to occur at its highest levels in semester one of year one (Donaldson et al. 2010, Rankin 2013, Elkins et al. 2015, Pitt et al. 2015), and many students may be missed for early supportive interventions if they must wait until the end of first year to be identified as being at risk. Agreement amongst academic staff would be needed on what constitutes an 'at risk' level of performance. In the UK, students are awarded an honours degree providing they pass all modules at forty percent or above. Any student who fails one or more modules in first year should definitely be identified for intervention, but perhaps other students would benefit from such supportive interventions also. For instance, students who surpass this 'at risk' level of performance, but who are not achieving their own academic goals, may not be given the opportunity of additional support (Seidman 2012).

Secondly, it tells us that interventions that effect an increase in the academic performance of students in year one should result in an increase in students' performance in years two and three. At present, students have access to support from Student Support, the faculty librarians and an academic studies adviser. Students can choose to utilise all or none of these support services as such university support services are not usually mandatory but are selectively sought by individual students who wish to avail of them. Wray et al. (2013) demonstrated that providing mandatory additional study skills tutorials can be beneficial to all students, not

just those who are motivated to avail of them. The benefits of such an approach were demonstrated by the lower levels of attrition and greater levels of self-referral to support services. This could be achieved through targeted support at or shortly after enrolment, thus intervening before failure has occurred. Yet, blindly targeting all students for interventions have implications for student and staff workload. Using resources to target those most at need of help would be of most benefit to all.

In summary, while some demographic characteristics and selection scores suggested correlations with student academic performance, the relationships were weak. Students' performance across the three years correlated strongly. It was felt necessary to identify the predictive validity of all variables combined in a bid to identify those which were most predictive of student academic outcomes.

5.5 Objective four: To design a selection model with the ability to predict programme outcomes.

To test the predictive validity of the variables collectively, those variables that met the requirements for inclusion in the path analysis were entered into the path model. This included the demographic characteristics (*Age, Gender, SES and SpLD*) and selection scores (*Personal Statement Scores, UCAS scores and Interview Scores*). Although it was clear that *Personal Statements* did not correlate with any student outcomes, it was still necessary to include it in the model due to its relationship with the demographic variable *Age* which showed that as age increased, so too did personal statement scores, though the difference in scores was small. All variables were tested collectively with *GPA 1*, then *GPA 2*, and finally *GPA 3*.

Greater combined variance could have assisted in predicting at which point during the course students could be assessed and identified as high risk for early and intensive intervention to help them succeed (Seidman 2012). However, the maximum variance in student outcomes explained by these variables was 10 percent and the model is unlikely to successfully identify those most likely to succeed, or those at most risk of failure. No one variable could be singled out as the main predicting factor of academic success or failure on the course.

The 10 percent variance is lower than that reported in other studies that tested combined selection methods and were able to reach 20 percent variance using selection methods alone (Cunningham et al. 2014, Hinderer et al. 2014). The differences could be explained by the

type of selection. Firstly, in the USA where these studies were conducted, there is more consistency in grading than in the UK, as grade point averages are scored similarly across schools and universities (Bennett et al. 2016). This consistency in grading may lead to greater correlation between grades before and after enrolment. An analysis kindly ran by Dr Mary Bennett (personal communication 10/12/2020), showed a significant correlation between prior GPA and third year nursing GPA with a large effect size of $r=.9$. This analysis was not initially part of their study design and was therefore not published in their original paper (Bennett et al. 2016). Secondly, the two studies that found a 20 percent variance in their research both used standardised admissions tests scores as part of their admission criteria. An integrative review to explore the predictive power of standardised admission tests was conducted by Twidwell and Records (2017). They found that the most predictive admissions test was the HESI-A2, but that most standardised admissions tests had moderate to large correlations with student outcomes, explaining between six and 51 percent of the variance. This proportion of variance is much greater than the proportion explained by the selection scores at Ulster University and may be suggestive of some benefit of standardised admissions tests for entry to pre-registration nursing courses.

Nursing-specific standardised admissions tests are based on and designed to correlate with nursing programme curriculums offered in the USA. Implementing such admissions tests that are linked with student outcome measures may be potential methods for increasing the predictive relationships between selection methods and programme outcomes at Ulster University. The clinical nature of the questions may serve as a better indicator of those who are likely to thrive in a nursing programme. While these standardised tests are not necessarily reflective of the outcomes of nursing programmes in the UK, tests could be developed for admissions to UK universities. While there are common elements between the nursing programmes delivered between the USA and UK, their structures are different. For example, USA programmes educate nursing students in all four fields of nursing during their degree (adult, mental health, learning disability and child), whereas the UK only educate nursing students in one field.

Traynor et al. (2019) recommended that psychometric tests like Nurse-match (presented in section 2.3) should be used for the initial screening of applicants for nursing programmes. They claimed that it is more successful in screening for values than personal statements and that it is less time consuming for academic staff. While its suitability and effectiveness has

been tested in two pilot studies for applicants to nursing programmes, its predictive validity has not been explored. Introducing admissions tests (either academic or psychometric) may create some additional concerns. Firstly, the tests may not comply with the NMC minimum standards for recruitment guidelines, where candidates are to be selected for their potential, not their current knowledge of the profession. Minimum standards, as stipulated by the NMC (2018a) to join the register, do not need to be reached until the end of the programme, apart from progress assessments throughout the course that ensure students are making adequate progress. Secondly, asking applicants to pay for standardised admissions tests can be perceived as non-inclusive, as some applicants may be unable to afford to sit the examination and are therefore excluded for this reason. Nurse-match, for example, would cost each applicant £30 (Traynor et al. 2019). Unless these costs are absorbed by the university, this may negatively impact diversity aims of nursing schools, considering that minority ethnic groups, those with disabilities (seen and unseen) and those with lower socio-economic status backgrounds are central to diversity (Kelly et al. 2018). Standardised admissions tests are subsequently referred to as ‘socio-economic tests’ by some authors (Westrick et al. 2021). This could also have implications for the success of widening access and participation policies, which aim to encourage applications from individuals who are typically underrepresented at university. Finally, admissions tests might create additional barriers for people with specific learning difficulties who may feel unable to attempt such tests without reasonable adjustments in place.

While there appears to be some merit in employing selection tests that link with course content (i.e., based on the nurse education curriculum), it is important all selection methods are accessible for all, free at the point of use and considerate of different learning difficulties adjustments, such as presenting data in different formats to meet the needs of people with specific learning difficulties. Any admissions test should be validated for its predictive power. Furthermore, the content of admissions tests should be scrutinised to ensure they do not test what’s already been assessed in prior academic achievement records such as GCSE maths or A-level biology (Emery and Bell 2009).

In summary, this study was unable to develop a useable and testable model that could predict student academic performance or course completion on the pre-registration nursing programmes at Ulster University. Primarily this was exemplified by the low amount of variance explained by the model, and the fact that no single demographic or selection method

stood out as the main contributor to this variance. It is necessary to continue to explore additional factors or characteristics that may have a greater influence on student academic performance, and parts of the answer may rest with academic performance in year one.

5.6 Objective five: To track students with specific learning difficulties and compare their academic outcomes to students without specific learning difficulties.

The prevalence of those with specific learning difficulties who were enrolled in the nursing programmes at Ulster University was presented under objective three. The larger attainment gap identified in year one will be discussed here.

The gap in academic performance between students with and without specific learning difficulties decreases as students' progress onwards from year one to the end of the course. It is possible that when the students first enrolled at university, some may not have been aware that they had a specific learning difficulty. This can occur as a result of limited funding in previous educational settings to offer educational psychologist assessments, meaning that some individuals were not referred for assessment for specific learning difficulties prior to university. It is also possible that students with milder forms of specific learning difficulties may have developed learning strategies that have allowed them to navigate the school system and complete academic assessments to the required level to make them eligible to apply for the nursing programmes at Ulster University. While these tactics may have been sufficient to complete and thrive in level three academic work, they may not be sufficient when undertaking work at university level. Students with undiagnosed specific learning difficulties would not have been offered adjustments or other support mechanisms until they were diagnosed later in the programme, which may have been reflected by poorer grades in year one. Typically, students who are unaware that they have specific learning difficulties are identified by academic staff following failures or poor performance in coursework or examinations. Early academic failures can be very disappointing and upsetting for students and lead to additional workloads for students and staff associated with repeat coursework assignments and examinations. Clearly, waiting until the end of first year, or after an initial failure, to be assessed as being 'at risk' would have implications for students with increased workload due to resitting assessments and a lack of confidence if they receive grades lower than their intelligence would suggest they should achieve. This emphasises the importance of early screening, referral and identification of people with specific learning difficulties to

ensure they receive the support they need to thrive in their academic career (Seidman 2012, Wray et al. 2013, Crawford et al. 2022).

The model of student retention proposed by Seidman (2012) recommends that students at risk of failure should be identified at enrolment using their prior academic achievement and demographic characteristics and given additional support. This suggests that student profiles and the overall process of selection should be used for more than simply deciding who is offered a position on an undergraduate programme. Nevertheless, identifying students considered ‘at risk’ may also have the unintended effect of making students feel like they are being singled out because of their specific learning difficulties, which they might prefer not to disclose to their peers. This could be mitigated by assuring confidentiality or offering support classes to all students. As remedial classes can be beneficial for all, regardless of demographic characteristics and selection scores, offering them to everyone has the added benefit of not singling out any one particular group of students for help. It also may encourage students with specific learning difficulties but who have chosen not to disclose this to the university to attend but still keep their diagnosis confidential. Seidman (2012) suggests that students who are not in need of assistance should not be made to take remedial classes. For example, he recommends that students who have passed and feel confident in certain aspects of their education, such as mathematics, but feel lacking in other areas, such as English language, should be able to attend classes that address their learning needs.

It should be noted that Seidman’s work stems from an American education system, where additional classes must be paid for by students in addition to their programme fees. This is the first time Seidman’s work has been used to guide research in the higher education system in the UK, where students do not pay to undertake pre-registration nursing programmes and where students do not pay for additional support services provided by the university either. As such students might be more keen to avail of additional support services within the UK system. Nevertheless, an undergraduate degree is a vast enterprise and undertaking additional classes that are not warranted adds unwanted stress to students’ existing heavy workload. There are no valid arguments for compulsory remedial classes for all students. One option could be to put the onus on the student to attend the remedial classes that they feel would address their learning needs. Classes that are open to all would not single anyone out and would offer intervention and academic support at an earlier time point, rather than waiting until the end of year one. It is possible that only the most dedicated students who want to

succeed will attend, but perhaps this explicitly sums up the ethos of a successful university student. It would also concentrate resources where necessary without adding additional workload to academic staff that is not warranted. In an effective pedagogic system, resources would be provided for academic staff to incorporate additional support interventions in their academic practice, and these workload implications would be acknowledged.

Seidman's model of student retention was identified as the theoretical underpinning for this PhD research and provided an excellent platform on which to guide the study. The aspect of the model that was chosen to underpin the work was part one, 'early and intensive intervention' to reduce the risk of attrition and to increase the rates of retention. Seidman refers to this as a 'pre-enrolment physical.' prior to enrolment.

This was used as a guide to review the demographic characteristics and selection scores of students for the pre-registration nursing programmes at Ulster University, with a view to identifying students who were 'at risk' of failure who would benefit from early and intensive support. Seidman's model challenges current practice of undergraduate education through advocating an earlier timepoint for assessment for at risk students. Students in undergraduate education are typically identified as 'at risk' through the assessment of examinations and assignments at the end of semester one, year one, when for some students, failure has already occurred.

This study was unable to identify a model with the ability to predict student outcomes at Ulster University, namely those at risk of failure. Considering that the findings of this PhD study identified GPA 1 as a more predictive point of assessment for students at risk of failure, a 'pre-enrolment physical' may not be possible which is a limitation to this model. In contrast, the Geometric Model of Student Persistence (Swail 2004) and the Theory of Individual Departure (Tinto 1987) have a greater focus on post-enrolment support for students, and highlight the institutional factors that may contribute to a student's success at university including student support services, and the relationship between students and academic staff. It is likely that the support provided by academic staff post enrolment would be more valuable in terms of identifying students who may be 'at risk' of failure, who would benefit from intervention. As such, these two models should be considered as a framework to guide future research in this area pertaining to the impact that ongoing academic support has on the educational journey of students in higher education.

In summary, the study identified that nursing students at Ulster University with specific learning difficulties perform almost on par with their peers who do not have specific learning difficulties. The greatest difference in academic achievement was seen in year one, and this gap had all but closed by years two and three of the programme. This highlights the importance of early intervention to help student succeed in their academic outcomes and indicates that the need for intervention should be identified by both the student and academic staff, so that the student who is deemed 'at risk' can be referred for support, or can refer themselves if they feel it is necessary to address their learning needs. A system of support such as this would need to be incorporated into and acknowledged in the workload of academic staff.

5.7 Summary

This chapter provided a collective discussion of all of the key findings of this PhD study which were discussed in relation to other relevant research, practices, policies and theory. The systematic review showed that cognitive selection methods were predictive of clinical and academic success in pre-registration undergraduate nursing programmes. The results of this PhD study largely support these findings. Non-cognitive selection methods are less predictive of success with the results of the systematic review indicating that there was no predictive power between interviews and outcomes, and that there was so little research into other non-cognitive measures such as personal statements that no conclusive argument could be made in favour of their use. This PhD study showed that personal statements had no predictive validity and that the predictive validity of UCAS scores and interview scores were low. However, the amount of predictive validity was practically the same, which tells us that rank ordering applicants should be based on a 50:50 weighting between interview scores and UCAS scores. This method would require development into a useable formula, and needs further statistical analysis to be conducted on subsequent cohorts that are selected in this way. No selection procedure will ever be completely accurate, but using one that is derived from statistical analysis is certainly defensible. Implementing this change at Ulster University would advantage those with higher prior grades more so than it does now, and considering that prior academic achievement is the post predictive element of programmes outcomes, this should be considered.

Ensuring the predictive validity of selection procedures is an important, nevertheless this must be considered in tandem with support for students once they have enrolled on the programme. The largest proportion of variance explained in terms of predicting student outcomes was between the students first and third year grades. The variance explained 50 percent of the grades in third year and mirrored the variance explained between some standardised admissions tests in the USA. Students with specific learning difficulties performed almost on par with their peers who did not have specific learning difficulties. There were no comparative studies to affirm these results, but the findings indicate that students may be benefiting from the reasonable adjustments put in place to mitigate against the effects of having specific learning difficulties. In conclusion, we have highlighted the importance of identifying students who perform poorly at the earliest opportunity to ensure that any support available to them is provided to address their learning needs.

The next chapter will provide the PhD study conclusion.

6 Chapter Six – Conclusion

This chapter will provide the overall conclusions to this study. It will present the study's contributions to knowledge and its strengths and limitations. It will identify the study's implications for future policy and practice and recommendations for further research before concluding with a full summary of the PhD study.

6.1 Contribution to knowledge

The contributions to knowledge generated by this PhD study have been disseminated in two article publications in high impact journals, the *Journal of Clinical Nursing* (impact factor: 3.036) and *Nurse Education Today* (impact factor: 3.442). These are readily accessible by educators in the field of nursing and have further been shared with colleagues through seminars and presentations at international nursing conferences. The study's contribution to knowledge will be presented on each study objective, considering the originality, significance, usefulness and relevance for each contribution.

Firstly, our systematic review of the literature is the first of its kind to consider statistical associations between selection criteria and progress outcomes for nursing students undertaking pre-registration nursing programmes. It provides insight into the types of selection criteria being used by nursing programmes across the world and their effectiveness in predicting student academic and clinical outcomes across all stages of the programme from enrolment to course completion. This is useful for universities when developing policies around selection processes for pre-registration undergraduate nursing programmes in relation to cognitive, non-cognitive and, as seen in paper one, combined screening methods.

Secondly, this study (to the best of our knowledge) is the first to highlight the differences between applicants who were offered a position on the pre-registration nursing programmes and those who were not. This unique exploration found that as applicants' age increased so too did their chance of enrolment, and while our study found that the proportion of male applicants to female applicants were low, it confirmed that there were no differences in the enrolment rates between male and female applicants. Importantly, we found that applicants with qualifications from further educational colleges were more likely to enrol than those with traditional school qualifications such as A-levels and ILCs. This is, therefore, the first study to generate knowledge in this area, provide a comprehensive profile of the applicants

for nursing programmes at one university in the UK and compare the profiles with those who successfully enrol. The findings will be useful for universities when designing and delivering targeted recruitment programmes to increase applications to the programmes from underrepresented groups, including male applicants.

Thirdly, this study incorporated a unique exploration of the demographic characteristics and selection methods used to admit students onto pre-registration nursing programmes in the UK. Until now it has been difficult to define or describe the demographic characteristics of students who are likely or unlikely to succeed or fail on these nursing courses. This study found that demographic characteristics (age, entry route, socio-economic status and specific learning difficulties) do have the ability to predict students' academic outcomes, as do UCAS and interview scores, but that the relationships are weak at best. This has provided unique insight into the factors that contribute to nursing students' success in their academic work and helped to develop the literature by providing a broader understanding of the value of selection processes across the globe. This will be important when considering the fairness of selection methods going forward and will help academic staff design selection methods that are fair and valid (paper two).

Fourthly, this is the first study to combine all demographic characteristics and selection methods into a model to assess the predictive validity of all variables combined. This work has helped us to gain a comprehensive understanding of how these variables work in tandem to influence student academic outcomes (paper two). The study has also led to an advancement in its methodology as it is the only study to explore the predictive validity of selection methods using path analysis, which has not been seen in previous research into nursing student selection. The study demonstrated that path analysis is a viable option to use when replicating this study design at other universities. More specifically, guided by the study methodology and applied in the discussion, this is the first time that the model of student retention by Dr Alan Seidman has been applied in a UK university setting with pre-registration nursing students.

Finally, we have extensively explored aspects of learning associated with people with specific learning difficulties, a field seriously under-researched, and we found that students with specific learning difficulties perform almost equally as well as students without specific learning difficulties, and the attainment gap narrows by the end of the programme. While previous research has focused on the clinical outcomes of students with specific learning

difficulties, this is the first study to explore their academic performance. This has enhanced our knowledge of the prevalence of students with specific learning difficulties in pre-registration nursing education and the impact that having specific learning difficulties has on academic outcomes in nursing programmes (paper 3). This will be useful in targeting students who have undiagnosed specific learning difficulties for referral and screening to ensure that reasonable adjustments are in place for those who will benefit from them to help them achieve their educational goals.

6.2 Strengths and limitations

Study strengths

The large samples used in part one ($n > 6000$) and two ($n > 1000$) and the multi-cohort design are evident strengths of this PhD study and has helped to assure the validity and reliability and enhanced generalisability and transferability of the findings.

A wide variety of demographic, selection and outcome variables were explored, which led to a thorough and comprehensive investigation of the factors that influence nursing students' academic outcomes. Existing research tended to focus only on the predictive validity of demographic characteristics or the selection methods, but rarely both. The combined variables approach is a strength of this study design. Combining the variables into a path model meant that the full influence of these factors could be measured together, and at various time points of the nursing programme. Their influence on programme outcomes was tested from 1st to 3rd year which gave a unique overview of the factors that influence nursing student programme outcomes.

The teams-based approach to this study led to a vast array of academics from various schools within Ulster University contributing to the overall study design. These academics, hailed from the School of Nursing and School of Sport, brought their own unique approach, research understanding and educational experience to the PhD process. The members of the supervision team and assessment team had a vast variety of research experience within and outside of the field of nursing and offered unique insights into the research process from their individual quantitative and/or qualitative research experience. These contributions were invaluable in assuring the quality of this PhD research study overall as well as the three publications.

The ‘*with publications*’ option of the PhD submission led to most of the study findings and discussions being double- and triple-blind peer reviewed prior to publication. The contributions of the reviewers further verified the quality of the papers through their advice and recommendations which the PhD researcher incorporated into the final paper submissions and ultimately the PhD thesis. Paper three was accepted with no editing requirements or recommendations and a personal email of congratulations from the editor of the journal, further reflecting the quality of the paper and thus the PhD thesis. One reviewer stated that the importance of the topic was well justified and that the concept of specific learning difficulties in higher education had not been well studied in prior research. Reviewers stated that the study was methodologically sound, well planned and that the reporting was clear. They agreed with the study limitations and recommendations for further research and concluded that no edits were required.

A person’s experience of university is about more than simply passing or failing their modules (Seidman 2012). His work into student retention suggested that student goal setting should form part of the academic journey to help students aim for whatever academic grades they wish to achieve. This premise as set out by Seidman helped to remove any pre-conceived ideas that a simple ‘pass’ at university level should be the benchmark for student attainment. It helped to develop the concept that university support services should be made available for all students who feel that they are at risk of not achieving their academic goals, and our study findings would support this suggestion.

Study limitations

Some limitations were specified in the study papers:

1. The systematic review potentially excluded other relevant literature by limiting the search period to ten years (paper 1).
2. The manual extraction of data may have led to some errors in the reporting of the findings of the systematic review (paper 1).
3. Where students with specific learning difficulties are concerned, they may choose not to disclose their diagnosis. It is possible that additional students had specific learning difficulties, but without their disclosure they could not be identified in the study (paper 3).

4. The study focused on students with specific learning difficulties as a whole, rather than their individual conditions, such as dyslexia. Providing condition-specific information of students with specific learning difficulties may have added further nuances to our understanding of this poorly researched area (paper 3).

Other PhD thesis limitations

In part one of the study, some data pertaining to the selection scores and entry routes were unavailable which meant that parts of the analysis (exploring the selection scores of those who were successful or unsuccessful at application in part one of the study) could not be conducted. Data pertaining to the *Entry Route* variable for applicants in part one of the study was missing in three out of the five year-cohorts and had to be excluded. This reduced the sample size from 6631 to 1823 and may have reduced the study rigour.

The study employed a retrospective approach to collection and analysis of data that had not originally been gathered for research purposes. Although the university admissions department gathering of this information was undertaken using a rigorous and therefore trustworthy process, the information associated with these variables were limited to the manner in which the information had been collected. For example, there was no information available pertaining to applicants' or students' ethnicity or religious background which would have offered important areas for exploration. Had this study been designed prospectively, the research team would have had greater freedom to stipulate what information could have been gathered, based on what would have been feasible within the duration of the PhD study resource limitations.

While this was a large-scale study conducted using multiple student cohorts, the single site design involving only one university potentially limits the generalisability of the findings. Nevertheless, this limitation is conceivably mitigated as some variables that possibly differ substantially between Ulster University and universities from other countries in the UK, in particular ethnicity, were not investigated.

6.3 Recommendations for policy and practice, and further research

Future policy and practice

The implications that this study raised highlighted the need for changes in future policy and practice. These are detailed below.

Implications for recruitment

This study showed that there is a lack of male students enrolled in pre-registration nursing programmes. New and innovative approaches may be needed to achieve enhanced recruitment of men into the nursing profession. To avoid practices that would see men get priority admission over women at selection, this work needs to be undertaken prior to the application phase. More financial and human resources could be allocated to target the recruitment of men and other groups of people who are underrepresented in the nursing programmes. Potential candidates should be approached early in their school education career such as year eight or nine of post primary education. The targeted interventions at Ulster University began in 2016 for the 2017 intake, which occurred after the final data collection point for this study. The impact of these interventions may be observed in years to come and academic staff should observe for any changes in the number of men applying for the programmes. This would indicate the effectiveness of these interventions and may guide universities of new changes or interventions that might be valuable. Such targeted interventions should also include students with previous degrees, considering their ability to outperform their peers without prior degrees. These students' prior experience of university education could be embraced and utilised as an asset to the entire cohort in the form of peer support.

Implications for selection

The results of this study confirm that personal statement scores do not predict student academic performance or course completion. Consequently, permanent discontinuation of the use of personal statements in selection at Ulster University should be considered. This recommendation is also supported by our systematic review findings that failed to identify any research to justify the continued use of personal statements in pre-registration nursing student selection.

The predictive validity of interviews is weak and their ability to predict those who will complete the programme non-existent. Yet, the selection process at Ulster University sees applicants with the highest interview scores being offered positions first, regardless of any other attributes or academic achievement. This study confirmed that a large number of applicants meet the criteria for an interview for the nursing programmes every year. As the courses are oversubscribed, less than a quarter of applicants who are interviewed ever commence the programme. Without a viable alternative to interviews at present, they should be retained as part of the admissions process at Ulster University, but less weight should be afforded to its influence over who is offered a position on the programmes. The statistical analysis in this study evidenced that UCAS scores had similar predictive power as interviews, thus both selection methods should be given equal weight in the decision to offer a person a place on the programmes. This would make UCAS scores a competitive part of the application process rather than simply being a criterion of minimum prior academic achievement.

Implications for education

Waiting for students to perform poorly and demonstrate academic struggles through failure is unfair, especially when students have a genuine unaddressed educational need. Interventions to address learning needs should be applied at the earliest opportunity, though identifying students at risk of failure at enrolment cannot be achieved with any great certainty. Pre-loading all students with additional study support is excessive, paternalistic and expensive, therefore students should be encouraged by academic staff and studies advisors to self-refer for additional supports. A person-centred methodology would allow students who feel they require additional support to access it in a timely manner and leads to the most efficient use of resources. The resolve is to permit (and encourage) students to avail of the support that they believe will be beneficial to their learning and help to build a foundation strong enough to support the building blocks of degree level education and beyond to help them achieve their educational goals. Resources should be provided within the school for these additional supports that should be individualised and based on student need such as remedial classes or personal tuition from academic staff.

Further research

Based on our research we make the following recommendations for further research.

1. The findings showed that males represent only 9% of applicants for the pre-registration programmes of nursing. While several local and national initiatives were discussed in relation to increasing the numbers of male applicants, the impact of these has not been validated. Future research should focus on exploring the effectiveness of local interventions and initiatives that aim to encourage more male applicants to apply for pre-registration nursing programmes.
2. The findings also highlighted the necessity to explore why there is an association between increasing age and success at application, and if bias in favour of age (on the part of the interviewer) plays a role in this. This could be conducted through qualitative interviews with experienced interview panellists from the School of Nursing at Ulster University and trust representatives.
3. There is also work to be done in terms of the application process within universities. As this study identified that applicants with qualifications traditionally obtained at further education colleges were more likely to commence the course, the preparation for the application process at these institutions should be explored with a view to identify best practice guidelines in pre-university preparation.
4. To continue to develop the evidence base into the selection methods that can predict student performance, data from schools of nursing of other UK universities should be explored. This would strengthen the reliability and validity of the selection criteria that they are already using. In particular, more evidence is needed to justify the continued use of non-cognitive screening methods such as face-to-face interviews, psychometric tests and personal statements. The student outcomes should include clinical outcomes as well as academic grades and completion rates, considering that clinical outcomes encompass 50% of the programme. This would only be possible in universities that had a greater variance in outcomes (not just successful/not successful) for students' clinical assessments. Any research into this topic would have to consider the well-known difficulties associated with clinical practice assessment that potentially include bias and inconsistency among assessors.

5. Research could be undertaken to design a process that would allow academic staff, as early as possible in year one, to identify the students who are at increased risk of discontinuation from their nursing programme due to clinical and/or academic failure. Early interventions to meet such students' needs may go a long way in mitigating poor student performance and consequently minimise attrition.
6. Further research should explore how underrepresented students experience university nurse education, and what support services or other educational practices they believe would be beneficial to their learning. This could be explored through individual interviews with students in 'at risk' categories (such as students with specific learning difficulties). Students could also be asked to keep a diary of their experiences. This will help to inform the support offered to 'at risk' students and help to identify barriers that prevent students with specific learning difficulties availing of these interventions. Respondents should be recruited from all year-groups to identify how learning needs and support may change over the course of the three-year degree programme.
7. This study did not investigate the uptake of reasonable adjustments by students with specific learning difficulties, nor did it consider the assessment or decision-making processes of the student support services on how these reasonable adjustments are decided. These would be important areas for further research.
8. This study considered only the binary variable 'completion/non-completion' without considering the timepoints at which students discontinued their studies. While it is known that attrition rates are highest in semester one of year one, less is understood as to why this is. Future research could consider what factors are influencing students decisions to leave the programmes to gain a deeper understanding of the thought processes and judgements that students employ during the process of leaving the course.
9. The systematic review identified that standardised admissions tests may have value in helping to select candidates that are capable of completing the programme. Future research could focus on developing an admissions test for pre-registration undergraduate nursing programmes that correlates with programme outcomes and conduct a longitudinal study to identify its predictive validity as a selection method.

6.4 Overall conclusion

Nurses represent around 50 percent of the global healthcare workforce, and there are few professions whose contribution to the health and wellbeing of the population are so crucial. As such, increasing the numbers of pre-registration nursing students who complete the course should be a priority as this would increase the numbers of qualified nurses available and consequently help to counteract the predicted global shortages of nurses. It is imperative that nurse educators have an understanding of the factors that can influence nursing students' academic performance at university. Having this knowledge, academic staff can target students who are at risk of academic failure or attrition to provide them with early, intensive and continuous interventions to help them complete the course and achieve their academic goals.

As such, this study aimed to review the demographic characteristics and selection scores of the applicants and students for the undergraduate nursing programmes at Ulster University with the intention of constructing a model that could predict programme outcomes. The model was able to explain a small proportion of the variance in academic outcomes, but this was not enough to identify a clear selection model that could be adopted by the university to confidently predict academic outcomes. In an ideal world, universities would be able to select students who are most likely to succeed clinically and academically, and on the basis of the evidence, selection should be guided by cognitive selection methods such as prior academic achievement and admissions tests.

Given the need to produce a quality nursing workforce that is diverse and responsive to the needs of the population, the selection processes at universities should be transparent, fair, reliable and valid. No selection process should favour one group of individuals over another, and recruitment strategies should target groups of students who are less likely to apply for a position on a nursing programme, such as males. Widening access and participation policies should encourage applications from non-traditional students and targeting minority groups at the recruitment stage should encourage more applications from these individuals.

Decisions about who to admit onto a nursing programme should be based on evidence as opposed to gut instinct or the expert judgement or experience of academic or clinical staff. The findings of this study provide some new evidence on the validity of selection criteria,

however the search for a more predictive method of selection should continue through further research.

As attrition remains a major problem for universities and subsequently the nursing profession, educators must respond promptly to our new evidence on the need for early assessment of learning needs, with corresponding response through support mechanisms. While this PhD study could not develop a feasible model that could reliably predict students who may be *'at-risk,'* it did evidence the need for a package of assessment strategies and response interventions *as early as possible* in year one. We strongly recommend the collaboration with students in ensuring that such a process is operative and successful. As students with specific learning difficulties perform academically as well as students without specific learning difficulties, students with specific learning difficulties should be able to benefit from this package of support mechanisms also, *in addition* to any condition-specific learning interventions needed. For such a programme of support to be successful, academic staff must raise awareness of the support services available for all students regardless of a diagnosis of specific learning difficulties, and in turn, academic staff must be allocated the workload associated with this important pedagogic work.

Summa summarum, all objectives and thus the aim of this PhD study have been met. We designed these objectives to address the gaps in the knowledge and research bases that were identified through literature searches and our own systematic review. We have presented the contributions of our PhD study to educational practice, and, based on our findings, we have presented succinct recommendations for policy, practice and future research.

6.5 Personal reflection

This personal reflection will focus on the lessons learnt throughout this study and the PhD researchers plans for future research.

Lessons learnt

For me, this PhD has been an incredible learning experience. My background as a clinical research nurse had shown me the benefits that research and education brought to the lives of the patients in my care. I was fully committed to the development of practice through

research and wanted to develop the skills necessary to become more involved in the research process. My clinical role gave me what I considered to be a reasonable amount of research experience, although this was limited to the ethical approval and data collection aspects of the research process, as well as team leadership and patient advocacy. While this helped to give me a realistic expectation of what could be achieved during a three year PhD by one small team of researchers, I was yet to encounter the wider aspects of the research process. This included the study design, dissemination of results, and the decision making responsibilities involved in leading a study.

Decision making was an area of great personal growth for me. Having the freedom to be guided by the literature and make decisions about the direction the research was going in was an entirely new concept. It was something I had previously watched other researchers do, but had never been actively involved in. Researchers must be able to make sound decisions based on the best evidence or information available to them at the time and this was the first area I felt I needed to assume responsibility for. I liken this process to that of actively moving from the role of a passenger in a car, to that of a driver. I also learnt the value that individuals from different backgrounds and with varying amounts of research experience can bring to a study. Research funders are increasingly advocating for the inclusion of patient or public involvement in research, with the understanding that it may improve the overall research design, conduction and dissemination of results (Staley 2015, Boivin et al. 2018). I regret that patient and public involvement was not something that I considered for this research. As my PhD progressed I developed an understanding of the benefits of public involvement and how it has the potential to bring true value to the research process. Now that the study is completed, it will never be clear how patient and public involvement could have influenced this research, or how the study may have changed in response to the input and recommendations made. As a researcher, patient and public involvement is certainly something I will be taking forward to consider for inclusion for future projects.

Future research plans

One recommendation from this PhD research that I will be developing through postdoctoral study involves exploring how underrepresented groups of pre-registration nursing students experience the academic aspect of their education, and the support services that they believe would be beneficial to their educational journey (recommendations 6 and 7 - section 6.3).

This will involve conducting face-to-face interviews with students with SpLDs across all three years of the degree programme. The findings of this investigation could be used to inform the support offered to this cohort of students and help to identify barriers that prevent students with SpLDs availing of these interventions. While this PhD study did not include any element of qualitative research, I believe the overall experience of completing a PhD, and training I received throughout, has taught me how to approach different types of methodology. I have also learned to trust experienced researchers and will glean from their insight when embarking on research methodologies that are unfamiliar to me.

By the grace of God I look forward to the opportunity to serve people through research and education for many years to come.

References

Ahmad, M. Safadi, R. (2009) Entry Criteria and Nursing Students' Success. *Jordan Medical Journal*, 43 (3) pp.189 – 196.

Aiken, L.H. Sloane, D.M. Bruyneel, L. Van den Heede, K. Griffiths, P. Busse, R. Diomidous, M. Kinnunen, J. Kózka, M. Lesaffre, E. McHugh, M.D. Moreno-Casbas, M.T. Rafferty, A.M. Schwendimann, R. Scott, P.A. Tishelman, C. Van Achterberg, T. Sermeus, W. (2014) Nurse staffing and education and hospital mortality in nine European countries: a retrospective observational study. *The Lancet*, 383 (9931) pp.1824-1830.

Al-Alawi, R. Oliver, G. Donaldson, J. (2020) Systematic review: Predictors of students' success in baccalaureate nursing programs. *Nurse Education in Practice*. Available at: <https://doi.org/10.1016/j.nepr.2020.102865> [Accessed 7th September 2020].

Ambani, Z. Kutney, A. Lake, E.T. (2020) The nursing practice environment and nurse job outcomes: A path analysis of survey data. *Journal of Clinical Nursing*. 29, pp. 2602–2614.

American Association of Colleges of Nursing (2019) Nursing Faculty Shortage. Available at: <https://www.aacnnursing.org/News-Information/Fact-Sheets/Nursing-Faculty-Shortage> [Accessed 7th March 2022].

Anand, A. (2018) Attrition Rate and Reasons for Attrition in Medicals Schools Worldwide - an Analysis. *Texila International Journal of Basic Medical Sciences*. 3 (1) pp. 1 – 7.

Asghar, Z.B. Siriwardena, A.N. Elfes, C. Richardson, J. Larcombe, J. Neden, K.A. Salim, A. Smailly, D. Blow, C. (2018) Performance of candidates disclosing dyslexia with other candidates in the UK medical licensing examination: cross-sectional study. *Postgraduate Medical Journal*. 94, pp.188-203.

Audet, L. Bourgault, P. Rochefort, C.M. (2018) Associations between nurse education and experience and the risk of mortality and adverse events in acute care hospitals: A systematic review of observational studies. *International Journal of Nursing Studies*, 80, pp. 128-146.

Bala, L. Pedder, S. Sam, A.H. Brown, C. (2021) Assessing the predictive validity of the UCAT—A systematic review and narrative synthesis. *Medical Teacher*. Ahead of print.

Barmby, P. Bolden, D. Higgins, S. Tymms, P. (2012) Predicting success on a Bachelor of Arts Primary Education degree course. *Educational Research*, 54, pp. 323-330.

Barrett, D. and Nobel, H (2019) What are cohort studies? *Evidence Based Nursing*. 22 (4) pp. 95 – 96.

Belfast Metropolitan College (2022) *Healthcare Practice – Health and Social Care (online)*. Available at: <https://www.belfastmet.ac.uk/course-detail/21-22/p00190-aa/healthcare-practice-health-social-care-hnc-level-4-ft-millfield/> [Accessed 16th January 2022].

Bennett, M. Borman I. Lovan, S. Cobb, B. (2016) Pre-admission Predictors of Student Success in a Baccalaureate of Science in Nursing Program. *Journal of Nursing Regulation*, 7 (3) pp. 11 – 18.

Bird, E. (2017) Will nursing apprenticeships mark the end of the university nursing degree? (online) available at : <https://www.nursinginpractice.com/professional/will-nursing-apprenticeships-mark-the-end-of-the-nursing-university-degree/> [Accessed 30th January 2022].

Boivin, A. Richards, T. Forsythe, L. Grégoire, A. L'Espérance, A. Abelson, J. & Carman, K. L. (2018) Evaluating patient and public involvement in research. *BMJ*, 363.

Brimble, M.J. (2013) Does entry route really affect academic outcome? Academic achievement of traditional versus non traditional entrants to BN(Hons) pre-registration nursing programmes. *Journal of Further and Higher Education*, 39 (3) pp. 379 – 398.

British Dyslexia Association (2019) Understanding Neurodiversity; A guide to SpLDs. Available at: https://cdn.bdadyslexia.org.uk/documents/Dyslexia/A_Guide_to_SpLD_2nd_ed.pdf?mtime=20190410221939&focal=none [Accessed 26th April 2021].

British Dyslexia Association (2020) Available at: <https://www.bdadyslexia.org.uk/dys>

lexia/neurodiversity-and-co-occurring-differences [Accessed 8th October 2020].

Browne, T., Slark, J. and Ward, K. (2020) How can you tell your nursing student has chosen the wrong vocation? An integrative literature review. *Nurse Education Today*, 93, pp. 1 – 9.

Budu, H.I., Abalo, E.M., Bam, V.B. Agymag, D.O., Noi, S., Budu, F.A., Peprah, P. (2019) “I prefer a male nurse to a female nurse”: patients’ preference for, and satisfaction with nursing care provided by male nurses at the Komfo Anokye teaching hospital. *BMC Nursing* 18 (47) pp. 1 – 9.

Bulfone, G. D. E. Maria, M. Maurici, M. Macale, L. Sili, A. Vellone, E. Alvaro, R. (2021) Academic failure and its predictors in baccalaureate nursing students: A longitudinal study. *Journal of Clinical Nursing*. 30, pp. 1953 – 1962.

Callwood, A., Cooke, D., Bolger, S., Lemanska, A. Allan, H. (2018) The reliability and validity of multiple mini interviews (MMIs) in values based recruitment to nursing, midwifery and paramedic practice programmes: Findings from an evaluation study. *International Journal of Nursing Studies*, 77, pp. 138-144.

Callwood, A., Groothuizen, J.E., Lemanska, A. Allan, H. (2020) The predictive validity of Multiple Mini Interviews (MMIs) in nursing and midwifery programmes: Year three findings from a cross-discipline cohort study. *Nurse Education Today*, 88, pp. 1-8.

Capponi, N. Mason Barber, L.A. (2020) Undergraduate nursing program admission criteria: A scoping review of the literature. *Nurse Education Today*, 92, pp.1 – 14.

Carter, B.M. Powell, D.L. Derouin, A.L. Cusatis, J. (2015) Beginning With the End in Mind: Cultivating Minority Nurse Leaders. *Journal of Professional Nursing*, 31 (2) pp. 95 – 103.

Castellan, C. (2010) Quantitative and Qualitative Research: A View for Clarity. *International Journal of Education*, 2 (2) pp. 1 – 14.

Chang, H.E. Jeong, S. (2021) Male Nurses’ Experiences of Workplace Gender Discrimination and Sexual Harassment in South Korea: A Qualitative Study. *Asian Nursing Research*. 15, pp. 303 – 309.

Chen, F. Curran, P.J. Bollen, K.A. Kirby, J. Paxton, P (2008) An Empirical Evaluation of the Use of Fixed Cut-off Points in RMSEA Test Statistic in Structural Equation Models. *Sociological Methods in Research*. 36 (4) pp. 462–494.

Cheng, V. Catline, J (2015) The role of resilience, delayed gratification and stress in predicting academic performance. *Psychology Teaching Review*. 21 (1) pp.13-23.

Clifton, A. Crooks, S, Higman, J. (2020) Exploring the recruitment of men into the nursing profession in the United Kingdom. *Journal of Advanced Nursing*. 76, pp. 1879 – 1883.

Clifton, A. Higman, J. Stephenson, J. Navarro, A.R. Welyczko, N. (2018) The role of universities in attracting male students on to pre-registration nursing programmes: An electronic survey of UK higher education institutions. *Nurse Education Today*, 71, pp. 111 – 115.

Clouder, L., Karakus, M., Cinotti, A. (2020) Neurodiversity in higher education: a narrative synthesis. *Higher Education*, 80, pp.757–778.

Coates, A. (2012) The Prevalence of Philosophical Assumptions Described in Mixed Methods Research in Education. *Journal of Mixed Methods Research*, 15 (2) pp. 171-189.

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences*, 2nd ed. Hillsdale, NJ: Lawrence Erlbaum Associates.

Collins, S. and Hewer, I. (2014) The impact of the Bologna process on nursing higher education in Europe: a review. *International Journal of Nursing Studies*, 51(1), pp. 150-156.

Craft, J.A. (2018) Academic performance of low SES students at an Australian university satellite campus. *Studies in Higher Education*, 44(8), pp. 1372-1385.

Crawford, C, Black, P, Melby, V. Fitzpatrick, B. (2021) An exploration of the predictive validity of selection criteria on progress outcomes for pre-registration nursing programmes— A systematic review. *Journal of Clinical Nursing*, 30, (17-18), pp. 2489-2513.

Crawford, C. Black, P. Melby, V. Fitzpatrick, B. (2022) The academic journey of students with specific learning difficulties undertaking pre-registration nursing programmes in the UK: A retrospective cohort study. *Nurse Education Today*, 111, pp. 1- 7.

Creswell, J.W. (2018) *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. 5th ed. USA, SAGE Publications Inc.

Crouch, A.T. (2019) Perceptions of the possible impact of dyslexia on nursing and midwifery students and of the coping strategies they develop and/or use to help them cope in clinical practice. *Nurse Education in Practice*, 35, pp. 90 – 97.

Cunningham, C. Manier, A. Anderson A. Sarnosky K. (2014) Rational Versus Empirical Prediction of Nursing Student Success. *Journal of Professional Nursing*, 30 (6) pp.486 – 492.

Dante, A., Ferrao, S., Jarosova, D., Lancia, L., Nascimento, C., Notara, V., Pokorna, A., Rybarova, L., SkelaSavic, B. Palese, A. (2016) Nursing student profiles and occurrence of early academic failure: Findings from an explorative European study. *Nurse education today*, 38, pp. 74-81.

Dante, A., Petrucci, C. & Lancia, L. (2013) European nursing students' academic success or failure: A post-Bologna Declaration systematic review, *Nurse education today*, 33, (1), pp. 46-52.

Dawkins, D. (2021) Recruitment and Retention of Minority High School Students to Increase Diversity in the Nursing Profession. *Nursing Clinical of North America*. 56 (3) pp. 427 – 439.

Del Mar, C., Hoffmann, T. Glasziou, P. (2013). *Information needs, asking questions, and some basics of research studies. Evidence-Based Practice across the Health Professions*. 2nd ed. Chatswood, Sydney: Churchill Livingstone, Elsevier.

Díaz, M. Sanches, A. Tanguma, J. (2012) Predictors of success for Hispanic nursing students in the first BSN course. *Hispanic Healthcare International*, 10 (2) pp.84 – 92.

Disability Discrimination Act (1995) (online) Available at:
<https://www.legislation.gov.uk/ukpga/1995/50/contents> [Accessed 11th November 2020].

Donaldson, J.H., McCallum, J. and Lafferty, P. (2010) Can we predict successful completion of the common foundation programme at interview? *Nurse Education Today*, 30 (7) pp. 649-656.

Elkins, N. (2015) Predictors of Retention and Passing the National Council Licensure Examination for Registered Nurses. *Open Journal of Nursing*, 5 (3) pp. 218-225.

Ellis, R. Griffiths, L. Higard, E. (2015) Constructing the Nurse-Match Instrument to Measure Professional Identity and Values in Nursing. *Journal of Nursing and Care*, 4 (245) pp. 1-10.

Emery, J.L. Bell, J.F. (2009) The predictive validity of the BioMedical Admissions Test for pre-clinical examination performance. *Medical Education*. 43 (6) pp. 557 – 564.

Equality Act (2010) (online) available at:
<https://www.legislation.gov.uk/ukpga/2010/15/contents/enacted> [Accessed 8th October 2019].

Eva, K. Rosenfeld, R. Reiter, H.I. Norman, G.R. (2004) An admissions OSCE: the multiple mini-interview. *Medical Teacher*. 38, pp.314–326.

Evans, W. (2014) “If they can't tell the difference between duphalac and digoxin you've got patient safety issues “. Nurse Lecturers' constructions of students' dyslexic identities in nurse education. *Nurse Education Today*, 34 (6), e41-e46.

Feng, C. Wang, H. Lu, N. Tu, X.M. (2013) Log transformation: application and interpretation in biomedical research. *Statistics in Medicine*. 32, pp. 230–239.

Field, A. (2018) *Discovering statistics using IBM SPSS statistics*, 5th ed. SAGE Publications, London.

Fisher, M.J. Marshall, A.P. (2009) Understanding descriptive statistics. *Australian Critical Care*. 22(2) pp.93-97.

Francis, R. (2013) *The Mid Staffordshire HNS Foundation Trust Public Enquiry*. The Stationary Office, London.

Freeman, J.C. Ali, A. (2017) Academic Support Programs Utilized for Nursing Students at Risk of Academic Failure: A Review of the Literature. *Nursing Education Perspectives*, 38 (2) pp. 69-74.

Gale, J., Ooms, A., Grant, R., Paget, K. and Marks-Maran, D. (2016) Student nurse selection and predictability of academic success: The Multiple Mini Interview project. *Nurse Education Today*, 40, pp. 123-127.

Gallagher, J.E. Niven, V. Donaldson, N. and Wilson, N.H.F. (2009) Widening access? Characteristics of applicants to medical and dental schools, compared with UCAS. *British Dental Journal*, 207 (9), pp. 433-445.

Garson, G. (2018) *Path Analysis*. USA, Statistical Associates.

Gartrell, K. Kent, V. Rock, M. Williams-Cooper, K. Curran, M.S. Durry, A. Necker, B. Armstrong, L. and Mark, H. (2020) Preadmission predictors for first semester course success in a baccalaureate nursing program. *Journal of Professional Nursing*, 36 (5) pp. 322-329.

Gill, T. Vidal Rodeiro, C.L. (2014) *Predictive validity of level 3 qualifications: Extended Project, Cambridge Pre-U, International Baccalaureate, BTEC Diploma*. Cambridge Assessment Research Report. Cambridge, UK, Cambridge Assessment.

Gioacchino Gelo, O. C. (2012) On research methods and their philosophical assumptions: "Raising the consciousness of researchers" again. *Psychotherapie und Sozialwissenschaft: Zeitschrift für Qualitative Forschung und klinische Praxis*, 14 (2) pp. 111–130.

Glazer, G., Clark, A., Bankston, K., Danek, J., Fair, M. and Michaels, J. (2016) Holistic Admissions in Nursing: We Can Do This. *Journal of Professional Nursing*, 32 (4) pp. 306-313.

Glerean, N. Hupli, M. Talman, K. Haavisto, E. (2017) Young peoples' perceptions of the nursing profession: An integrative review. *Nurse Education Today*. 57, pp. 95 – 102.

Goduka, N. (2012) From positivism to indigenous science: a reflection on world views, paradigms and philosophical assumptions. *Africa Insight*, 41 (4) pp. 123-137.

Gravetter, F.J. Wallnau, L.B. (2017) *Statistical Behavioral Sciences*. 10th ed. USA, Cengage.

Grech, V. and Calleja, N. (2018) WASP (Write a Scientific Paper): Parametric vs. non-parametric tests. *Journal of Early Human Development*. 123, pp. 48-49.

Groothuizen, J. Callwood, A. Gallagher, A. (2018) What is the value of Values Based Recruitment for nurse education programmes? *Journal of Advanced Nursing*, 74 (5) pp. 1068-1077.

Groothuizen, J.E. Callwood, A. Gallagher, A. (2018) What is the value of Values Based Recruitment for nurse education programmes? *Journal of Advanced Nursing*, 74, pp.1068–1077.

Hair, J.F. Black, W.C. Babin, B.J. Anderson, R.E. (2019) *Multivariate Data Analysis*. 8th ed. Cengage, United Kingdom.

Halpenny, D. Cadoo, K. Halpenny, M. Burke, I. Torreggiani, W.C. (2010) The Health Professions Admission Test (HPAT) score and leaving certificate results can independently predict academic performance in medical school: do we need both tests? *Irish Medical Journal*, 103 (10) pp. 300-302.

Hamshire, C. Kack, K. Forsyth, R. Langan, M, Harris, W. (2019) The wicked problem of healthcare student attrition. *Nursing Inquiry*. 28, pp.1 – 8.

Hamshire, C. Willgoss, T.G. Wibberly, C. (2013) Should I stay or should I go – A study exploring why health care students consider leaving their programme. *Nurse Education Today*, 33, pp. 889 – 895.

Harris, C. (2018) Reasonable adjustments for everyone: Exploring a paradigm change for nurse educators. *Nurse Education in Practice*, 33, pp. 178 – 180.

Heaslip, V. Board, M. Duckworth, V. Thomas, L. (2017) Widening participation in nurse education: An integrative literature review. *Nurse Education Today*, 59, pp. 66-74.

Hendricks, S.M. Krothe, J.S. (2014) Outcomes and Lessons Learned Regarding the Use of Interviewing for Baccalaureate Nursing School Admission. *Journal of Professional Nursing*, 30 (5) pp. 392-398.

Hinderer, K.A. Dibartolo, M.C. Walsh, C.M. (2014) Hesi Admission Assessment (A(2)) Examination Scores, Program Progression, and Nclex-Rn Success in Baccalaureate Nursing: an Exploratory Study of Dependable Academic Indicators of Success. *Journal of Professional Nursing*, 30 (5) pp. 436-442.

House, S.L. Sturgeon, L. Garrett-Wright, D. and Blackburn, D. (2015) BSN Admission Group Interviews: Perceptions of Students, Faculty, and Community Nurses. *Nursing Education Perspectives*, 36 (1) pp. 58-59.

Ijpelaar, J. Power, T, and Green, B. (2017) Northern Ireland Multiple Deprivation Measure. *Journal of the Statistical and Social Inquiry of Ireland*. 48, pp.163-174.

Information Commissioner's Office (2021) Guide to the General Data Protection Regulation (online) Available at: <https://ico.org.uk/for-organisations/guide-to-data-protection/guide-to-the-general-data-protection-regulation-gdpr/exemptions/> [Accessed 4th August 2022].

Ingham-Broomfield, R. (2016) A nurses' guide to the hierarchy of research designs and evidence. *Australian Journal of Advanced Nursing*, 33 (3) pp.38-43.

Irvine, S. Williams, B. Smallridge, A. Solomonides, I. Gong, Y.H. and Andrew, S. (2021) The self-regulated learner, entry characteristics and academic performance of undergraduate nursing students transitioning to University. *Nurse Education Today*, 105, e:105041.

J.J. Zerwic, L.D. Scott, L.L. McCreary, C. Corte. Programmatic evaluation of holistic admissions: The influence on students. *Journal of Nursing Education*, 57 (7) pp. 416-421.

- Jones-Schenk, J. Harper, M. (2014) Emotional Intelligence: An admission criterion alternative to cumulative grade point average for prelicensure students. *Nurse Education Today*, 34, pp. 413 – 420.
- Kale, S., Kamble, M.W. Spalding, N. (2020) Predictive validity of multiple mini interview scores for future academic and clinical placement performance in physiotherapy, occupational therapy and speech and language therapy programmes. *International Journal of Therapy and Rehabilitation*, 27 (4) pp. 1-13.
- Kelly, M. Patterson, F. O’Flynn, S. Mulligan, J. Murphy, A. (2018) A systematic review of stakeholder views of selection methods for medical school admission. *BMC Medical Education*, 18 (139) pp. 1 – 26.
- Kenny, A. Kidd, T. Nankervis, K. Connell, S. (2011) Mature age students access, entry and success in nurse education: An action research study. *Contemporary Nurse*, 38 (1-2) pp. 106 – 118.
- Keogh, B (2013) *Review into the quality of care and treatment provided by 14 hospital trusts in England: overview report*. London.
- Kim, J.S. (2019) Emotional Labour Strategies, Stress, and Burnout Among Hospital Nurses: A Path Analysis. *Journal of Nursing Scholarship*. 52 (1) pp. 105 – 112.
- Kühnast, C. Neuhäuser, M. (2008) A note on the use of the non-parametric Wilcoxon-Mann-Whitney test in the analysis of medical studies. *German Medical Science*. 7 (6) pp. 1-5.
- Lahtinen, P. Leino-Kilpi, H, Salminen, L. (2014) Nursing education in the European higher education area — Variations in implementation. *Nurse Education Today*. 34, pp. 1040 – 1047.
- Lakens, D. (2013) Calculating and reporting effect sizes to facilitate cumulative science: a practical primer for *t*-tests and ANOVAs. *Frontiers in Psychology*. (online) Available at: <https://www.frontiersin.org/articles/10.3389/fpsyg.2013.00863/full> [Accessed 20th February 2022].

Lancia, L. Petrucci, C. Giorgi, F. Dante, A. Grazia-Cifone, M. (2013) Academic success or failure in nursing students: Results of a retrospective observational study. *Nurse Education Today*, 33, pp.1501 – 1505.

Lauder, M. (2019) Record number of men applying for nursing courses following recruitment drive. *Nursing in Practice* (online). Available at: <https://www.nursinginpractice.com/latest-news/record-number-of-men-applying-for-nursing-courses-following-recruitment-drive/> [Accessed 23rd March 2022].

L'Ecuyer, K.M. (2019) Clinical education of nursing students with learning difficulties: An integrative review (part 1). *Nurse Education in Practice*, 34, pp. 173-184.

Liao, L. Sun, X. Yu, H. Li, J. (2016) The association of nurse educational preparation and patient outcomes: Systematic review and meta-analysis. *Nurse Education Today*, (42) pp. 9-16.

Lui, X. Codd, C. Mills, C. (2018) Incremental Effect of Academic Predictors on Nursing Admission Assessment. *Nurse Educator*, 43 (6) pp. 292 – 296.

Mahdavi, P. Valibeygi, A. Moradi, M (2021) Relationship Between Achievement Motivation, Mental Health and Academic Success in University Students. *Community Health Equity Research and Policy*, 0 (0) pp. 1-7.

Marcelin, J.R.Siraj, D.S. Victor, R. Kotadia, S. Maldonado, Y.A. (2019) The Impact of Unconscious Bias in Healthcare: How to Recognize and Mitigate It. *The Journal of Infectious Diseases*, 220 (2) pp. 62 – 73.

McLaughlin, K. Muldoon, O.T. Moutray, M. (2010) Gender, gender roles and completion of nursing education: A longitudinal study. *Nurse Education Today*, 30 (4) pp. 303 – 307.

McNeill, C., Erskine, A., Ellis, R. Traynor, M. (2018) Developing nurse-match: A selection tool for evoking and scoring an applicant's nursing values and attributes. *Nursing Open*, 6 (1) pp. 59-71.

Medentry (2022) UCAT Preparation (online). Available at: <https://www.medentry.co.uk/ucat> [Accessed 23rd March 2022].

Mesel, T. (2012) The necessary distinction between methodology and philosophical assumptions in healthcare research. *Scandinavian Journal of Caring Sciences*, 27 (3) pp. 750 – 756.

Mitchell, K.M. Baxter, C.E. Gural, D.M. Chorney, M.A. Simmons-Swinden, J.M. Queau, M.L. Nayak, N. (2021) Strategies for retention of nursing students: A scoping review. *Nurse Education in Practice*, 50, pp. 1 – 9.

Moher, D. Liberati, A. Tetzlaff, J. Altman, D. PRISMA Group. (2009) Preferred reporting items for systematic reviews and meta-analyses: The PRISMA Statement. *Annals of Internal Medicine*. 151 (4) pp. 264 – 269.

Mooring, Q.E. (2016) Recruitment, advising, and retention programs - Challenges and solutions to the international problem of poor nursing student retention: A narrative literature review. *Nurse Education Today*, 40, pp. 204-208.

Moss, S. (2016) Fit indices for structural equation modelling (online). Available at: <https://www.sicotests.com/psyarticle.asp?id=277> [Accessed 22nd March 2021].

Murphy, S., Klieger, D., Borneman, M. Kuncel, N. (2009) The Predictive Power of Personal Statements in Admissions: A Meta-Analysis and Cautionary Tale, *College and University*, 84 (4) pp. 83-86.

Nagelsmith, L. Bryer, J. Yan, Z. (2012) Measuring Motivation and Volition of Nursing Students in Nontraditional Learning Environments. *Journal of Nursing Measurement*, 20 (2) pp. 90-112.

National Health Service (2011) *The 10 Essential Shared Capabilities for Mental Health Practice: Learning Materials (Scotland) 2011 Version*. NHS Education Scotland, Edinburgh.

National Health Service (2021) *The NHS Constitution for England* (online). Available at: <https://www.gov.uk/government/publications/the-nhs-constitution-for-england/the-nhs-constitution-for-england> [Accessed 23rd March 2022].

Neilson, G.R. Lauder, W. (2008) What do high academic achieving school pupils really think about a career in nursing: Analysis of the narrative from paradigmatic case interviews. *Nurse Education Today*, 28 (6) pp. 680–690.

Newton, S. Moore, G. (2009) Use of Aptitude to Understand Bachelor of Science in Nursing Student Attrition and Readiness for the National Council Licensure Examination-Registered Nurse. *Nurse Education Today*, 25 (5) pp. 273-278.

Northern Ireland Practice and Education Council (2014) *Gateway to Nursing: Report of Phase 2: attributes which are valued to support career in nursing*. Northern Ireland, NIPEC.

Northwest Regional College (2022) Health Studies Pathway (online) Available at: <https://www.nwrc.ac.uk/courses/health-studies-health-science-pathway-level-3-national-extended-diploma> [Accessed 11th January 2022].

Nursing and Midwifery Council (2018a) *Realising professionalism: Standards for education and training*. London, NMC.

Nursing and Midwifery Council (2018b) *Future Nurse: standards of proficiency for registered nurses*. London, NMC.

Nursing and Midwifery Council (2018c) *Code of Conduct: Professional Standards of Practice and Behaviour for Nurses, Midwives and Nursing Associates*. London, NMC.

Nursing and Midwifery Council (2019a) *Raising Concerns: Guidance for nurses, midwives and nursing associates*. NMC, London.

Nursing and Midwifery Council (2019b) *Guidance on Health and Character*. London, NMC.

Olofsson, Å. Taube, K. Ahl, A. (2015) Academic Achievement of University Students with Dyslexia. *Dyslexia*. 21(4) pp. 338-349.

Palagolla, N. (2016) Exploring the Linkage between Philosophical Assumptions and Methodological Adaptations in HRM Research. *Journal of Strategic Human Resource Management*. 5 (1) pp. 10-15.

Pallant, J. (2020) *SPSS Survival Manual. A step by step guide to data analysis using IBM SPSS*. 7th ed. Open University Press, London.

Parahoo, K. (2014) *Nursing Research: Principles, Process and Issues*. Palgrave Macmillan, London.

Parish, C. (2006) 'Patients' wishes must come first after male nurse intimacy ruling. *Nursing Standard* (online). Available

at: <https://link.gale.com/apps/doc/A147927993/AONE?u=anon~764e65ae&sid=googleScholar&xid=336a94e7> [Accessed 26th March 2022].

Patterson, F. Roberts, C. Hanson, M. Hampe, W. Eva, K. Ponnampereuma, G. Magzoub, M. Tekian, A. Cleland, J. (2018) Ottawa consensus statement: Selection and recruitment to the health care professions, *Medical Teacher*, 40 (11) pp. 1091-1101.

Pau, A. Jeeveratnam, K. Chen, Y. Fal, A. Khoo, C. Nadarajah, D. (2013) The multiple mini interview (MMI) for student selection in health professions training – A systematic review. *Medical Teacher*, 35 (12) pp.1027 – 1041.

Perkins, A. Burton, L. Dray, B. Elcock, K. (2013) Evaluation of a multiple-mini-interview protocol used as a selection tool for entry to an undergraduate nursing programme. *Nurse Education Today*, 33 (5) pp. 465-469.

Pitt, V. Powis, D. Levette-Jones, T. Hunter, S. (2015) The influence of critical thinking skills on performance and progression in a pre-registration nursing programme. *Nurse Education Today*, 35 (1) pp.125 - 131.

Powis, D. Hamilton, J. McManus, I. C. (2007) Widening access by changing the criteria for selecting medical students. *Teaching and Teacher Education*, 23 (8) pp. 1235–1245.

Prymachuk, S. Richards, D.A. (2008) Predicting stress in pre-registration midwifery students attending a university in Northern England. *Midwifery*, 24 (1) pp. 108-122.

Rankin, B. (2013) Emotional intelligence: enhancing values-based practice and compassionate care in nursing. *Journal of Advanced Nursing*, 69 (12) pp. 2717 – 2725.

Rees, E.L., Hawarden, A.W., Dent, G., Hays, R., Bates, J. Hassell, A.B. (2016) Evidence regarding the utility of multiple mini-interview (MMI) for selection to undergraduate health programs: A BEME systematic review: BEME Guide No. 37. *Medical Teacher*, 38 (5) pp. 443–455.

Richardson, J.T.E. (2011) Eta squared and partial eta squared as measures of effect size in educational research. *Educational Research Review*, 6 (2) pp.135-147.

Richardson, J.T.E. (2015) Academic Attainment in Students with Dyslexia in Distance Education. *Dyslexia*. 21 (4) pp. 323-337.

Robinson, D. and Salvestrini, V. (2020) *The impact of interventions for widening access to higher education: a review of the evidence*. United Kingdom, Education Policy Institute.

Rodgers, S. Stenhouse, R. McCreddie, M. Small, P. (2013) Recruitment, selection and retention of nursing and midwifery students in Scottish Universities. *Nurse Education Today*, 33 (11) pp. 1301-1310.

Royal College of Nursing (2018) *The UK nursing labour market review 2018*. London, Royal College of Nursing.

Sabin, M. Taylor, R. and Tilley, C. (2012) Untangling a complex issue: An overview of initiatives to support nursing and midwifery student recruitment, selection and retention in Scottish Universities. *Nurse Education Today*, 32 (4) pp. 469-474.

Sanderson-Mann, J. Wharrad, H. McCandless, F. (2012) An empirical exploration of the impact of placement- based learning, and a comparison with non-dyslexic students. *Diversity and Equality in Health Care*. 9, pp. 89-99.

Sarwono, J. (2017) *Path Analysis: Data Analysis Application*. USA, Amazon.

Scotland, J. (2012) Exploring the Philosophical Underpinnings of Research: Relating Ontology and Epistemology to the Methodology and Methods of the Scientific, Interpretive, and Critical Research Paradigms. *English Language Teaching*, 5 (9) pp. 9-16.

Seidman, A. (2012) *College Student Retention*. 2nd ed. Rowman and Littlefield Publishers, United Kingdom.

Sharp, J.G. Hemmings, B. Kay, R. Sharp, J.C. (2019) Academic boredom and the perceived course experiences of final year education studies students at university. *Journal of Further and Higher Education*, 43 (5) pp. 601-627.

Shulruf, B., Wang, Y.G., Zhao, Y.J. Baker, H. (2011) Rethinking the admission criteria to nursing school. *Nurse Education Today*, 31 (8) 727-732.

Snowden, A., Stenhouse, R., Duers, L., Marshall, S., Carver, F., Brown, N. Young, J. (2018) The relationship between emotional intelligence, previous caring experience and successful completion of a pre-registration nursing/midwifery degree. *Journal of Advanced Nursing*, 74 (2) pp. 433-442.

Spencer, T.D. (2020) Improving Diversity of the Nursing Workforce Through Evidence-Based Strategies. *Journal of Nursing Education*. 59 (7) pp. 363 – 364.

Staley, K. (2015) ‘Is it worth doing?’ Measuring the impact of patient and public involvement in research. *Research involvement and engagement*, 1(1), pp. 1-10.

Stenhouse, R. Snowden, A. Young, J. Carver, F. Carver, H. Brown, N. (2016) Do emotional intelligence and previous caring experience influence student nurse performance? A comparative analysis. *Nurse Education Today*, 43, pp. 1-9.

Streiner, D.L. (2005) Finding Our Way: An Introduction to Path Analysis. *Research Methods in Psychiatry*, 50, pp. 115–122

Strickland, H. Cheshire, M. (2017) Exploring the correlation between non-traditional variables and student success: A longitudinal Study. *Journal of Nursing Education*, 56 (6) pp. 351 – 355.

Swail, W.S. (2004) *The Art of Student Retention*. Texas, Educational Policy Institute.

Tabachnick, B.G. Fidell, L.S. (2019) *Using Multivariate Statistics*. 7th ed. USA, Pearson Education.

Taimalu, M. Luik, P. (2019) The impact of beliefs and knowledge on the integration of technology among teacher educators: A path analysis. *Teaching and Teacher Education*, 79, pp. 101 – 110.

Talman, K. Hupli, M. Puukka, P. Leino-Kilpi, H. Haavisto, E. (2018) The predictive value of two on-site selection methods of undergraduate nursing students: A cohort study. *Journal of Nursing Education and Practice*, 8 (7) pp.12 – 21.

Tartavouille, T. Adorno, M. Garbee, D. Kensler, P. Manning, J. (2018) Predictors of success in BSN students. *International Journal of Nursing Education Scholarship*, 15 (1) pp.1 – 8.

Taylor, R. Macduff, C. Stephen, A. (2014) A national study of selection processes for student nurses and midwives. *Nurse Education Today*, 34 (8) pp. 1155-1160.

The Health Foundation (2019) How many nursing students are leaving or suspending their degrees before graduation? (online). Available at: <https://www.health.org.uk/news-and-comment/charts-and-infographics/how-many-nursing-students-are-leaving-or-suspending-their-degrees> [Accessed 31st January 2022].

The Hyponatremia Inquiry (2018) The Inquiry into Hyponatraemia-related Deaths (online). Available at: <http://www.ihrdni.org/Full-Report.pdf>. [Accessed 22nd March 2022].

Timer, J.E. Clauson, M.I. (2011) The use of selective admissions tools to predict students' success in an advanced standing baccalaureate nursing program. *Nurse Education Today*, 31 (6) pp. 601-606.

Tinto, V. (1987). *Leaving College: Rethinking the Causes and Cures for Student Attrition*. Chicago, IL: University of Chicago Press.

Tranter, S. Galanouli, M. Roberts, M. Leonard, L. Gale, T. (2018) Initiatives aimed at retaining ethnically diverse student nurses in undergraduate programmes: An integrative review. *Journal of Clinical Nursing*, 27 (21-22) pp. 3846-3857.

Traynor, M. Galanouli, D. Roberts, M. Leonard, L. Gale, T. (2017) Identifying applicants suitable to a career in nursing: a value-based approach to undergraduate selection. *Journal of Advanced Nursing*, 73 (6) pp. 1443-1454.

Traynor, M. Barr, O. McNeill, C. Erskine, A. and Ellis, R. (2019) Burdett Trust for Nursing Final Report “What Matters to Patients” (online). Available at: https://pureadmin.qub.ac.uk/ws/portalfiles/portal/248090160/Burdett_Final_Report_Full.pdf [Accessed 1st April 2022].

Trice, L.B. Foster, P.H. (2008) Improving nursing school diversity through use of a group admission interview. *AORN Journal*, 87 (3) pp. 522 – 532.

Trinity College (2022) *UCAS and progress points* (online). Available at: <https://www.trinitycollege.com/qualifications/music/UCAS-Progress-8> [Accessed 30th March 2022].

Twidwell, J.E. Records, K. (2017) An Integrative Review on Standardized Exams as a Predictive Admission Criterion for RN Programs. *International Journal of Nursing Education Scholarship*, 14 (1) pp. 1 – 12.

UCAS (2022) *How to write a UCAS undergraduate personal statement* (online). Available at: <https://www.ucas.com/undergraduate/applying-university/writing-personal-statement/how-write-personal-statement#what%E2%80%99s-a-personal-statement-> [Accessed 22nd January 2022].

Ulster University (2022a) *Widening Access Plans 2022/23* (online). Available at: <https://www.ulster.ac.uk/about/widening-access/plans/2022-23> [Accessed 24th March 2022].

Ulster University (2022b) *Adult Nursing Entry Conditions* (online). Available at: <https://www.ulster.ac.uk/courses/202223/nursing-adult-25148#entryconditions> [Accessed 24th March 2022].

Ulster University (2022c) School of Nursing-Athena SWAN (online). Available at: <https://www.ulster.ac.uk/faculties/life-and-health-sciences/nursing/athena-swan> [Accessed 16th April 2022].

Underwood, L. Williams, L. Lee, M. Brunnert, K. (2013) Predicting baccalaureate nursing students' first semester outcomes: HESI admission assessment. *Journal of Professional Nursing*, 29 (25) pp. 38 – 42.

Van Hofwegen, L. Eckfield, M. Wambuguh, O. (2019) Predicting nursing program success for Veterans: Examining the importance of TEAS and pre-admit science GPA. *Journal of Professional Nursing*, 35 (3) pp. 209 – 215.

Vierula, J. Haavisto, E. Hupli, M. Talman, K. (2020) The assessment of learning skills in nursing student selection: A scoping review. *Assessment & Evaluation in Higher Education*, 45 (4) pp. 496-512.

Volkert, D. Candela, L. Bernacki, M. (2018) Student motivation, stressors, and intent to leave nursing doctoral study: A national study using path analysis. *Nurse Education Today*, 61 pp. 210-215.

Wambuguh, O. Eckfield, M. Van Hofwegen, L. (2016) Examining the importance of admissions criteria in predicting nursing program success. *International Journal of Nursing Education Scholarship*, 13 (1) pp. 87 – 96.

Westrick, P.A. Schmidt, F.L. Le, H. Robbins, S.B. Radunzel, J.M. (2021) The Road to Retention Passes through First Year Academic Performance: A Meta-Analytic Path Analysis of Academic Performance and Persistence. *Educational Assessment*, 26 (1) pp. 35 – 51.

Williams, R. (2017) Why are there so few male nurses? (online). Available at: <https://www.theguardian.com/healthcare-network/2017/mar/01/why-so-few-male-nurses> [Accessed 11th January 2022].

Willis, P. (2013) *Quality with Compassion: The Future of Nursing Education*. London Royal College of Nursing.

Wolkowitz, A.A. Kelley, J.A. (2010) Academic predictors of success in a nursing program. *Journal of Nursing Education*, 49 (9) pp. 498-503.

World Health Organisation (2020) *Nursing and Midwifery fact sheet* (online). Available at: <https://www.who.int/news-room/fact-sheets/detail/nursing-and-midwifery> [Accessed 31st January 2022].

Wray, J. Aspland, J. Barrett, D. Gardiner, E. (2017) Factors affecting the programme completion of pre-registration nursing students through a three year course: A retrospective cohort study. *Nurse Education in Practice*, 24, pp. 14-20.

Wray, J. Aspland, J. Taghzouit, J. Pace, K. (2013) Making the nursing curriculum more inclusive for students with specific learning difficulties (SpLD): embedding specialist study skills into a core module. *Nurse Education Today*. 33 (6) pp. 602-607.

Wray, J. Aspland, J. Taghzouit, J. Pace, K. Harrison, P. (2012) Screening for specific learning difficulties (SpLD): The impact upon the progression of pre-registration nursing students. *Nurse Education Today*, 32 (1) pp. 96-100.

Wray, J. Watson, R. Gibson, H. Barrett, D. (2020) Approaches used to enhance transition and retention for newly qualified nurses (NQNS): A rapid evidence assessment. *Nurse Education Today*, 98 (5) pp. 1 – 12.

Yim, S.Y. (2014) An anxiety model for EFL young learners: A path analysis. *System*, 42, pp. 344 – 354.

Yu, X. Li, C. Gao, X. Liu, F. Lin, P. (2018) Influence of the medication environment on the unsafe medication behaviour of nurses: A path analysis. *Journal of Clinical Nursing*. 27, pp. 2993 – 3000.

Zamanzadeh, V. Ghahramanian, A. Valizadeh, L. Bagheriveh, F. Lynagh, M. (2020) A scoping review of admission criteria and selection methods in nursing education. *BMC Nursing*, 19 (121) pp. 1 – 17.

Zhang, X. Savalei, V. (2020). Examining the effect of missing data on RMSEA and CFI under normal theory full-information maximum likelihood. *Structural Equation Modeling*, 27 (2) pp. 219–239.

Appendices

Appendix 1 – Personal statement scoring criteria

Personal Statement – scoring form

Courses **BSc. (Hons) Nursing Adult (3005)**
 BSc. (Hons) Nursing Mental Health (4031)

Applicant name: UCAS ID:

	4	3	2	1	0
1. Personal desire for a career in nursing					
2. Motivation for nursing					
3. Expectations of the course and nursing as a profession					
4. Decision making affecting self and others					

Signature: Date:

Feedback comments:

Score = /16

If applicant has previously commenced nurse education please tick box to request a transcript of education and academic reference

Office use only

Proceed to		Reject	
-------------------	--	---------------	--

Personal statement – Criteria

Personal desire for a career in nursing

The candidate demonstrates:

- 4. A clearly articulated desire to commence a career in nursing based on clear goals experience and knowledge of the role of the nurse.
- 3. Development of the reasons for choosing nursing
- 2. A clear reason for choosing nursing.
- 1. Reasons for choosing nursing lack clarity
- 0. No reasons given for choosing nursing.

Motivation for nursing

The candidate shows evidence (or clear examples) of:

- 4. Motivating factors including realistic expectations of the challenges (readiness)
- 3. Motivating factors of how they have prepared to pursue a career in nursing
- 2. Factors that have motivated their decisions
- 1. A lack of clarity in motivation for choosing nursing
- 0. No motivation to undertake nursing.

Expectations of the course and nursing as a profession

The candidate shows evidence of:

- 4. Awareness of how the programme might contribute to their future career
- 3. Recognising the knowledge and experience that will be gained from the BSc Hons Nursing programme
- 2. Understanding the role of the nurse as a professional
- 1. Understanding the role of the nurse
- 0. No understanding of the course or nursing as a profession

Decision making affecting self and others

The candidate shows:

- 4. An ability to articulate the importance of personal and team management skills in providing nursing care
- 3. An ability to articulate the importance of personal and team management skills
- 2. Some recognition of the importance of personal/ team management skills
- 1. Some involvement in activities that encourage personal/ team management skills
- 0. No involvement in activities that encourage and develop personal/team management skills

Appendix 2 – Interview questions at Ulster University

Candidates Name: _____ Personal ID: _____ Course Code: _____

INDIVIDUAL INTERVIEW SCHEDULE- <u>BSc Hons NURSING – ADULT</u> Please open the interview with the following statement We will now ask you some questions. Please answer these questions fully, using your knowledge and experience. You may ask us to repeat the question if you require. Questions:	Outstanding	Very good	Good	Fair	Poor	Comments
	5	4	3	2	1	
1. Tell us something about yourself. (This is an open question to allow the candidate to settle into the interview – not scored)						
2. Why have you chosen to specifically study Adult Nursing (This is to ascertain has the candidate is motivated to do nursing and has given sufficient consideration to the level of study required.)						
3. What do you think will be involved in undertaking this course? (This is to provide the candidates with the opportunity to demonstrate that they know what to expect from the course involved.)						
4. What do you think the role of the Adult nurse involves (This will provide the candidate the opportunity to demonstrate their readiness for a career in nursing and their expectations of nursing) as a profession.						
5. Tell us about an experience that has challenged you and what you learned from it that will assist you in undertaking this course? (This will provide the candidate the opportunity to demonstrate reflective decision making skills)						
6. What specific qualities do you have that you think might be important to becoming an effective Adult nurse and why? (This will provide the candidate with an opportunity to demonstrate an insight into nursing, self awareness readiness for the course and their interpersonal skills)						

Interviewers Signature: _____

Overall Score: _____/25

Appendix 3 – Code book

Continuous variables:

Age
Personal statement score
Interview score
UCAS score
Grade point average (GPA) years 1, 2 and 3
Socio-economic status (SES)

Categorical variables:

Year of entry: 2012 = 1, 2013 = 2, 2014 = 3, 2015 = 4, 2016 = 5.

Gender: Female = 0, Male = 1.

Home/international: Home student = 0, international student = 1.

Specific learning difficulty (SpLD): No = 0, Yes = 1.

Course commencement: No = 0, Yes = 1.

Course completion: No = 0, Yes = 1.

Entry route (applicant database): A-level = 1, Access Diploma = 2, Irish Leaving Certificate = 3, previous degree = 4, BTEC = 5, HNC = 6, HND = 7, Other = 8.

Entry route (student database): A-level = 1, Access Diploma = 2, Other = 3, previous degree = 4, BTEC = 5, HNC = 6, HND = 7.

Appendix 4 – Recording of data entry errors

There were three errors detected in the GPA variable. Two participants had a score of 6 and another a score of 7. These scores were entered in error and should have been 60, 60 and 70 respectively and were corrected. The range, minimum and maximum tests were re-executed and all variables were within the expected limits as indicated by the code book.

Appendix 5 – Approval letter from Head of School of Nursing

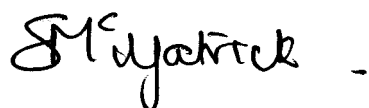
Caroline Crawford
PhD Researcher
Ulster University
Magee Campus

20th June 2019

Dear Caroline

I am happy to approve and support this project. I wish you all the best in your study.

Regards

A handwritten signature in black ink, appearing to read 'S McIlfatrick', followed by a small dash.

Professor Sonja McIlfatrick
Head of School
School of Nursing

Appendix 6 – Research proposal (May 2019)

Title

An exploration of nursing student selection and progress data at one university in the United Kingdom (UK).

Background

Nursing is synonymous with caring values, trustworthiness, a high level of clinical skill delivery and complex care coordination (Hinderer et al. 2014). Selecting the right people to enter the nursing profession is essential to ensure that high standards of care delivery are met and maintained. In the 2010 Standards for Pre-registration Nursing Education the Nursing and Midwifery Council (NMC) stipulated that by 2013 every newly qualified nurse must have obtained a Bachelors Degree in an approved nursing programme in order to be eligible to apply to join the NMC register (NMC 2010). This move has seen positive results in clinical areas demonstrated by a study by Aiken et al. (2014) who reported that with every 10% increase in nurses educated at degree level, patient outcomes improved by 7%. These results are echoed in a systematic review and meta-analysis by Liao et al. (2016) who concluded that with every 10% increase in nurses trained to bachelor's degree level, patient mortality rates decreased by 6%.

Alongside the implementation of nursing degree education, the role of the nurse has been developing to meet the healthcare needs of the population (Liao et al. 2016). To cope with the rising demands of the nurses role there is a need for highly skilled individuals to enter the profession. These individuals must be educated to think critically, to question practices and culture, to use evidence from research to inform practice, to undertake complex clinical skills and to lead the development of their role in line with the ambition of the profession (NMC 2018a).

In the UK many undergraduate degree programmes admit students onto courses on the bases of their Universities and College Admission Service (UCAS) tariff point scores, which are mostly an accumulation of points awarded for academic grades but can also be gathered through graded examinations in speech, drama, dance and music (UCAS 2019). Courses that subsequently lead to registration in a healthcare profession such as medicine, midwifery and nursing often apply additional admission criteria to UCAS tariff points. These

include personal statement scores, psychometric tests, and structured face-to face interviews (Patterson et al. 2018, Rodgers et al. 2013, Timer and Clauson 2011) which are frequently referred to as ‘cognitive screening.’ It is thought that using cognitive screening in addition to UCAS Tariff points is likely to increase the chances of those being selected who are not only capable of completing the course, but are also suitable to enter their chosen profession. Despite this widely used practice, there is limited evidence to support the claim that cognitive screening has the predictive validity to select suitable candidates to take-up healthcare roles.

The NMC (2018b) ‘Standards for Pre-registration Nursing Programmes’ state a minimum criterion that applicants must meet before being selected to commence on an approved nursing course. This ensures that those being selected have the required level of numeracy, literacy and technology skills to undertake the course, can demonstrate values that come in line with the NMC Code of Conduct (2018c), can learn new behaviours and be of good health and character. In 2010 these standards included the necessity for institutions to have face-to-face engagement with applicants’ prior to being selected for a nursing course (NMC 2010). This was often interpreted as a structured, group or multiple mini interview, but it has since been removed in the revised standards and is no longer a requirement (NMC 2018b). Nevertheless, with such an extensive criterion for admission, it is questionable whether it is possible for institutions to assess a candidate as having met these standards without meeting them face-to-face. Selection criteria for nursing programmes differ significantly across institutions in the UK, with some applying no additional criteria other than that specified by the NMC, and others applying extensive additional criteria (Willis 2012).

To date the largest evidence base for selecting nursing students that are most likely to complete the course is prior academic achievement (Bennett 2016, Wambuguh et al. 2016, Hinderer et al. 2014, Lancia et al. 2013, Shulruf 2011), with prior grade point averages having a positive correlation to nursing module grades (Bennett 2016, Wambuguh et al. 2016, Hinderer et al. 2014, Lancia et al. 2013, Shulruf 2011), programme completion (Bennett 2016, Wambuguh et al. 2016, Hinderer et al. 2014, Lancia et al. 2013) and first time NCLEX pass rates (Bennett 2016, Wambuguh et al. 2016, Hinderer et al. 2014). NCLEX is the final examination assessment that leads to nursing registration in the United States (US). It is not a requirement for registration in the UK.

New Psychometric tests are currently being developed in the UK to aid universities in the selection of nursing students, including the Nurse Match Instrument, which measures the core values and attributes of an applicant to determine their suitability to enter the nursing profession (McNeill et al. 2018) and Emotional Intelligence Tests which focus on the emotional readiness of an individual to undertake the role of a nurse and be competent in assessing their own core values and recognising the values of others (Jones-Shenk and Harper 2014, Rankin 2013). Faculty entrance exams on numeracy, literacy and science are also frequently cited in international literature as additional selection criteria with higher grades reported as having a positive relationship with student success and completion rates of undergraduate nursing programmes (Bennett et al. 2016, Underwood et al. 2013).

With strategies such as the Widening Access and Participation Strategy (Department of Employment and Learning 2012) and multiple entry routes into nursing including A-levels and Access to Higher Education, the number of potential candidates who are applying for the pre-registration nursing courses currently out way the number of commissioned places that are available. In 2018 the average number of applicants per place on a nursing programme had a 2:1 ratio across the UK, with that number rising to 10:1 in Northern Ireland (Royal College of Nursing 2018). This is to be welcomed for as the pool of applicants from all backgrounds , abilities and experience increases, so too does a diverse healthcare workforce that accurately represents the people that they serve and the needs of the population as a whole (Heaslip et al. 2017). With the development of more advanced screening procedures, the number of students entering the nursing profession with a specific learning difficulty (SpLD) including dyslexia, dyscalculia, dyspraxia and attention deficit hyperactivity disorder (ADHD) has also increased (Wray et al. 2013, Morris and Turnbull 2007). With so many applications to consider, institutions are under pressure to ensure a fair selection process that selects the right candidates for the course with the right values and characteristics and a high intellectual ability to cope with the rising demands of the profession and diversity of our growing population (Willis 2012).

In 2013 the Francis Report was published highlighting concerns about gross negligence and care failings in the Mid-Staffordshire Trust. The report showed how patients had been denied the most basic human rights, in a culture where complacency towards poor standards of care was considered normal. This highlights the role of the nurse in keeping care standards high (McNeill et al. 2018). To qualify as a nurse in the UK and enter the NMC Register, students

must be able to demonstrate that they have met all standards of proficiency and are safe to practice, putting the needs of the patient above their own while delivering care with compassion and kindness to justify the trust of the general public (NMC 2018c). These standards are the theoretical building blocks that form part of the curriculum and are taught and assessed in the academic environment by faculty staff before being developed in clinical placements. This 50% academic, 50% clinical learning strategy is standard practice across health care degree programmes in the UK and has been found to be more than adequate in meeting all course competencies in nursing education prior to registration (Willis 2012). Nevertheless, as unacceptable standards of nursing practice are being investigated and reported in the UK (Francis 2013, Keogh 2013), this calls into question if current methods used to select candidates to enter the nursing profession are effective. One of the concluding recommendations of the Francis Report was that institutions must review how they select nursing students to ensure that they choose those who are most appropriately suited to role with the right attributes and values to deliver high standards of nursing care. This recommendation has been a catalyst for universities reviewing their selection criteria into nursing programmes (Groothuizen et al. 2018, Gale 2016, Traynor et al. 2014). Recommendations from the Francis Report have also led to the implementation of the Values Based Recruitment Framework (VBR) across Universities in England. Due to how recently VBR has been introduced (2015), there is no evidence as yet that this has made any impact of improving standards of patient care (Groothuizen et al. 2018).

Selection practice for BSc Hons Nursing at Ulster University

Approximately 2000 applications are received per year by Ulster University for the undergraduate nursing course. Of these applications 1800 are eligible by meeting the academic criteria for admission. Applicants are required to submit a personal statement which is scrutinised for content pertaining to the desire and motivation to become a nurse, the awareness and expectations that they have in relation to studying nursing at undergraduate level and their personal and team management skills. The scrutiny of the personal statement was advocated by the Northern Ireland Practice and Education Council for Nursing and Midwifery (NIPEC, 2014) in a bid to streamline the admissions process in Northern Ireland. Once the personal statements are reviewed and points awarded, approximately 1500 applicants are individually interviewed face-to-face then placed on a waiting list ranked in order of interview scores. Each year the Department of Health allocate a specified number of

places (n=316 in 2018) which are offered across the Adult and Mental Health fields of practice.

A substantial amount of time is afforded each year by faculty staff to review and score the content of the applicants' personal statements and to carry out face-to-face structured interviews with no real evidence of any predictive validity in selecting students most likely to complete and excel on the course. To justify the trust of the general public that those who are being selected to enter the nursing profession are suitable, it is necessary to add to the growing body of research to help develop an evidence base for which tools are most likely to predict the best candidates who will excel both academically and clinically in their field.

Aim/objectives

The aim of this study is to investigate the current selection processes and progression data of the undergraduate nursing students at Ulster University.

1. To conduct a systematic review of literature focused on nursing student selection and progress through the undergraduate BSc programme.
2. To review the demographics and entry routes of those who apply for a position on the pre-registration nursing course at Ulster University.
3. To investigate the relationships between UCAS tariff points, personal statement scores and interview scores, average academic performance at each year of the course and completion of the course.
4. To identify predictors to high academic achievement and course completion.
5. To identify the predictive validity of personal statement scores, interview scores and UCAS tariff points for those students most likely to complete the course and achieve higher academic grades.

Methodology

Design. This study encompasses two parts and will use a quantitative design.

Part 1. A systematic review of literature on research focusing on nursing student selection and progression through the pre-registration degree course.

Part 2. A descriptive correlation cohort study of the demographic characteristics and outcomes of people who apply to the undergraduate nursing programme at Ulster University. The demographic characteristics will include age, gender, socio economic status, entry route, student/employment background and declaration of a specific learning difficulty including dyslexia, dyspraxia, dyscalculia and Attention Deficit Hyperactivity Disorder. Correlations will be used to establish if significant relationships exist between the descriptive data of the applicants and those who are subsequently offered a place on the programme based on their selection scores which include UCAS tariff points, personal statement scores and interview scores. The study will explore the relationships between the selection scores with academic performance over each of the three years of the course and course completion at the end of year three. To measure academic performance at each year of the programme the average grade per year will be used, which includes grades from examinations and assignments. The sample will include applicants for the 2012, 2013, 2014, 2015 and 2016 cohorts, n= approx. 10,000.

Demographic variables	Selection score variables	Outcome measures
Age	UCAS score	Average grade year 1
Gender	Personal statement score	Average grade year 2
Socio-economic status	Interview score	Average grade year 3
Entry route		Programme completion
Student/employment status		
Specific learning difficulty		

Methods of data collection

Phase 1 - The systematic review will include studies that focus on selection methods and subsequent student progression on pre-registration nursing bachelor's degrees. This will cover all internationally published literature and will be conducted on electronic databases contained within PROQUEST, ETHOS, EBSCO, OVID, COCHRANE and Web of Knowledge and through hand searching journals and manually checking reference lists from papers. The following inclusion and exclusion criteria will be applied;

Inclusion: Any quantitative or qualitative research studies that focus on nursing students who are selected to undertake a pre-registration nursing qualification at degree level and their progress outcomes. The progress can be studied for any length of time from the beginning of the course until course completion. Studies can include retrospective data that has been harvested for research such as retrospective cohort studies, or new data that has been intentionally gathered for research purposes such as longitudinal studies.

Exclusion: Studies that are published greater than 10 years ago, no English translation available and not peer reviewed in an academic journal. Studies that focus on nursing students completing associate, diploma or post-graduate courses will be excluded as will studies that focus only on the validity of selection methods without considering student outcomes, and studies that measure student outcomes only and not the selection methods used to select the students. Studies that focus only on NCLEX-RN pass rates as the only study outcome as this assessment does not form part of a nursing programme baccalaureate outcome.

Any literature identified through searching will follow the Preferred Reporting Items for Systematic Reviews and Meta-Analysis framework (PRISMA) (Moher et al.2009). From an early review of the results it is anticipated that most studies that will be suitable for inclusion will be quantitative. Any qualitative papers that are eligible for inclusion will also be included in the review. The quality of the studies will be reviewed by following the Critical Appraisal Skills Programme framework for Cohort Studies (2018).

Phase 2 - Data will be collected from the Life and Health Faculty in relation to the demographics and applications for the Undergraduate Nursing Programme for years of entry 2012, 2013, 2014, 2015 and 2016. All demographic variables will be available as they form part of the application process aside from socio-economic background. In this case the applicants' postcodes will be measured against the Northern Ireland Postcode deprivation scale to determine socio-economic status. Applicants' selection scores will include UCAS tariff points, personal statement scores, personal and interview scores and will be obtained from the Life and Health Faculty electronic records. The outcome measures of the average academic grade for years 1, 2 and 3 and programme completion will be collected from the School of Nursing and Faculty Records.

Ethical governance

This is a low risk category A study. Ethical approval will be sought from the Ethics Filter Committee of Institute of Nursing and Health Research. Permission has been granted to collect data pertaining to student demographics: age, gender, socio-economic status, entry route, student/employment status and admissions applications for entry years 2012, 2013 and 2014.

An amendment be sought to cover the following;

1. To add an additional demographic variable 'specific learning difficulty' declared, or diagnosed at any stage throughout the undergraduate programme.
2. To access data pertaining to demographic variables, selection scores, and programme outcomes for cohort years 2015/2016 and 2016/2017 in addition to years 2012/2013, 2013/2014, and 2014/2015 for which ethical approvals have already been granted.
3. To request the students' grades for years 1, 2 and 3 and course completion rates for cohorts 2012/2013, 2013/2014, 2014/2015, 2015/2016 and 2016/2017.

Proposed (preliminary) methods of data analysis

Data will be analysed using SPSS for Windows version 25. Data will be entered into SPSS from excel files and once cleaned it will be checked for normal distribution. Descriptive statistics will be performed to establish the demographic characteristics of the sample (n=10000) which will include age, gender, socio economic status, entry route, student/employment background and a declared diagnosis of specific learning difficulty. In addition to UCAS points, personal statement scores and interview scores, various statistical tests will be used to ascertain differences between sub-groups in these variables (e.g. age category, gender) using ANOVA, and their influence on the outcome measures of average academic grade at years 1, 2 and 3 and end of third year programme completion using regression analysis. It is proposed that, using logic modelling through the use of AMOS, factorial regression will identify the significant predictors of outcome.

Validity and reliability

Phase 1. The literature search for the systematic review has been conducted across health, education and grey literature search databases to help ensure that all relevant literature has been identified. The PRISMA Framework (Moher et al. 2009) will be used to guide the screening of all the literature. Full text papers for review will be cross checked by each

member of the supervisory team for inclusion or exclusion, the quality of the studies will be reviewed by following the Critical Appraisal Skills Programme Framework for Cohort Studies (2018) with the reasons for exclusion documented in the framework.

Phase 2. The methods for data analysis have previously been scrutinized for appropriateness and given ethical approval in a previous study which investigated 3 cohorts. This study will investigate an additional 2 cohorts bringing the number of cohorts to 5 and strengthening the reliability and predictability of results.

Dissemination

This study is part of a 'PhD by publication' project and it is anticipated that results will be published in an academic nursing journal such as Nurse Education Today. A summary of findings will be presented to School of Nursing at Ulster University.

Anticipated research impact

This study will add to the growing evidence base regarding selection methods for pre-registration nursing programmes with the predictive validity to determine, at selection, which candidates are most likely to excel academically and complete the course making them eligible to apply to join the NMC Register. The study is likely to impact future strategies into the selection of nursing students in the UK.

Timeframe

It is anticipated that data collection and analysis will begin in September 2019 and be completed with results available within 12 months (September 2020).

References

Aiken, L. Sloane, D. Bruyneel, L. Van dan Heede, K. Griffiths, P. Bussel, R. Diomidous, M. Kinnunen, J. Kozka, M. Lessaffre, E. McHugh, M. Casbas, M. Rafferty, A. Schwendimann, R. Scott, A. Tishelman, C. Achterberg, T. Sermeus, W. (2014) Nurse staffing and education and hospital mortality in nine European countries: a retrospective observational study. *The Lancet*. 383 (9931) pp. 1824-1830.

Bennett, M. Bormann, L. Sherry, L. Cobb, B. (2016) Preadmission Predictors of Student Success in a Baccalaureate of Science in Nursing Program. *Journal of Nursing Regulation*. 10 (7) pp. 11 – 18.

Critical Appraisal Skills Programme framework (2018) *Checklist for Systematic Reviews*. Available at: https://casp-uk.net/wp-content/uploads/2018/03/CASP-Systematic-Review-Checklist-2018_fillable-form.pdf [Accessed 1st February 2019].

Department for Employment and learning (2012) *Access to Success: Integrated Regional Strategy for Widening Participation in Education*. Department for Employment and learning.

Francis, R. (2013) *Report of the Mid Staffordshire NHS Foundation Trust Public Inquiry*. UK, The Stationary Office.

Gale, J. Ooms, A, Grant, R. Paget, K. Marks-Maran, D. (2016) Student nurse selection and predictability of academic success: The Multiple Mini Interview Project. *Nurse Education Today*. 40 pp. 123 – 127.

Groothuizen, J. Callwood, A. Gallagher, A. (2018) What is the value of values based recruitment for nurse education programmes? *Journal of Advanced Nursing*. 74 (5) pp. 1068-1077.

Heaslip, V. Board, M. Duckworth, V. Thomas, L. (2017) Widening participation in nurse education: An integrative literature review. *Nurse Education Today*. 59, pp. 66 – 74.

Hinderer, K. BiBartolo, C. Walsh, C. (2014) HESI Admission Assessment (A²) Examination Scores, Program Progression, and NCLEX-RN Success in Baccalaureate Nursing: An Exploratory Study of Dependable Academic Indicators of Success. *Journal of Professional Nursing*. 30 (5) pp. 436 – 442.

Jones-Schenk, J. Harper, M. (2014) Emotional Intelligence: An Admission criterion alternative to cumulative grade point averages for prelicensure students. *Nurse Education Today*, 24, pp. 413 – 420.

Keogh, B. (2013) *Review into the quality of care and treatment provided by 14 hospital trusts in England*. NHS England. Available at: <https://www.nhs.uk/nhsengland/bruce-keogh-review/documents/outcomes/keogh-review-final-report.pdf> [Accessed 1st May 2019].

Lancia, L. Petrucci, C. Giorgi, F. Dante, A. Cifone, M. (2013) Academic failure of success in nursing students: Results of a retrospective observational study. *Nurse Education Today*. 33, pp. 1501 – 1505.

Liao , L. Xiao, S. Hua, Y, Jun-Wen, L. (2016) The association of nurse educational preparation and patient outcomes: Systematic review and meta-analysis. *Nurse Education Today*. 42, pp. 9 – 16.

- McNeill, C. Erskine, A. Ellis, R. Traynor, M. (2018) Developing nurse match: A selection tool for evoking and scoring an applicant's nursing values and attributes. *Nursing Open*. 6 (1) 59 – 71.
- Moher, D. Liberati, A. Tetzlaff, J. Altman, D. PRISMA Group. (2009) Preferred reporting items for systematic reviews and meta-analyses: The PRISMA Statement. *Annals of Internal Medicine*. 151 (4) pp. 264 – 269.
- Morris, D. Turnbull, P. (2007) The disclosure of dyslexia in clinical practice: Experiences of student nurses in the United Kingdom. *Nurse education today*. 27 (1) pp. 35 – 42.
- Northern Ireland Practice and Education Council for Nursing and Midwifery 2012. *Gateway to Nursing Pre-Registration Nursing Programme Application and Selection Strategy*. Available at: http://www.nipec.hscni.net/download/projects/previous_work/highstandards_education/gateway_to_nursing/project_documentation/GTN-ProjectPlan.pdf [Accessed 12th December 2018].
- Nursing and Midwifery Council (2010) *Standards for pre-registration nursing education*. London, NMC.
- Nursing and Midwifery Council (2018a) *Future Nurse: standards of proficiency for registered nurses*. London, NMC.
- Nursing and Midwifery Council (2018b) *Standards for pre-registration nursing programmes*. London, NMC.
- Nursing and Midwifery Council (2018c) *The Code: Professional standards of practice and behaviour for nurses, midwives and nursing associates*. London, NMC.
- Patterson, F. Roberts, C. Hanson, M. Hampe, W. Eva, K. Ponnampereuma, G. Magzoub, M. Tekian, A. Cleland, J. (2018) 2018 Ottawa consensus statement: Selection and recruitment to the healthcare professions, *Medical Teacher*. 25, pp. 1 – 11.
- Rankin, B. (2013) Emotional intelligence: enhancing values-based practice and compassionate care in nursing. *Journal of Advanced Nursing*. 69 (12) pp. 2717-2725.

Rodgers, S. Stenhouse, R. McCreaddie, M. Small, P. (2013) Recruitment, selection and retention of nursing and midwifery students in Scottish Universities. *Nurse Education Today*. 33 (11) pp. 1301 – 1310.

Royal College of Nursing (2018) *The UK nursing labour market review 2018*. London, Royal College of Nursing.

Shulruf, B. Wang, Y. Zhao, Y. Baker, H. (2011) Rethinking the admission criteria to Nursing School. *Nurse Education Today*. 31 pp. 727 – 732.

Timer, E. Clauson, M. (2011) The use of selective admissions tools to predict students' success in an advanced standing baccalaureate nursing program. *Nurse Education Today*. 31 (6) pp. 601-606.

Traynor, M. Galanouli, D. Roberts, M. Leonard, L. Gale, T. (2016) Identifying applicants suitable to a career in nursing: a value-based approach to undergraduate selection. *Journal of Advanced Nursing*. 73 (6) pp. 1443– 1454.

UCAS (2019) *Calculate your UCAS Tariff points*. UCAS. Available at: <https://www.ucas.com/ucas/tariff-calculator> [Accessed 28th May 2019].

Underwood, L. Williams, L. Lee, M. Brunnert, K. (2013) Predicting Baccalaureate Nursing Students' First-Semester Outcomes: HESI Admission Assessment. *Journal of Professional Nursing*. 29 (2) pp. 38 – 42.

Wambuguh, O. Eckfield, M. Hofwegen, L. (2016) Examining the Importance of Admissions Criteria in Predicting Nursing Program Success. *International Journal of Nursing Scholarship* 13(1) pp. 87– 96.

Willis, P. (2012) *Quality with Compassion: The Future of Nursing Education*. London Royal College of Nursing. Available at: <https://www.macmillan.org.uk/documents/newsletter/willis-commission-report-macmail-dec2012.pdf> [Accessed 18th October 2018]

Wray, J. Aspland, J. Taghzouit, J. Pace, K. (2013) Making the nursing curriculum more inclusive for students with specific learning difficulties (SpLD): Embedding specialist study skills into a core module. *Nurse Education Today*. 33, pp. 602–607.

Summary of Changes (continued):


Additional ethical considerations: N/A

List of enclosed documents:

1. Revised research proposal.

Declaration:


I confirm that the information in this form is accurate and that implementation of the proposed amendment will benefit the study appropriately.

Signed  Date 17/10/2019
(Chief Investigator)

Filter Committee Decision

This amendment:

is appropriate to the needs of the study, is in category A and should be implemented [✓]
is appropriate to the needs of the study, is in category B and should be considered by the University REC []
is NOT appropriate and should be reconsidered or withdrawn []

Signed  Date17-Oct-19
(Chair of Filter Committee)

Appendix 8 - Proof of submission paper 2

14-Apr-2022

Dear Caroline Crawford,

Your manuscript entitled "Investigating the predictive validity of selection methods for pre-registration nursing programmes in the United Kingdom - A retrospective cohort study." has been successfully submitted online and is presently being given full consideration for publication in the Journal of Clinical Nursing. Your manuscript ID is JCN-2022-0919.

Please mention the above manuscript ID in all future correspondence or when calling the Editorial Office with queries. If there are any changes in your mailing address or e-mail address, please log onto Manuscript Central at <https://eur03.safelinks.protection.outlook.com/?url=https%3A%2F%2Fmc.manuscriptcentral.com%2Fjcnur&data=04%7C01%7C Crawford-cj%40ulster.ac.uk%7Ca9b9de7b25ef4f88d31208da1e1559ff%7C6f0b94874fa842a8aeb4bf2e2c22d4e8%7C0%7C0%7C637855375138626765%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzliLCJBTiI6Ikl1haWwiLCJXVCi6Mn0%3D%7C3000&sdata=kjxvMVjSX24Hn281t9YYaC7Zxu4iHvqVe8rpOdd4J7c%3D&reserved=0> and edit your account accordingly.

The review process is usually completed within 10 weeks, but can take longer, depending on reviewer availability (e.g. during holiday periods or if an alternative reviewer needs to be approached). This time frame includes selecting and inviting reviewers, awaiting their response to the request, consideration of the reviews by the assigned Editor and, finally, the Editor's decision and communication with the author.

Please be patient during this process and it would be much appreciated if you would not email the Editorial Office to enquire about the status of your manuscript until a period of at least 10 weeks has lapsed. You can track the progress of your paper using the tracking facility in your author centre. If you wish to view the status of your manuscript, you can do so at any time by checking your Author Centre after logging onto <https://eur03.safelinks.protection.outlook.com/?url=https%3A%2F%2Fmc.manuscriptcentral.com%2Fjcnur&data=04%7C01%7C Crawford-cj%40ulster.ac.uk%7Ca9b9de7b25ef4f88d31208da1e1559ff%7C6f0b94874fa842a8aeb4bf2e2c22d4e8%7C0%7C0%7C637855375138626765%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzliLCJBTiI6Ikl1haWwiLCJXVCi6Mn0%3D%7C3000&sdata=kjxvMVjSX24Hn281t9YYaC7Zxu4iHvqVe8rpOdd4J7c%3D&reserved=0>

Thank you very much for submitting your manuscript to the Journal of Clinical Nursing.

With best wishes,

Shwetha Ramachandran
Editorial Office
Journal of Clinical Nursing