



Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

An exploration of the role of the clinical academic and strategies to sustain and build the clinical academic workforce

Dr Elaine Burke, MB MM

A thesis submitted to the University of Dublin in partial
fulfillment of the requirements for the degree of Doctor of
Philosophy

Supervisor: Professor Martina Hennessy

April 2022

Declaration

I declare that this report has not been submitted as an exercise for a degree at this or any other university and it is entirely my own work.

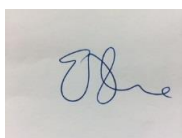
I agree to deposit this thesis in the University's Open Access institutional repository or to allow the Library to do so on my behalf, subject to Irish Copyright Legislation and Trinity College Library conditions of use and acknowledgement.

I consent to the examiner retaining a copy of the thesis beyond the examining period, should they so wish.

I have read and I understand the plagiarism provisions in the General Regulations of the University Calendar for 2022.

Student Name: Elaine Burke

Student Number: 15310053



Signature: _____

Acknowledgements

I wish to express my deep and sincere gratitude to my supervisor, Professor Martina Hennessy, for her unwavering support, patience, and advice during my research.

I would also like to thank all my colleagues in the School of Medicine for their support and for making the office an enjoyable place to work. I would like to thank the Dublin South-East Intern Network Team, particularly Mr Evan Blake for his invaluable assistance with the recruitment to and running of the academic track, anonymisation of applications and recording of recruitment data. I also wish to thank Mr David Mockler for his help with my literature review, Professor Valerie Smith for her advice on performing a concept analysis, Dr Karen Misstear for her assistance with data collection and manuscript preparation for the repertory grid study, and Dr Eleisa Heron for her assistance with statistical analysis of the gender balance data. I wish to acknowledge Dr Aileen Patterson for her advice on evaluation frameworks and both Dr Patterson and Dr Fionnuala Gough for examining my continuation viva and providing invaluable feedback. I would also like to thank Ms Dara O'Mahony and Ms Teresa Fox in the postgraduate office for their support throughout both my Master's degree and my PhD, and Ms Ruth Allison for her assistance in organising my PhD Viva. I wish to acknowledge thank the School of Medicine in Trinity College Dublin for providing funding towards the cost of my fees.

I wish to acknowledge all those who agreed to participate in this research: Professor Louise Gallagher who allowed her biography to be part of the concept analysis; trainee and senior clinical academics who participated in the Repertory Grid study; all those who assisted with the creation and evaluation of the Academic Internship Track including the Intern Network Executive, Health Service Executive, Irish Medical Council, and the academic interns themselves. I would also like to thank all those who assist with the recruitment process including academic and administrative staff and particularly those who participated in the gender bias study.

I would like to thank my good friend Dr Deirdre O'Shea, Senior Lecturer and Organisational Psychologist, University of Limerick, for her encouragement, advice, and for introducing me to the concept of Repertory Grid Technique.

Finally, I would like to thank all my family for their support; in particular, my mother Phil, my sister Róisín and my brother-in-law Tom for allowing me to practice my interview and qualitative data analysis skills on them. I would like to thank my son Liam and daughter Molly, who was born during this PhD, for always being there to cheer me up with a cuddle. I would like to especially thank my husband Mark, without whose endless patience, support, encouragement, and advice this PhD would not have happened.

I would like to dedicate my thesis to my grandmother, Kathleen Hackett, in loving memory.

Table of Contents

Declaration.....	2
Acknowledgements	3
List of Figures	10
List of Tables	11
List of Abbreviations.....	12
Abstract	14
Background	14
Methodology.....	14
Results.....	14
Lay Abstract	16
Background	16
Methodology.....	16
Results.....	16
Aims and Objectives	18
Aim 1.....	18
Objectives.....	18
Aim 2.....	18
Objectives.....	18
Aim 3.....	18
Objectives.....	18
Value of Research.....	20
Outputs to Date.....	21
Oral Presentations	21
Abstracts submitted for oral presentation	21
Reports.....	22
Peer-Reviewed Publications.....	22
Manuscripts ready for submission	22
Chapter 1: Introduction	23
Chapter 2: Clinical academic: A concept analysis.....	27
2.1 Background.....	27
2.1.1 Clinical academics: an “endangered species”	27
2.1.2 Concept analysis	28
2.2 Aims	28
2.2.1 Objectives	29

2.3 Methodology	29
2.3.1 Framework.....	29
2.3.2 Literature review.....	30
2.3.3 Data management and analysis.....	35
2.4 Results	35
2.4.1 Other terms	35
2.4.2 Defining attributes	37
2.4.3 Cases.....	42
2.4.4 Antecedents.....	44
2.4.5 Consequences	47
2.4.6 Empirical referents.....	49
2.5 Discussion.....	50
2.5.1 Terminology.....	50
2.5.2 The evolving role of the clinical academic.....	51
2.5.3 The importance of Intrinsic Motivation	52
2.5.4 Gaps in the literature	53
2.5.5 Reflections on Walker and Avant’s Framework.....	53
2.5.6 Limitations	54
2.6 Conclusion	55
Chapter 3: An exploration of clinical academics’ views on successful clinical academic practice using Repertory Grid Technique.....	56
3.1 Background.....	56
3.1.1 Clinical Academic Careers and Training: The Irish Context	56
3.1.2 Social Cognitive Career Theory and Career Success	57
3.1.3 Methodological approaches: Personal Construct Theory and Repertory Grid Technique.....	58
3.2 Aims	59
3.3 Methodology	60
3.3.1 Participants.....	60
3.3.2 Interview technique	61
3.3.3 Improving credibility by triangulation.....	64
3.3.4 Statistical analysis of individual grids.....	65
3.3.5 Aggregate Analysis: Honey’s content analysis.....	66
3.3.6 Differential analysis.....	67
3.4 Results.....	67
3.4.1 Credibility	67

3.4.2 Individual grid analysis	68
3.4.3 Aggregate analysis	70
3.4.4 Differential analyses.....	74
3.5 Discussion.....	80
3.5.1 Personal factors	80
3.5.2 Organisational Factors.....	83
3.5.3 Competencies	84
3.5.4 Person-environment Fit.....	85
3.5.5 Clinical focus vs. Research focus	86
3.5.6 Differential analysis 1: Established versus trainee clinical academics.....	87
3.5.7 Differential analysis 2: Female versus male clinical academics..	87
3.5.8 Reflections on framework and methodology: SCCT, PCT and RGT	89
3.5.9 Limitations	91
3.6 Conclusion	91
Chapter 4: Creation and evaluation of a combined clinical and academic training programme for junior doctors in Ireland: The Academic Internship Track	93
4.1 Background.....	93
4.1.1 Benefits of early exposure to research	93
4.1.2 Combined clinical academic training programmes: experience overseas	94
4.1.3 Internship in Ireland.....	95
4.2 Aims	96
4.2.1 Objectives	97
4.3 Evaluation of the AIT.....	97
4.3.1 The Context, Input, Process and Product (CIPP) Model of Evaluation.....	97
4.3.2 Context Evaluation	99
4.3.3 Input Evaluation	100
4.3.4 Process Evaluation	104
4.3.5 Product Evaluation	109
4.4 Discussion.....	113
4.4.1 Demand for combined clinical academic training.....	113
4.4.2 Participants' outputs	113
4.4.3 Retention of expertise and job satisfaction.....	115

4.4.4 Areas for improvement	116
4.4.5 Limitations	118
4.5 Conclusion	119
Chapter 5: Gender Balance in Clinical Academic Careers: a real world resumé study	121
5.1 Background.....	121
5.1.1 Gender bias in academic medicine	122
5.1.2 Resumé studies and implicit bias.....	123
5.1.3 The need for gender equality	124
5.1.4 Same-gender supervisors	124
5.2 Aims	125
5.3 Methodology	126
5.3.1 Ethical considerations	126
5.3.2 Investigating the presence of gender imbalance.....	126
5.3.3 Comparing anonymised and named scores	126
5.4 Results.....	129
5.4.1 Gender balance during recruitment to the AIT	129
5.4.2 Comparison of anonymised versus anonymised applications shortlisting scores.....	132
5.4.3 Gender of proposed supervisors.....	136
5.5 Discussion.....	138
5.5.1 Bias against female candidates and the effect of anonymisation	138
5.5.2 Alternative explanations: Cues for control and differences in cohorts	139
5.5.3 Female candidates and same-gender supervisors.....	141
5.5.4 Limitations	143
5.6 Conclusion	144
Chapter 6: Conclusion and Recommendations.....	146
6.1 Introduction.....	146
6.2 Summary of key findings.....	146
6.3 Limitations.....	149
6.4 Recommendations.....	150
6.5 Future research	151
6.6 Researcher perspectives and learning	153
References	155
Appendix 1: List of studies used for Concept Analysis	172

2021 Concept Analysis	172
2018 Concept analysis	175
Appendix 2: Ethics approval for Repertory Grid study	180
Appendix 3: Repertory Grid Study Results: Dendrograms.....	181
Grid E1 (Established, Male)	181
Grid E2 (Established, Male)	182
Grid E3 (Established, Female)	183
Grid E4 (Established, Female)	184
Grid E5 (Established, Female)	185
Grid T1 (Trainee, Female)	186
Grid T2 (Trainee, Male)	187
Grid T3 (Trainee, Male)	188
Grid T4 (Trainee, Female)	189
Grid T5 (Trainee, Male)	190
Appendix 4: Core categorisation procedure	191
Appendix 5: Representative quotes for each overarching construct	196
Appendix 6: Academic Internship Track Curriculum	203
Appendix 7: Ethics approval for Resumé study.....	208
Appendix 8: Email to shortlisting reviewers	209
Appendix 9: Mean difference plots of Anonymous-Non anonymous (named) scores.....	211

List of Figures

- Fig. 2.1: Timeline of evolution of concept analysis
- Fig. 2.2: Flowchart of the study selection process 2021
- Fig. 3.1: Triadic elicitation using GridSuite 5
- Fig. 3.2: Rating elements according to a construct
- Fig. 3.3: Example of a completed grid
- Fig. 3.4: Grid E2 Dendrogram
- Fig. 3.5: Grid T4 Dendrogram
- Fig. 4.1: Intern Networks in Ireland and their affiliated universities
- Fig. 4.2: Geographic locations of hospitals with academic internship posts
- Fig. 4.3: Expression of interest at Stage 1 of internship application process
- Fig. 4.4: Number of full applications for the Academic Track received per year
- Fig. 4.5: Full Applications to the Academic Track by University 2017-2021
- Fig. 4.6: Peer-reviewed publications of first three cohorts of academic interns (n=72)
- Fig. 4.7: Longer term career plans (HST= Higher Specialist Training, ICAT = Irish Clinical Academic Training Programme)
- Fig. 5.1: Flowchart explaining inclusion and exclusion criteria for data analysis
- Fig. 5.2: Gender balance prior to interventions
- Fig. 5.3: Gender balance after introduction of interventions
- Fig. 5.4: Reviewer characteristics
- Fig. 5.5: Reviews per application
- Fig. 5.6: Reviews of anonymous and named applications
- Fig. 5.7: Histogram of differences between scores when the application was anonymous compared to named
- Fig. 5.8: Histogram of differences between scores for female and male candidates
- Fig. 5.9: Ratio of female to male supervisors by gender 2017-2020

List of Tables

Table 1.1:	Other terms and their definitions
Table 3.1:	Participant demographics
Table 3.2:	Supplied constructs
Table 3.3:	Overarching constructs, frequency, and category according to factor predictive of career success
Table 3.4:	Constructs in order of importance to the group as a whole
Table 3.5:	Differential analysis established vs trainee clinical academics
Table 3.6:	Differential analysis female vs male clinical academics
Table 4.1:	Academic Internship Track Evaluation Model adapted from Stufflebeam et al
Table 4.2:	Academic intern posts and their locations
Table 4.3:	Stages of recruitment process to the AIT
Table 4.4:	Top five publications by journal impact factor (published after start of AIT)
Table 4.5:	Specialties represented by academic interns (n=72)
Table 5.1:	Number of applicants to academic track by stage of recruitment process
Table 5.2:	Ratio of male to female candidates during recruitment process by year
Table 5.3:	Number and % of supervisors named by candidate by gender and year

List of Abbreviations

AAMC	Association of American Medical Colleges
AIT	Academic Internship Track
AMEE	Association for Medical Education in Europe
BST	Basic Specialist Training
C	Competencies
CAO	Central Applications Office
COVID	Coronavirus Disease
CRF	Clinical Research Facility
DORA	Declaration of Research Assessment
EEA	European Economic Area
EEG	Electroencephalogram
EPA	Entrustable Professional Activity
GIM	General Internal Medicine
HRB	Health Research Board
HSE	Health Services Executive
HST	Higher Specialist Training
ICAT	Irish Clinical Academic Training programme
IM	Intrinsic Motivation
IMC	Irish Medical Council
INE	Intern Network Executive
INHED	Irish Network of Healthcare Educators
ICU	Intensive Care Unit
LR	Largest Rating
MD	Doctor of Medicine

MRI	Magnetic Resonance Imaging
NDTP	National Doctors Training and Planning
NHS	National Health Service
NIH	National Institutes of Health
NUI	National University of Ireland
OF	Organisational factors
PCT	Personal Construct Theory
PEF	Person-environment Fit
PF	Personal Factors
PGF	Person-group fit
PJF	Person-job fit
POF	Person-organisation fit
RGT	Repertory Grid Technique
SCCT	Social Cognitive Career Theory
SD	Sum of differences
SDT	Self-Determination Theory
SFI	Science Foundation Ireland
SHO	Senior House Officer
TCD	Trinity College Dublin
UKAFP	UK Academic Foundation Programme
URiM	Underrepresented in Medicine

Abstract

Background

Clinical academics are critical to delivering high quality patient care and discovering new ways to treat disease (1), however the clinical academic workforce is shrinking (2-4). There is a need to clearly define the role and attributes of successful clinical academics, and to investigate strategies to maintain this workforce.

Methodology

A concept analysis of the term “clinical academic” was carried out using the Walker and Avant framework. Following this, 10 clinical academics at different career stages were interviewed on their construal of successful clinical academic practice using a structured interview technique, Repertory Grid. The data was analysed quantitatively and qualitatively. Social Cognitive Career Theory provided a framework for interpreting results.

A combined clinical academic training programme for junior doctors at the earliest career stage, the Academic Internship Track (AIT) is described. This programme was evaluated using the CIPP model (Context, Input, Process and Products).

A resumé study of applications to the AIT over 4 years was conducted to monitor gender balance and the effects of anonymising applications.

Results

The ideal clinical academic is highly motivated and embodies attributes such as innovation, perseverance, integrity, and collaboration.

Maintenance of the role requires appropriate training, a supportive work environment and adequate investment. Consequences include benefits for patients, students, and clinicians. Development of supports for clinical academics should take personal and organisational factors into consideration as well as learning experiences and person-environment fit.

There is a demand for early career combined clinical academic training; participants in the AIT contribute substantially to their field, and the programme may contribute to retention of this talent in Ireland.

Anonymising applications to the AIT did not result in statistically significant differences in scores, however gender balance improved. Cues for control may play an important role in mitigating unconscious bias.

Lay Abstract

Background

Clinical academics are doctors, nurses and allied health care professionals who divide their time between treating patients and academic work (research and teaching). This allows them to do research that will have an impact on patient care. However, there is a shortage of clinical academics worldwide. This PhD seeks to answer: what does it take to be a successful clinical academic and how can we help support and train clinical academics for the future?

Methodology

I began by reading and interpreting scientific literature on the topic of clinical academics and then talking to clinical academics at different career stages to define the role of the clinical academic and find out what it takes to succeed.

I was part of a team which set up a combined clinical and academic training programme for junior doctors who have just graduated from medical school, the Academic Internship Track (AIT). I evaluated the programme by looking at things like satisfaction of participants and their research outputs.

I looked at gender balance in the AIT and conducted an experiment over two years to see if anonymising applications made any difference to how they were scored.

Results

Clinical academics need to be highly innovative, collaborate well with others, and to have integrity and perseverance to succeed. The need proper training pathways, a supportive work environment and proper investment. Having a clinical academic workforce means there are benefits for patients, healthcare students and other healthcare workers.

The AIT has been very successful: there is a great demand for the programme, participants are very happy with the experience, and they contribute significantly to knowledge in their area of interest. They are more likely to remain in Ireland after internship compared to their peers.

Anonymising applications didn't make a significant difference to the scores. I found that gender balance improved, and this might be because reminding people about bias can help them to overcome it. Tackling gender bias will need a comprehensive approach.

Aims and Objectives

Aim 1

Contribute to the understanding of the roles of the clinical academic and the development of a holistic view of the professional identity of clinical academics

Objectives

- Investigate the meaning of the term “clinical academic” based on current usage in the literature
- Referring to the literature, identify attributes, antecedents, and consequences of the role of the clinical academic
- Investigate the importance of the role to healthcare and society
- Explore clinical academics’ construal of successful clinical academic practice and the attributes of successful clinical academics

Aim 2

Using the creation of a combined clinical academic training programme, the Academic internship Track (AIT) to investigate educational strategies designed to help build and support the clinical academic workforce

Objectives

- Describe the learnings from the creation of a combined clinical academic training programme for junior doctors, the Academic Internship Track
- Evaluate the AIT using the CIPP model (Context, Inputs, Process and Product)
- Describe strengths and challenges of the programme and make recommendations for further improvements

Aim 3

Explore the issue of gender equality in academic medicine and investigate strategies enhance equality

Objectives

- Using the AIT, investigate the presence of gender bias in recruitment to academic training programmes

- Test the hypothesis that anonymising applications can be applied to recruitment to clinical academic training programmes as a mechanism to mitigate gender bias
- Explore internal gender bias by investigating whether female candidates to the AIT recruitment process are more likely to nominate a supervisor of the same gender compared to male candidates

Value of Research

This research will be of interest to key stakeholders in the clinical academic workforce including educators, employers, institutions, funding bodies, clinical academics, aspiring clinical academics, and patient groups.

Providing a clear definition of the role based on its current usage and identifying key attributes that define successful clinical academic practice will contribute to the professionalisation of the role. A holistic view of the clinical academic is needed to guide assessment criteria for training selection, recruitment, promotion, and funding awards. It will also inform the creation of specific training and assessment methods such as Entrustable Professional Activities (EPAs).

A description of the implementation of a combined clinical academic training programme and its evaluation will provide a basis for establishing similar programmes in other countries or with other groups of healthcare professionals e.g., Senior House Officers (SHOs) or non-physician clinical academics. Demonstrating the success of the AIT will provide an evidence base for establishing combined clinical academic training pathways from the beginning of clinical careers.

Testing the effectiveness of anonymising applications to the AIT will provide evidence for or against the use of this strategy to mitigate unconscious bias. It will also highlight the issue of unconscious bias in academic medicine. Exploring the selection of same-gender supervisors by applicants to the academic track will draw attention to a potential disparity which could affect senior female clinical academics by increasing their mentoring duties disproportionately.

Outputs to Date

Oral Presentations

23/03/2022: "Innovation, integrity and collaboration: towards a holistic view of the clinical academic". Oral presentation at INHED Annual Conference, University of Limerick. Abstract published in conference proceedings.

23/03/2022: "Use of a combined qualitative and quantitative technique, Repertory Grid, to explore professional identity in clinical academics". Oral presentation at INHED Annual Conference, University of Limerick. Abstract published in conference proceedings

11/03/2021: "Girls Allowed: Enhancing gender balance and mitigating the effects of unconscious bias in recruitment to a combined clinical academic training programme". Oral presentation at INHED Annual Conference, University College Dublin. Abstract published in conference proceedings

11/03/2021: "On the Right Track: Outputs of a combined clinical academic training programme for junior doctors in Ireland, the Academic Internship Track". Oral presentation at INHED Annual Conference, University College Dublin. Abstract published in conference proceedings

07/03/2019: "Introduction of an Academic Track for Internship in Ireland: Providing opportunities for the clinical academics of the future". Oral Presentation, THE (Trinity Health Education) International Research Conference, Trinity College Dublin. Abstract published in conference proceedings

07/02/2019: "Clinical Academic: A Concept Analysis". Oral Presentation at INHED (Irish Network of Healthcare Educators) Annual Conference, National University of Ireland, Galway. Abstract published in conference proceedings.

Abstracts submitted for oral presentation

16/02/2022: "Innovation, integrity and collaboration: towards a holistic view of the clinical academic". Submitted to AMEE 2022, The Association

of Medical Education in Europe Annual Conference, Lyon, France. 27-29th August 2022. Decision on 28th April 2022

16/02/2022: “Gender balance in academic careers: a real world resumé study”. Submitted to AMEE 2022, The Association of Medical Education in Europe Annual Conference, Lyon, France. 27-29th August 2022. Decision on 28th April 2022

Reports

27/06/2020: “Report on the Academic Track 2017-2020”. Internal report submitted to the HSE NDTP (National Doctors’ Training and Planning)

Peer-Reviewed Publications

8/11/2021: Evaluation of an early career clinical academic training programme using the CIPP model. Burke, E; Hennessy M. BMJ Open 2021;11:e052965. doi: 10.1136/bmjopen-2021-052965

Manuscripts ready for submission

Exploring the professional identity of clinical academics. Burke E, Misstear K, Hennessy M

Chapter 1: Introduction

The past century has seen incredible advances in medicine, with global life expectancy almost doubling and child mortality at the lowest it has ever been: in the past three decades alone, numbers of deaths in children under five has more than halved (12.6 million to 5.4 million)(5). Much of this progress can be attributed to healthcare improvements brought about by clinical research and discovery, and many of these discoveries were made by healthcare professionals who combined clinical work with research. Carl Jung, the founder of analytic psychology, was a practicing psychiatrist (6). Stanley Dudrick pioneered the use of Total Parenteral Nutrition (TPN) while working as a surgical resident at University of Pennsylvania Hospital (7). In the 1970's, medical oncologist Larry Einhorn developed a three-drug cisplatin-based regimen which improved cure rates for locoregional testicular cancer from 5% to almost 100% (8). Barry Marshall used his one year of funded research while training as an internal medicine specialist to demonstrate the causative link between *H. pylori* infection and peptic ulcer disease, providing a simple and effective treatment for many and transforming our understanding of the condition (9). Denis Burkitt, a graduate of Trinity College Dublin (TCD), integrated research into his career at a later stage while working in Africa, and is recognised as discovering the childhood cancer which bears his name, Burkitt's Lymphoma, as well as describing the importance of fibre in the diet (10).

Clinical academics are healthcare professionals who combine clinical practice with academic work. In bridging a gap between research and practice, they have the potential to enhance patient care through innovation and discovery, improving and saving countless lives. They may be uniquely positioned to identify pertinent research questions and maintain a vital link with the end-users of the products of healthcare innovation (1). Despite the importance of this role however, concerns that the workforce is shrinking have been raised since the 1970's, when it was noticed that the NIH was awarding fewer grants to clinicians and more grants awarded to non-clinician PhDs for work in basic sciences; simultaneously PhD recipients of the Nobel Prize for Medicine and Physiology steadily overtook MD recipients in the latter half of the 20th

century (11, 12). An increase in clinical research funding over the past number of decades has not seen a parallel increase in cures and treatments for human disease, and the inability to translate basic scientific findings into treatments, combined with other inefficiencies, results in a wastage of up to 85% of research funding, estimated to cost \$200 billion annually in the US alone (13). There are international calls to urgently address the challenges facing the clinical academic workforce so that it can be built and sustained for the future, and that advances made in biomedical science can be translated into improvements in patient care (3, 14, 15).

Currently there exists no exact definition of the term clinical academic, which is used interchangeably with other terms such as physician scientist, academic clinician, and clinician investigator. The professional identity of the clinical academic has not been well-described (16), and measures of success emphasise research outputs without considering a more holistic view of the clinical academic (17). An emphasis on research outputs puts clinical academics at a disadvantage compared to those who are engaged in full-time research, and fails to acknowledge excellence in other key areas such as teaching (18). There exists a lack of governance and specific credentialling for clinical academics: credentialling occurs separately in the clinical and scientific domains (16). Many countries lack a clear career pathway from graduation to consultant level, and the work of the clinical academic is in danger of being undervalued and under-resourced. Discrimination on the basis of gender is as much an issue in academic medicine as it is in other professions (19), and discrimination limits access to talent.

This thesis will explore the role and identity of the clinical academic and investigate strategies to nurture aspiring clinical academics from an early career stage. Chapter 2 is a concept analysis which reviews current scientific literature to explore use of the term clinical academic and uncover a consensus around the meaning of the term. Antecedents and consequences arising from the concept are described and model, borderline, related and contrary cases further explore the meaning.

Chapter 3 explores the role and identity of the clinical academic. A constructivist technique based on Personal Construct Theory (PCT) is employed. Structured interviews were carried out using Repertory Grid Technique (RGT) with clinical academics at various career stages, representing multiple specialties, to investigate their construal of successful clinical academic practice. A consensus on the attributes which are most central to successful clinical academic practice was established by statistically analysing each of the individual grids and then performing an aggregate analysis. Social Cognitive Career Theory (SCCT) provided a theoretical framework for the interpretation of findings.

Chapter 4 describes the creation and evaluation of a combined clinical academic training programme for junior doctors, the Academic Internship Track (AIT). The programme is evaluated using the CIPP (Content, Input, Process and Product) model. The need for a combined clinical academic training programme at the earliest career stage, involvement and feedback from key stakeholders, the aims of the programme, and its design including a curriculum and competitive recruitment process are described. Exit feedback and scientific outputs of former participants are measured through peer-reviewed publications as a way of evaluating the success of the programme.

The issue of gender equality in academic medicine is explored in Chapter 5. Gender bias is known to exist in almost all professions, and academic medicine is no different. Senior female clinical academics are outnumbered by male (20, 21). Same-gender mentorship is often recommended, but there remains little evidence that it is effective in addressing gender balance (22) and because female faculty are significantly outnumbered by male in the most senior positions, same-gender mentoring could result in female faculty being disproportionately allocated mentoring duties at the expense of activities which could further their own careers, e.g., publication. A real world resumé study which investigates recruitment to the AIT for evidence of gender bias and explores whether anonymising applications to the AIT could lead to an improvement in gender balance is described. An investigation into whether applicants to the AIT are more likely to seek same-gender supervisors is also conducted.

Up to January 2020, healthcare was facing numerous challenges including increasing antimicrobial resistance, escalating incidence of chronic diseases, growing healthcare costs and the known and unknown health effects of climate change. These concerns have been overshadowed by the global crisis that is the COVID-19 pandemic which as of 26th April 2022 has infected over 508 million globally and caused over 6.2 million deaths (23). Leading the fight against COVID are many clinical academics. As early as January 2020, clinical academics working in respiratory medicine, critical care and emergency medicine in China published guidance on the diagnosis and treatment of this novel pathogen, making their knowledge based on experience and observations of patient care available to the international healthcare community (24, 25). Emergency medicine doctors from Italy led by associate professor and anaesthetist Dr Giuseppe Foti were among the first to report the benefits of prone positioning for COVID patients (26); clinical academics Peter Horby and Martin Landray, led the RECOVERY trial which reported dexamethasone as being the first drug identified to reduce COVID mortality (27). Closer to home, Consultant Haematologist in St James's Hospital, Professor James O'Donnell, is leading the ground-breaking Irish COVID-19 Vasculopathy Study (iCVS) (28). It is possible that these studies were at inspired by the clinical experience of managing COVID patients and facilitated by access to such patients, highlighting the benefits of combined clinical and academic practice. As we deal with the challenges the pandemic has brought, it is timely to reflect on the role of the clinical academic in our society and consider how the workforce may be supported now and into the future.

Chapter 2: Clinical academic: A concept analysis

2.1 Background

2.1.1 Clinical academics: an “endangered species”

Clinical academics occupy a crucial role within healthcare. Remaining in active clinical practice while simultaneously carrying out research allows academic clinicians identify important and emerging questions and retain an invaluable connection to the end users of the products of their discoveries (1). However, the term clinical academic, while widely used, is ill-defined and can vary between individuals, across institutions and countries. There are many other similar terms such as clinician scientist, clinician investigator and physician investigator; these terms are often used interchangeably and can add to the confusion.

It has been recognised for over 40 years that the clinical academic workforce is under threat, and clinical academics are at risk of becoming an “endangered species”. In the US, MD applicants for National Institutes of Health grants have been decreasing since the 1970, with a corresponding significant increase in (non-MD) PhD applicants (15), and increased investments by the NIH in medical research have not necessarily led to increases in new treatments and cures (29, 30). The challenges of combining a clinical and academic career have been well-described and include difficulties securing research funding (18, 31, 32), pay disparity (33, 34), prolonged training (31, 35), and institutions and funding bodies which undervalue the role of the clinical academic in furthering knowledge of human disease and translating research from the bench to the bedside (18).

Another challenge facing clinical academics is the lack of specific credentialling for the role; credentialling occurs in the separate domains of clinical practice and research. There is a lack of governance and regulation of clinical academics which in turn threatens the professional identity of the clinical academic and potentially leads to lack of job sustainability (16, 31). The problem is even greater for the non-physician clinical academics, whose roles can be even less recognised and supported than their medical counterparts (16, 36).

In 2017, a meeting of an international group of experts to discuss gaps in the understanding of the role of the clinician scientists recognised the lack of a consensus definition of the term. It identified the exploration of the role and definition of the term as important areas of future research (31). This definition could contribute to forming the basis of a professional identity so that the appropriate recognition and governance structures can be implemented, and the resources required to support this workforce be more readily identified.

2.1.2 Concept analysis

The definition of a concept has occupied philosophers as far back as Aristotle, who stated that a concept was “an abstraction composed of unchanging and essential elements or objects”. More recent thinking holds that the content of a concept is closely related to its linguistic use, however concepts are not words themselves, but mental images of phenomena, and therefore can only have pure expression in the mind of an individual. Nonetheless there must exist a general consensus about the meaning of a concept if understanding is to be achieved (37). It is this consensus that is sought during concept analysis. One of the aims of this thesis is to investigate how the term clinical academic is currently understood; therefore, concept analysis is the most appropriate approach to explore this question.

Concept analysis refers to a process by which the use of a concept is clarified which allows for a more precise discussion and use of the term (38). Concept analysis seeks to distinguish between concepts and identify the specific attributes of a concept and its relationship to similar concepts (39). There are several different approaches to concept analysis; Walker and Avant’s 8-step model (2005) was chosen as it is the most widely used approach in nursing (39) (concept analysis is infrequently undertaken in medicine), and offers a rigorous and structured approach.

2.2 Aims

This concept analysis aims to contribute to the understanding of the roles of the clinical academic and help develop a holistic view of the professional identity of clinical academics by reviewing the current usage of the term in

the literature. A greater understanding of the roles and identity of clinical academics may inform curriculum development and the assessment and regulation of clinical academics.

2.2.1 Objectives

1. Contribute to a definition of the term clinical academic and identify key attributes
2. Describe antecedents to the role and consequences arising because of the work of clinical academics
3. Describe model, borderline, related and contrary cases to further explore the meaning of the term clinical academic
4. Describe empiric referents for the role of the clinical academic (empiric referents are phenomena which demonstrate the existence of the role)

2.3 Methodology

2.3.1 Framework

Walker and Avant define concepts as “categories of information that contain defining attributes”, and concept analysis is the “formal linguistic exercise that enables delineation of these defining characteristics or attributes”. The outcome is always tentative because concepts may evolve over time, and different researchers may reach different conclusions about the defining attributes of a concept (37). Therefore, this method is appropriate for analysing the term clinical academic, which is a role that is continuously evolving and may change in the future.

The eight steps of Walker and Avant’s method comprise:

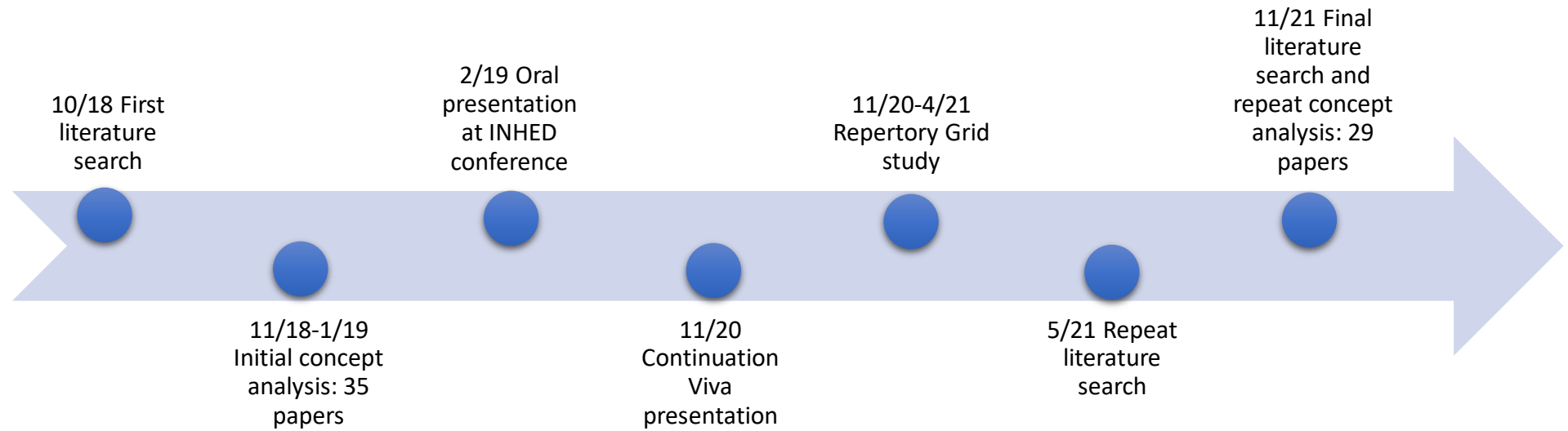
1. selection of a concept
2. determining the aims or purposes of analysis
3. identifying all uses of the concept that can be discovered
4. determining the defining attributes
5. identifying a model case

6. identifying borderline, related, contrary, invented, and illegitimate cases
7. identifying antecedents and consequences
8. defining empirical referents (40).

2.3.2 Literature review

Two separate literature searches and analyses were conducted 2 and a half years apart: the first in October/November of 2018, and the second in May 2021. The second literature search was conducted to take into account the fact that the use of the term may have evolved over time and to incorporate some important studies which had been published in the interim. Findings from the initial concept analysis had been presented at a healthcare professionals' conferences (INHED, 2019) and at a Continuation Viva (November 2020), and feedback from both presentations was incorporated into the repeat analysis in 2021. Furthermore, the repertory grid study (Chapter 3) had been conducted in the interim, this informed the second literature search and analysis. See Fig. 2.1 for a timeline of how the concept analysis evolved. For a full list of studies used in each analysis, please see Appendix 1.

Fig. 2.1: Timeline of evolution of concept analysis



The term academic clinician was initially selected for analysis. However, a search of the scientific literature (PubMed) using this term alone uncovered only ten articles, the majority of which were over twenty years old. A brief search using the term clinical academic found almost 100 articles and therefore this term was selected for analysis instead.

A search to check for usage of the term clinical academic and similar (academic clinician, clinician investigator) in non-scientific literature was conducted using Google, however the first twenty results related only to scientific publications with no use of the term in non-scientific literature; thereafter the search was limited to scientific literature.

2.3.2.1 Literature search 2018

A search of two databases (PubMed and EMBASE) was conducted using the terms clinical academic/academician, academic clinician, clinical faculty, physician investigator, clinician scientist, clinician educator, clinical competence, professional competence, attribute, career path, clinical education, teacher, or teaching. Only English language papers published in the previous 20 years were included. Eighty-nine articles in total were retrieved using this strategy. Titles and abstracts were reviewed for all eighty-nine papers. A further search using just Clinical academic (Title) alone found ten further studies not found in the previous search which were also reviewed. Reviewing the bibliographies of relevant studies resulted in two further papers of relevance being found. In total thirty-five papers were deemed most relevant by the reviewer and were downloaded for full analysis (Appendix 1).

2.3.2.2 Literature search 2021

Reflection on feedback obtained on the first literature search led to the incorporation of additional databases to ensure non-medical healthcare literature is adequately represented. The term Professional Identity was also identified as an important part of the search. The new search strategy was expanded to include three additional databases: Scopus, CINAHL and the Cochrane library. Similar terms were used including clinical academic, academic clinician, physician investigator, and clinician scientist with the addition of professional identity in a final search in November 2021. Only English language papers were included. Because this search was an update of

a previous search, only papers from the previous 10 years were included. A total of 1,165 articles were returned using this strategy. Following review of titles and abstracts and removal of duplicates, 74 were deemed to be relevant. A further review of the content of the papers resulted in a total of 29 being imported for analysis (Fig. 2.2). There was an overlap of only 3 papers with the previous search (Hall, 2017; McKinney, 2017 and Sherbino, 2014). Of the 26 papers included, 19 referred to doctors, 4 to nurses, 2 to doctors, nurses and allied health care professionals and one was ambiguous. Papers were written by authors based in the USA, UK, New Zealand, the Netherlands, Canada, and Germany.

A full list of articles used from both literature searches is available in Appendix 1.

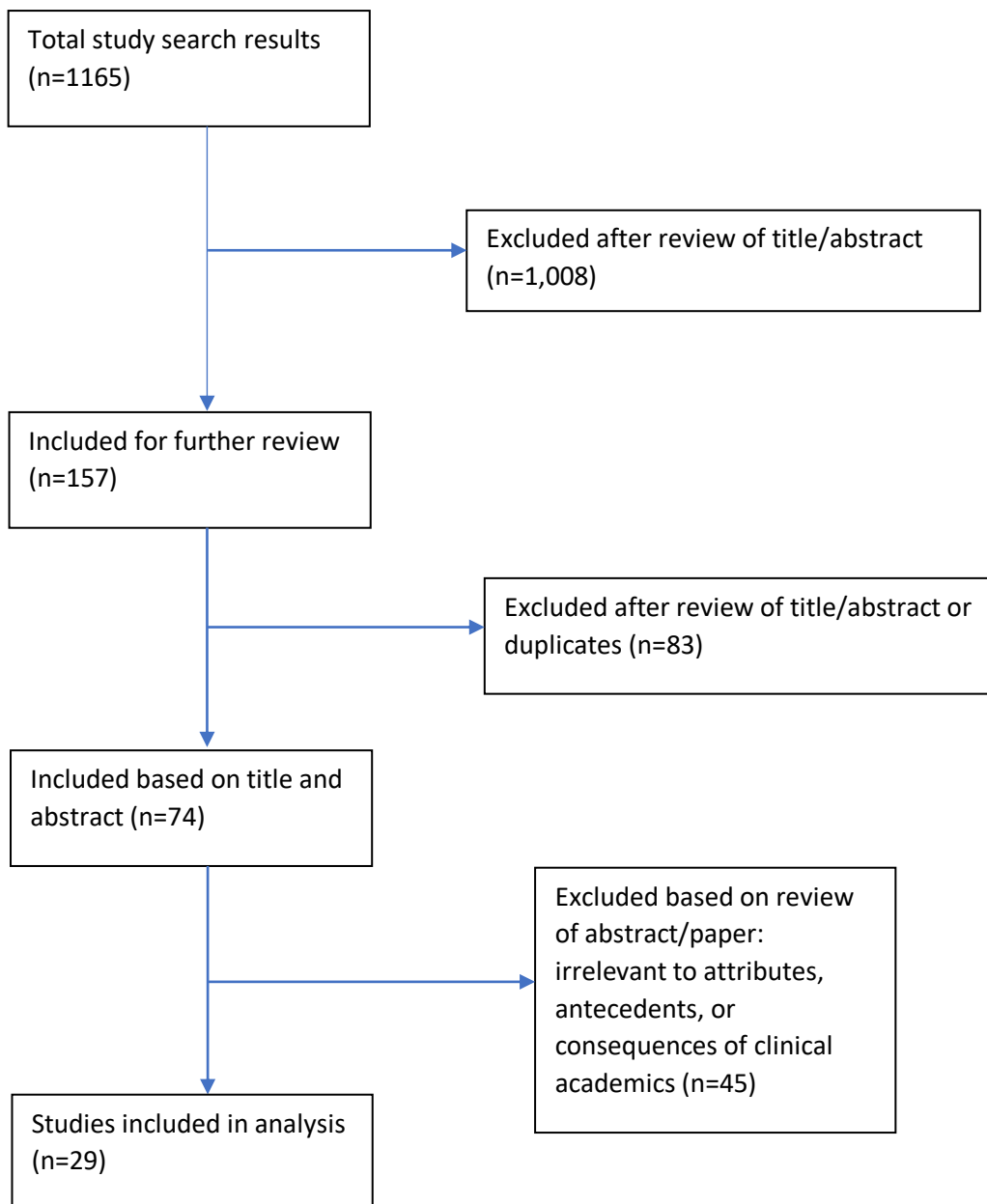


Fig. 2.2: Flowchart of the study selection process 2021

2.3.3 Data management and analysis

A qualitative data analysis software package, NVivo (released in March 2020)(41) was used to manage the data. Articles were downloaded in PDF format, imported to NVivo, and relevant sections coded accordingly into nodes. Nodes were organised according to Walker and Avant's method into Antecedents, Attributes, Consequences and Other terms. Nodes were reviewed repeatedly until categories within each framework were identified and organised finally into overarching themes. A separate data analysis was carried out for each literature review.

2.4 Results

2.4.1 Other terms

Upon reviewing of the literature, numerous similar but distinct terms were discovered. These included clinician-investigators (11, 42), physician-scientists (43), physician-investigators (44), academic clinician scientists (45), clinician-educators (45), clinical researchers (44), clinical faculty (46-48), and clinician scientists (18, 44, 49). Terminology usually incorporates two words, e.g. physician and investigator, and there are many combinations which can have different meanings, e.g. physician-investigator, clinician-investigator, physician-scientist, clinician-scientist, however there is no consensus on the meaning of the individual words making up the term, for instance "clinician" can refer exclusively to physicians or can include other health care practitioners, as in "clinician-scientist" (physicians)(18, 44) and "clinician-investigator" (physicians and other health care practitioners)(42). To add to the confusion, some terms such as physician-scientist and clinician-investigator are used interchangeably (18, 42, 44), and other terms such as clinical-researcher can have more than one meaning (18, 44, 49). Some of the more commonly used terms along with their meanings are listed below in Table 1.1.

Term	Definition
Physician investigator	Broad term encompassing clinical researchers, clinician-scientists and physician-scientists but excluding non-medical health care professionals (18, 44)
Clinical researcher	Physicians who work clinically and conduct patient-centred research(18, 44), alternatively: A health care professional or scientist who runs clinical research trials (49)
Clinician scientist	Physicians who work clinically and conduct lab-based research (18, 44)
Physician scientist	Physicians who spend the majority of their time in funded biomedical research (43, 44)
Clinician investigator	Similar to physician scientist but can also include non-physician health care practitioners (42)
Academic clinician scientist	Clinician scientists who have an institutional requirement to teach (45)
Clinician-educator	Clinicians who are employed by the health service and have a primarily clinical role but are also heavily involved in teaching and supervision (1, 45)
Clinical faculty	Lacks single definition but tends to refer to university staff who teach health care professional students in a clinical setting with or without additional clinical and/or research duties (46-48)

Table 1.1: Other terms and their definitions

Terms can also take on different meanings depending on where they are used, for example “physician-investigator” is a commonly used term in the USA and

includes both medical practitioners (internists) and surgeons, whereas usage of this term in other regions would exclude surgeons.

Clinician-scientist appears to be the most widely used term in current literature, presumably because it incorporates all healthcare professionals, not just medical. Out of all these terms, clinician-investigator and physician-investigator are closest to the term clinical academic in terms of use.

2.4.2 Defining attributes

Clinical academics may come from a medical, nursing, dental or allied health care professional background, but most of the literature discusses clinical academics from a medical background, with a scarcity of information on other health care professionals who combine clinical practice with research.

Following data extraction from the 29 articles in the most recent literature review, the following themes were identified:

1. Tripartite role
2. Motivation to combine academic work with clinical practice
3. Specific professional and personal characteristics of successful clinical academics

These three defining attributes set clinical academics apart from other clinicians and researchers and help us work towards a greater understanding of the professional identity of the clinical academic.

2.4.2.1 Tripartite role

2.4.2.1.1 Triple threat: Clinical practice, research, and teaching

The traditional view of the clinical academic is the Oslerian ideal of a clinical practitioner who is involved in both clinical research and teaching, also known as the “triple threat”. This view still predominates in the literature; however, the nature of the role may be evolving: clinical work is becoming more complex and time-consuming and this, combined with the administrative duties which often accompany an academic position, can leave little time to focus on clinical research (33, 34). Moreover, there are those who draw a distinction between the “clinical researcher”, a clinician without an additional research qualification who spends time engaged in clinical research; the

“clinician-scientist”, a clinician with a research qualification who spends time engaged in lab-based or other non-patient facing research; and lastly the “physician-scientist”, a clinician who spends all of their time engaged in research (18). It is possible in the future that, as all aspects of the role of the clinical academic increase in complexity, new roles will emerge which are narrower in scope than the traditional “triple threat”: we already have clinician-educators and clinician-scientists; a future concept analysis could find terms such as clinician-researcher and educator-administrator emerging. For now, the traditional view of the clinical academic as a “health professional who works within and across both clinical and academic environments” (50, 51) still prevails.

2.4.2.1.2 Balance between clinical and academic work

Recommendations for the amount of time spent engaged in academic work vary greatly, from as little as 0.5-1 day per week (52) up to 80% of a 40-hour week (53), although a commonly accepted benchmark internationally is 75% of the week, the amount of time that National Institutes of Health (NIH) K grant recipients are expected to spend engaged in research (52, 53). Despite the reduced time spent in clinical work compared to full-time clinicians, clinical academics are still expected to be experts in their field (54). This level of research engagement can be a particular challenge for clinicians practicing in technical, procedure-based specialties who need to undertake a certain number of cases to maintain their skills. It is most likely that the balance between time spent in clinical work and research changes as clinical academics progress through their career (43). Furthermore, a narrowly-defined scope of practice, as opposed to generalist practice, may be suitable for clinicians who are required to spend a significant bulk of time away from direct patient care (53).

2.4.2.1.3 Research attributes

Clinical academics often, though not always, hold an additional research qualification (42). They are expected to show leadership, run their own research programmes, and to continually contribute to their field (34). Research publications are considered important to maximise impact on the scientific community (32, 34, 50, 54). They must ensure their research is adequately resourced, and hence they are required to be successful in securing

research funding (33, 34). An additional attribute, specific to the clinical academic, is that they are often well-positioned to observe the outcomes of innovations in treatments, both their own and the innovations of others, and can therefore improve these innovations even further (54).

2.4.2.1.4 Teaching skills

While teaching remains central to the role of the clinical academic, it is also recognised that the duty of teaching the next generation belongs to all clinicians (34). Clinical academics tend to identify teaching as a key part of their professional identity (30, 32, 53, 54), but perhaps here again a further distinction should be drawn. References to teaching in the papers reviewed here encompass diverse activities such as lecturing undergraduates, postgraduate clinical training, dissemination of research findings, research supervision and mentorship. There is an emerging view that much of the work of teaching, particularly undergraduate teaching which represents a substantial workload, should be shared more with full-time clinical colleagues, leaving clinical academics to focus on their research and the areas in medical education where they are uniquely positioned to contribute, e.g., research supervision, mentorship and training the next generation of clinical academics (34, 53). Full-time clinicians are unlikely to see it this way however, and they are not necessarily contractually obliged to deliver teaching, so further refinement of this view is required.

2.4.2.2 Motivation to combine academic work with clinical practice

Investigation of the defining attributes of clinical academics requires consideration of the reasons why one may be drawn to a career path which is arguably more difficult and less certain than the alternative, a career focussed solely on clinical practice. Social Cognitive Career Theory or SCCT (Lent, Brown, and Hackett, 1994) is founded on the principles of Bandura's Social Cognitive Theory (SCT) and identifies three social cognitive mechanisms that are relevant for career development: self-efficacy beliefs ("can I do this?"), outcome expectations ("what will happen if I do this?"), and goal representations (career aspirations). Career interest develops when learning experiences arise from person-environment interactions and influence self-efficacy and outcome expectations (55). This process can take many years (56), underscoring the importance of early exposure to clinical research. Indeed, early exposure to

research is mentioned several times in the literature as an important encouraging factor (42, 43, 50, 57).

Clinical academics are thought to be intrinsically motivated to pursue combined clinical and academic practice by virtue of two personal traits: curiosity and altruism. Clinical academics describe a passion for answering research questions (32), and it is their innate curiosity that helps drive both their motivation to conduct clinical research and their research discoveries (34, 43, 52, 58); at the same time they are also driven by a desire to help others and improve patient care (30, 32, 43). That they are intrinsically motivated is also important: Self-Determination Theory (SDT, Ryan and Deci) tells us that intrinsic motivation (IM) is a particular type of motivation, referring to the state of doing an activity for the inherent satisfaction of doing the activity itself. Intrinsic motivation can result in enhanced performance, perseverance, creativity, and overall improvements in well-being; conditions that support autonomy and competence can foster intrinsic motivation. Meanwhile, individuals who are being motivated externally by rewards, incentives or punishments and threats (e.g. deadlines, pressured evaluations and imposed goals) are less likely to perform to the same standard (59). In considering the supports required to maintain intrinsic motivation in clinical academics, removal of barriers and obstacles will likely be more important than punishments or rewards.

2.4.2.3 Specific personal and professional characteristics

There are personal and professional characteristics which, although they may not be unique to clinical academics, are specifically required for success in this role. These characteristics include innovation, perseverance, an ability to navigate dual identities, and professional attributes including an ability to collaborate and excellent time management.

2.4.2.3.1 Innovation

Clinical academics hold an overarching view of a healthcare specialty, and this allows them, through clinical observations, to identify complex clinical problems which are unsolved or thought unsolvable (30, 54). They challenge dogma and assumptions in clinical care, and their observations can lead to innovations such as new treatments or new understanding of a clinical

problem. They also observe the outcomes of their innovations and the innovations of others (30, 34, 54).

2.4.2.3.2 Perseverance

Perseverance and dedication appear to be key requirements of successful clinical academics (34, 54), and some of the most successful in their field list multiple setbacks, delays, and rejections along their career pathway. For example, Joseph Coselli, a vascular surgeon and academic who discovered that CSF drainage during thoracoabdominal aortic aneurysm repair could significantly reduce the rate of post-operative paraplegia, overcame the disappointing results of a major 30 year clinical trial, as well as several institutional board rejections, to revisit the question and look at the problem in a different light: draining CSF according to intracranial pressure as opposed to volume as had been done in the first study. The findings of this and subsequent studies transformed the way in which the operation was carried out and remains the only intervention that is recommended as a means of reducing the risk of post-operative paraplegia (54), yet without perseverance, this discovery may never have been made.

2.4.2.3.3 Navigating dual identities

Clinical academics occupy a challenging position in bridging the worlds of clinical practice and scientific research; because they don't work full-time in either role it can be difficult to achieve the same outputs as individuals working full-time in one of these roles. Furthermore, the academic environment differs significantly from the clinical environment socially, culturally, and epistemologically, and navigating each environment successfully requires a different set of skills. However, the act of crossing boundaries between these two worlds, known as the broker role, leads to valuable learning, new perspectives, insights and collaborations which can result in innovations (30).

Although they can successfully navigate both roles, studies have found that clinical academics tend to identify primarily as clinicians rather than as scientists. Their research is reflective of their clinical discipline, and their ultimate goal in conducting research is usually to improve patient care, as opposed to the generation of scientific knowledge (30, 43). Combined practice

allows clinical academics to retain their identities as clinical practitioners, underpinning the work they do as researchers.

2.4.2.3.4 Professional attributes

While there may be significant overlap in the professional attributes of clinical academics and full-time clinicians, there are some skills that are of particular importance to clinical academics. Building relationships and collaborations is a key skill, and increasingly the most successful researchers are those that collaborate across disciplines, universities, and countries (34, 60). Efficiency and good time management, while essential for all clinicians and researchers, may be of particular importance when balancing the multiple competing demands of a clinical academic role (34, 53).

2.4.3 Cases

2.4.3.1 Model Case: *Clinical academic*

The next stage in Walker and Avant's approach to concept analysis is identification of a model case which is *"an example of the use of the concept that demonstrates all the defining attributes of the concept"* (40). The following case is based on a real-life clinical academic, Professor Louise Gallagher. Professor Gallagher has consented for her biography to be included here and has received a copy of this chapter.

Louise Gallagher (MB MRCPsych PhD FTCD) is Chair of Child and Adolescent Psychiatry in Trinity College Dublin and a Consultant Child Psychiatrist in Children's Health Ireland at Tallaght Hospital. She completed a PhD in genetics of autism. She leads the Autism and Rare Neurodevelopmental Disorders group at Trinity College Dublin. Her research group studies the relationships between genes, mental health and behaviour using genomics, MRI, EEG, and neurocognitive assessment. Her work has contributed to the understanding of the role of common and rare genetic factors to autism and other neurodevelopmental conditions, particularly understanding the relationships between genetic risks, endophenotypes and symptoms. Clinically she leads a specialist neurodevelopmental assessment pathway at Children's Health Ireland at Tallaght Hospital. In her role as Chair of Child and Adolescent Psychiatry in Trinity College Dublin, she is involved in teaching undergraduate and postgraduate healthcare students.

2.4.3.2 Borderline case: Full-time clinician

Walker and Avant's method requires the identification of additional cases, including borderline, related and illegitimate cases. All the following cases are purely fictional. A **borderline case** is an example that contains most, but not all, of the defining attributes of the concept (40):

James Smyth is clinical nurse specialist in oncology working in a large tertiary care centre. As well as his nursing degree, he holds a postgraduate diploma in cancer nursing. During his nursing training, he participated in a research project on the support needs of family carers of patients with advanced cancer; he was first author on the resulting peer-reviewed publication and presented the findings at an international conference. He enjoyed working on this project, but since qualifying, he has been working clinically full-time and hasn't had time to work on other research projects. Although he is often called on to help assess patients enrolled on cancer clinical trials, he is not involved in any of the patient recruitment. He engages often with nursing and medical students on placement on the Oncology Day Ward and oncology team and likes teaching. He also delivers lectures on cancer care to general nursing staff in his hospital. He prepares these lectures on his own time. He enjoys his job although it is busy; he likes being part of a multidisciplinary team providing high quality care.

2.4.3.3 Related case: Clinical researcher

Related cases are examples of concepts that are related to the concept but do not contain all of the defining attributes – they demonstrate ideas that are very similar to the main concept but differ from them when examined closely (40).

Professor Cynthia Long is a researcher working in the neuroscience department of the Faculty of Health sciences at a large university. She graduated with a degree in science and subsequently a PhD in Neuroscience and spent some time as a postdoctoral researcher. She now works as an Associate Professor in the Neurosciences department. Her research interests lie in uncovering the role of inflammatory cells in Alzheimer's disease and through her work she has made some exciting discoveries which have the potential to impact upon patient care. She is working currently on several

large international collaborations involving researchers from multiple disciplines. She provides teaching to undergraduate and postgraduate medical and neurosciences students and is seen as a leader in her field.

2.4.3.4 Contrary case

Contrary cases are said to be “not the concept” – it can be said of a contrary case, “whatever the concept is, that is certainly not an instance of it” (40).

Dr. Alex Lee is an SHO on the endocrinology team. He wishes to pursue a career in internal medicine. He wants to do a research project to help build his CV and has recently started to gather data for an audit on insulin prescribing in his hospital. His team have not been consulted on this project and he has neglected some of his clinical duties in gathering this data. He has not been granted protected time to undertake this work. His study is not well designed, but he prefers to work alone rather than ask for help; he has attempted similar projects in the past but has never managed to bring one to completion. It is unclear how his findings might contribute to patient care. There are some 3rd year medical students attached to his team, but he is too busy to engage with them.

2.4.4 Antecedents

The next step in the process is the identification of antecedents and consequences. Antecedents are said to be “*events or incidents that must occur or be in place prior to the occurrence of the concept*” (40). Antecedents to clinical academics have been organised into three groups:

1. Appropriate training
2. A supportive work environment
3. Adequate investment in the role

2.4.4.1 Appropriate Training

Prolonged training to obtain both clinical and research expertise has been cited as a barrier to a career as a clinical academic (31, 35), and combining clinical and academic training in a single pathway (e.g., MD-PhD programmes) is a successful strategy to provide appropriate training of shorter duration (31, 61). Combined programmes can also provide experience of balancing the dual roles of clinician and academic, and help foster a sense of community among

aspiring clinical academics (61), contributing to the development of a professional identity. Curricula of clinical academic training programmes could include elements such as guided reflection, collaborative environments, peer-to-peer support, role-modelling and mentoring (16).

In addition to providing dedicated pathways, it is recommended that specific research training form part of all clinicians' training at both undergraduate and postgraduate levels. In order to compete with basic scientists, clinicians need to be well-versed in methodologies of both the basic sciences and clinical research (62). Exposure to research training should begin early, in keeping with recommendations based on SCCT (43), but specialist training could also include dedicated research training for postgraduate trainees (60).

Trainee and established clinical academics could also benefit from dedicated professional development programmes, such as programmes aimed at supporting the transition of trainees into faculty positions (53). Other successful professional development programmes for clinical academics have incorporated training on career advancements and academic promotions, budget planning, and funding identification (48). In addition to providing training and information to clinical academic faculty, these dedicated programmes can help convey the value placed by the institution on the role of the clinical academic (53).

Mentoring plays a key role in supporting the careers of trainee clinical academics (31, 43). The benefits of mentorship include improved problem-solving, access to professional networks and career opportunities, and enhanced well-being and self-confidence. Furthermore, mentors can act as a role model, providing the mentee with a greater understanding of what is expected of a clinical academic (50, 63). Mentoring needs are diverse, and this should be reflected by the availability of mentors from different backgrounds (60, 61). Mentors themselves need support and adequate training if they are to fulfil this critical role (48).

2.4.4.2 Supportive work environment

Clinical academics require a work environment that is supportive of their specific needs: institutions should demonstrate that they value the role of the clinical academic, for example, by providing dedicated professional

development supports as outlined above. Institutions can promote public recognition of clinical academics, for example, through the creation of internal awards or publicising innovations led by clinical academics (53). Encouraging and facilitating collaborations (43, 61), particularly interdisciplinary collaborations (35), and fostering a sense of community among clinical academics (53) will also enhance the working environment. Where the dual role of the clinical academic is not already well-established, institutions should strive to embed the concept of dual practice and avoid forcing clinical academics to choose between full-time clinical practice or full-time research (30, 50).

A supportive work environment facilitates role-modelling by providing opportunities for established clinical academics to interact with trainees (61). Clinical academics who wish to prioritize family life can be supported by the creation of flexible job opportunities (57); this and other initiatives such as subsidized child-care can encourage more trainees to pursue this career path (61).

One study found that major predictors of intent to leave academic medicine included: “lack of work-life balance, absence of faculty development, lack of recognition of clinical work or teaching roles in promotion evaluation, and the absence of an ‘academic community’” (33). In working to create a work environment which actively supports the role of the clinical academic, institutions can overcome these barriers to prevent loss of faculty and attract talented trainees to a clinical academic career.

2.4.4.3 Adequate investment

For the role of the clinical academic to exist, there needs to be adequate investment by the relevant government organisations and institutions. In the first instance, job opportunities are required, and may need to be created de novo, particularly for non-medical health care disciplines (36). These posts ideally will have adequate protected time away from clinical duties; this will not only facilitate clinical research (52) but will also allow for professional development, skills training, and may contribute to feelings of competence and motivation (43, 48, 50). Investment may be required to provide the appropriate research infrastructure including research assistants, statistical

support, and resources for starting projects (48, 52, 60). If a disparity in pay between clinical academics and their full-time clinical counterparts exists, investment may help address this and avoid the loss of staff to full time clinical roles (33, 60).

Investment in research is also required, but current funding structures may disadvantage those in a dual role. The challenges of competing for funding and the associated lack of security and stability are cited as major barriers to pursuing a clinical academic career (32). Further, early career researchers can be disadvantaged by processes which favour well-established groups with significant track-records (34). It is possible that new approaches such as the Declaration on Research Assessment (DORA) compliant CV, with its emphasis on research impact and patient and public involvement, could help clinical academics overcome this disadvantage, however the impact of implementing this approach on clinical academics has yet to be established. In the meantime, there have been calls to consider developing or expanding funding models which providing funding streams for early-career clinical academics with clinically orientated projects (60).

2.4.5 Consequences

Consequences are outcomes, or events that arise as a result of the existence of concept, clinical academics (40). Consequences of the role of the clinical academic can be divided into consequences for patients, consequences for students, and consequences for clinicians.

2.4.5.1 Consequences for patients

The development of new cures for human disease is one of the most significant consequences of the role of the clinical academic. Clinical research has also contributed significantly to scientific understanding of the human body and human pathology; moreover, new, and innovative treatments and improvements in patient care have the potential to impact the lives of many. Perhaps the most famous example of this is Alexander Fleming who trained as a physician and combined clinical practice with clinical research, one output of which was the discovery of penicillin (64). More recently, clinical academics made substantial contributions in the treatment of COVID, providing evidence

for management strategies such as proning and the use of dexamethasone (26, 27).

Clinical academics ensure that the needs of the patient remain central to clinical research. Clinician-led research projects funded by the NIH are twice as likely to involve human subjects compared to projects led by scientists with non-clinical degrees (42). Through their dual professional identities, clinical academics can identify research questions that are pertinent to patient care (30, 36, 65), they are well-positioned to collect data from their patient populations, and they can influence research teams so that the patients' perspective and the translation and implementation of the research findings remain to the forefront (30). Clinical academics help ensure that discoveries made in the basic sciences translate to advances in healthcare which benefit patients, key stakeholders including the healthcare system and funding bodies, and society in general.

2.4.5.2 Consequences for students

Clinical academics contribute to healthcare education by passing on their expertise of both clinical practice and research skills. They deliver clinically relevant education and contribute to the training of both future clinicians and clinical academics (33, 36, 54). Through their training and mentorship, they have the potential to impact the lives of many students and trainees, and consequently their future patients; one paper profiling seven surgeon-scientists in one faculty describes that between them, they had listed over 1,300 mentees in their CVs. Clinical academics also disseminate their knowledge and discoveries widely: the same seven surgeon-scientists listed over 3,400 scientific presentations between them (54).

2.4.5.3 Consequences for clinicians

Clinical academics themselves benefit from being able to pursue their research interests, as combined clinical and academic practice is thought to protect against burnout. There is evidence to suggest that combining clinical practice with research leads to higher career satisfaction and lower rates of burnout across multiple specialties. However, it is noted that the combination of clinical and academic work alone is not enough to improve career satisfaction and prevent burnout: clinical academics need protected time for academic

activities, otherwise the beneficial effects of dual practice are outweighed by the increased workload (66).

The role of the clinical academic can have positive effects for colleagues, peers and for clinical academics themselves. A clinical academic who is well-informed of the latest innovations in their field can help keep their colleagues up to date. According to the Royal Australasian College of Surgeons, surgeon-scientists' research involvement leads to a more rigorous approach to everyday work, which in turn helps improve the quality of work done by colleagues (34), and there is evidence that research-active institutions are associated with lower mortality rates (67).

2.4.6 Empirical referents

The final step of Walker and Avant's approach to concept analysis is to define empirical referents for the concept. An empirical referent demonstrates the existence of the concept (40); empirical referents demonstrating the existence of the determining attributes of clinical attributes are described below.

2.4.6.1 Tripartite role

Individual contracts and job descriptions for clinical academics will allude to combined clinical and academic practice, and the availability of protected time to carry out academic activities. Research attributes, e.g., a research qualification, and teaching experience will be referred to in the job specification.

2.4.6.2 Motivation

There are many different types of motivation, and different methods to measure motivation depending on the type of motivation in question. Clinical academics can be considered both outcome-focussed and process-focussed: outcome-focussed where the outcome is benefitting patients, and process-focussed or intrinsically motivated because of the internal benefits (e.g., enjoyment) associate with the pursuit of their goals. Outcome-focussed motivation can be measured using behavioural indicators such as performance and persistence. The Intrinsic Motivation Inventory (IMI) can be used to measure intrinsic motivation by assessing the degree of enjoyment or interest, perceived competence, value/usefulness, effort, felt pressure and tension and perceived choice of an individual performing an activity (68).

2.4.6.3 Personal and professional characteristics

Innovation may be measured using an established tool, the Innovation Potential Indicator (69). Perseverance is a component of grit and can be measured using the Duckworth Grit Survey (70). The other characteristics of successful clinical academic practice such as successful navigation of dual identities and an ability to collaborate are evidenced by markers of job performance such as evaluations, promotions, and research outputs. A competency framework for clinical academics has been developed which incorporates 11 “function-specific competencies” (e.g., research role, teaching role, clinical role, and administrative role) and 5 “supporting competencies”, e.g., emotional intelligence, communication skills and professional ethics and integrity (71).

2.5 Discussion

2.5.1 Terminology

Many terms exist to describe the role of clinicians who engage in academic work. The meaning of the terms used can vary depending on the nature of the academic work undertaken or the primary employer, individual characteristics such as research qualification, and geographical region. The abundance of similar terms and the many variations of the role of the clinical academic can lead to confusion. Clarifying the meaning of the term clinical academic based on its current usage can contribute to the elucidation of the professional identity of clinical academics. Defining the professional identity of clinical academics is essential to understanding motivations to pursue this career pathway and help inform selection, training and career development strategies to help maintain this workforce (16).

Much of the literature on this topic is dispersed through specialty-specific journals, and the variations in terminology make it even more challenging to gather and collate information. “Clinical academic” is the term most used in Ireland, but it appears somewhat infrequently in the literature when referring to an individual (as opposed to a clinical academic centre or training programme). The terms “clinician-scientist” and “physician investigator” appear more frequently, however “clinician-scientist” may not recognise the educational role of the clinical academic, and “physician-investigator” excludes

other healthcare professions. A term which includes all healthcare professionals rather than focussing on a single group may be preferable as we move towards a greater emphasis on multidisciplinary team-led expertise, because it indicates an inclusive workforce, recognising the importance of nursing and allied health practitioners in this role and the benefits of interdisciplinary collaboration. For now, the term “clinical academic” may be the most inclusive descriptor as it incorporates all aspects of the role and includes practicing healthcare professionals from all disciplines. The agility of the phrase clinical academic was recently demonstrated when the Irish Clinical Academic Training (ICAT) programme expanded to incorporate dentistry and veterinary trainees as well as medical without having to amend the title.

2.5.2 The evolving role of the clinical academic

The tripartite view of the clinical academic, incorporating practice, research, and teaching, still predominates in the literature but increasingly there are calls to narrow the scope of clinical academics’ practice, focussing more on areas of practice, research, and education where they are uniquely positioned to contribute. These views are prompted by concerns about the workload of clinical academics, with all three components of the traditional role increasing in both in complexity and in the time required to perform effectively in all three areas. Moreover, it is increasingly recognised that the administrative duties of clinical academics also require a substantial amount of time and skill (33, 72), so the role truly consists of four parts rather than three. It is possible that a future concept analysis of clinical academics could find the attributes of the role more focussed and narrower in scope, recognising expertise in two areas rather than three or four.

Teaching is thought to remain central to the role of the clinical academic. There are suggestions that to avoid over-burdening clinical academics, this should be a shared responsibility with all clinicians (72). While there may be an ethical duty among all clinicians to teach, and they are usually very willing to teach, the reality is that in many jurisdictions teaching is a paid part of the academic role, and full-time clinicians may not be willing to adopt responsibility for training programmes. Since medical schools’ income is closely tied to the number of students taught, and medical student numbers have increased significantly in recent years (73), further consideration of the

balance between providing educational leadership and research leadership is required.

Clarity on the role of the clinical academic and attributes of successful clinical academics is relevant to selection for training programmes, recruitment, and promotion. These processes currently rely almost exclusively on research metrics (17, 74). The adoption of narrative CVs such as the Declaration of Research Assessment (DORA) compliant CV by funding bodies including Science Foundation Ireland (SFI) (75) indicates a move away from metrics such as the h-index, however the impact this will have on both established and trainee clinical academics has yet to be determined. Clinical academics might stand to benefit from a greater emphasis on research impact and patient and public involvement, however for those whose careers are well-established, attempting to retrofit a CV which has been geared towards research metrics for years may represent a significant challenge. The impact of this change warrants tracking.

2.5.3 The importance of Intrinsic Motivation

An interest in and establishment of a career as a clinical academic takes many years to develop (56). Overcoming shortages in the workforce will require investment in research training from the earliest undergraduate stages. Clinical academics are seen as being intrinsically motivated, so curriculum design could consider Self-Determination Theory or similar theories as a framework to support intrinsic motivation. Fostering intrinsic motivation requires that three psychological needs are met: autonomy (choosing the subject of enquiry), competence (feeling capable of mastering the skills required) and relatedness (belonging to a group and feeling valued by significant others) (76). Conversely, threats (e.g., deadlines), punishments and rewards are likely to have the opposite effect to what is desired (59). For example, offering students an opportunity to undertake a research elective in an area of interest to them, allowing them to perform meaningful tasks during the elective, and promoting relatedness by facilitating mentoring could all form part of a strategy to nurture future clinical academics from the earliest undergraduate stages.

2.5.4 Gaps in the literature

The revised literature search in 2021 included 5 healthcare databases: PubMed, Embase, CINAHL, Scopus and the Cochrane Library, and sought articles on all healthcare professionals who combine clinical practice with academic work. However, as in the first literature search, most studies concerned doctors, with fewer studies concerning nursing or allied health care professionals. It may be that the concept of dual clinical and academic practice is not well-established outside of medicine (77). There is substantial evidence that the model of combined clinical and academic practice confers significant benefits to patients (78), the healthcare systems (67), students (54), and clinicians (72), therefore it is imperative that opportunities to combine clinical and academic practice, along with the antecedents to the role, be made available to all healthcare professionals.

The literature describes a workforce which has been under threat for the past number of decades. Most papers put forward a case to help preserve and expand this workforce and identify barriers and challenges that need to be overcome, resulting in the prevailing view from the literature being overwhelmingly in support of this workforce. There is also a view that clinicians are unique in being able to identify pertinent research questions and generate new treatments, but this does not hold up to scrutiny; many treatments are developed by scientists in the pharmaceutical industry independent of clinicians. A balanced discussion is lacking: one which acknowledges that the role of the clinical academic confers advantages to the role-holder in keeping with social cognitive theories of career choice and development, e.g., salary, title, fulfilment and respect (56). The benefits of a combined role to patients, students and healthcare may be well understood by the clinical academic community, but papers which provide concrete examples of these benefits are relatively rare. Justifying the provision of additional resources to sustain this workforce may require a more open and balanced discussion of the benefits of the clinical academic workforce, and a strengthening of the evidence base to support this discussion.

2.5.5 Reflections on Walker and Avant's Framework

The Walker and Avant framework for concept analysis was chosen because it is one of the most widely used and published frameworks, and it offers a clear

step-by-step approach, and it emphasises the iterative nature of concept analysis which is appropriate for analysing the concept of a role such as the clinical academic which evolves over time. The framework has its roots in nursing theory, and has rarely been used outside of nursing (79); certain aspects may strike those with a non-nursing background as unusual or methodologically weak e.g., the use of cases. Most authors tend to create fictitious cases, but the validity of this approach is questionable. Describing a real person for the model case may be a way of grounding the concept analysis in the reality, but there are sensitivities which make it difficult to describe real people as “borderline” or “contrary” cases. Nonetheless, the use of cases may be a helpful way to explain the concept further by using examples.

A further criticism of this framework is that it has changed little since its initial development in the 1980’s (80) and that as an exercise that is focussed entirely on the literature, it doesn’t contribute any information that isn’t already known. Later concept analysis frameworks incorporate a literature search with fieldwork such as semi-structured interviews and combine all the data in a hybrid analysis, e.g., the Schwartz-Barcott and Kim model. However, concept analysis is not necessarily designed to provide a conclusive answer to the nature of a concept, and may instead be viewed as part of a process rather than the end point (81). It can therefore provide a useful foundation for further work, such as the interviews conducted for Chapter 3 exploring clinical academics’ construal of successful clinical academic practice.

2.5.6 Limitations

There are some limitations to this concept analysis. Articles were retrieved and analysed by one researcher only. This is not unusual in concept analysis and there are many published examples with only one author (82, 83), nonetheless incorporating a review from a second researcher may have enhanced the study. The existence of multiple similar terms for clinical academic made the literature search more complex and it is possible that important studies were missed if an unfamiliar term was used. Lastly, exclusion and inclusion criteria for papers included were not described at the outset because this is not part of the Walker and Avant framework, however, clearly defining these criteria may have enhanced this methodological approach.

2.6 Conclusion

The role of a clinical academic encompasses excellence in research, practice, and teaching, requiring innovation, perseverance, collaboration, efficiency, and an ability to navigate dual identities and balance competing demands for time. Clinical academics are likely to be intrinsically motivated to pursue their chosen path; however, they require adequate resources and institutional support if they are to persist in their goals. Resources include proper investment in research infrastructure, appropriate training pathways, professional development programmes and the availability of posts which facilitate combining clinical practice with academic work. Sustaining this workforce is critical because clinical academics are essential in translating research to patient care, improving our understanding of disease, and discovery and adoption of new cures and treatments which can impact the lives of many.

This concept analysis has reviewed current literature and triangulated descriptions of how the term clinical academic is used. It has provided exemplars that either embody or are contrary to the attributes of a clinical academic, and how it differs from similar and overlapping concepts at this point in time. Reflecting the evolving nature of concepts, this analysis has included two literature searches conducted 3 years apart (Fig. 2.1). To the best of my knowledge, this is the first attempt to define the role of the clinical academic based on current literature. This analysis brings some clarity to the concept of the clinical academic and contributes to understanding the importance of the role, the attributes of successful clinical academics and the resources required to sustain the role. The importance of Intrinsic Motivation as an antecedent to success is highlighted. This analysis may be seen as the starting point for further investigation into the attributes and identity of the clinical academic.

Chapter 3: An exploration of clinical academics' views on successful clinical academic practice using Repertory Grid Technique

3.1 Background

Chapter 2 provides a tentative description of the role of the clinical academic based on the usage of the term in scientific literature and offers a foundation for further exploration. This chapter approaches the question from the perspective of clinical academics at different career stages and investigates their construal of successful clinical academic practice, and the professional and personal characteristics required.

3.1.1 Clinical Academic Careers and Training: The Irish Context

Ireland is a small nation but it is home to 24 of the top 25 biotech and pharmaceutical companies in the world (84). Ireland has retained its reputation as a Strong Innovator in Europe in 2021 (85), and the Irish government has pledged to build a strong research and innovation base in Ireland with the aim of becoming a Global Innovation Leader (86). This has prompted expansion of the number of Health Research Board (HRB) funded physician-investigator awards; as a result academic capacity has increased in cancer, immunology, personalised medicine, neuroscience, ageing, bioinformatics and medical devices (87).

In Ireland, the academic internship (AIT), combined with the Irish Clinical Academic Training (ICAT) programme for Higher Specialist Trainees provides a limited but distinct pathway for aspiring clinical academics at graduation and from Higher Specialist Training (HST) to consultant level. The intervening years between internship and HST (Basic Specialist Training, or BST) do not offer a combined pathway currently. The 6-7 year ICAT programme offers trainees specialist clinical training combined with a PhD in their chosen field (88).

While it has been widely recognised that the clinical academic workforce is under threat (2, 3, 15), international experts have recommended strategies to sustain the role for the future. Research which helps define the identity of clinical academics can contribute to the recognition of the importance of the role of the clinical academic to health care, and to help position the role within

emerging academic health science systems. Exploring the factors and characteristics that support a successful clinical academic career will inform selection criteria for recruitment and promotion and support the career development of aspiring clinical academics.

3.1.2 Social Cognitive Career Theory and Career Success

Considering the factors which help determine career success requires an understanding of what is meant by career success. There are many definitions of career success which have evolved over time from objective measures such as traditional hierarchical progression (climbing the ladder), to incorporate subjective components of how an individual views his/her own success in the context of personal needs and values. Therefore, interpretations of career success vary between individuals. Social Cognitive Career Theory (SCCT, Lent et al 1994) combines internal and external factors (personal and environmental) which can help predict career success and therefore provides a useful framework for conceptualising career development interventions (89).

SCCT aims to integrate the various theories of career development and success to create a unifying model. Other models favour an individual, structural, or behavioural approach, however each of these models is limited in its ability to predict career success. In contrast, SCCT explains how personal and environmental factors all interact to shape career development, and prior work has shown that it can form a framework for measuring career success (55, 89). Furthermore, there is extensive evidence to support SCCT as a framework for understanding career-related behaviour and outcomes, and it has been shown to provide an effective theoretical foundation for exploring clinical academic career development (90, 91). Therefore, this model was chosen as the most appropriate for exploring determinants of success for clinical academics.

SCCT identifies three social cognitive mechanisms that are relevant for career development: self-efficacy beliefs, outcome expectations, and goal representations (55). There are three interlocking processes whereby (i) career interests develop, (ii) interests and other socio-cognitive mechanisms promote career-relevant choices, and (iii) varying levels of performance are achieved. Career interest develops when learning experiences arise from

person-environment interactions and influence self-efficacy and outcome expectations. Goals develop from relevant self-efficacy beliefs and outcomes expectations. Personal factors influence the nature and variety of learning experiences to which an individual is exposed. External factors such as supportive environmental conditions combine with personal factors to help shape career interest and determine performance attainment. Based on this model, Rasdi et al propose four factors to which can help predict career success: individual characteristics, organisational factors, learning experiences and person-environment interactions. Individual characteristics or personal factors (PF) include gender, work values and attributes. Organisational factors (OF) include career support and encouraging opportunities. Learning experiences shape competencies (C) and those who engage proactively with learning experiences are more likely to possess relevant competencies, therefore for senior staff, competencies can be considered equivalent to learning experiences (89). Person-environment fit (PEF) relates to compatibility between individuals and their work environment (92).

3.1.3 Methodological approaches: Personal Construct Theory and Repertory Grid Technique

Repertory Grid Technique (RGT) was chosen as a methodological approach because a survey technique wouldn't provide enough depth; semi-structured qualitative interviews would be prone to interviewer bias, and participants might struggle to identify multiple attributes without significant prompting. RGT has advantages over other approaches in that it combines both qualitative and quantitative methods to offer a robust analysis, it eliminates interviewer bias, participants essentially create their own questionnaire, and it gathers data not only on factors required for success, but the relative importance of each factor to the concept of successful practice. It is a methodology commonly employed in Job Analysis i.e., describing jobs and the attributes required to perform them, and provides the workers' perspective (93).

Personal Construct Theory (PCT) forms the theoretical foundation for Repertory Grid Technique. Initially described by Kelly in 1955, PCT is the idea that individuals construct the meaning of their own lives, and we are constantly creating, testing, and refining our personal theories, or construct systems, to make sense of the world around us and our place in it. Individuals

construct their own version of reality using a hierarchical system in which both the constructs themselves and the hierarchy into which they are organised are personal: some constructs are more important, or central, others are less important or peripheral (94, 95). PCT does not question the existence of the real world but holds that the individual views it through “transparent patterns or templates which he creates and then attempts to fit over the realities of which the world is composed”. These transparent patterns are constructs (96).

Constructs are the similarities and differences that define a phenomenon (97), they are therefore bipolar, e.g., old/young, rich/poor- a contrast is implied, and it is the contrast that gives constructs their uniqueness. Using personal construct methodology, it is possible to obtain a more holistic view of individuals’ meaning system than other, more traditional approaches can achieve (94). PCT has many applications: in education, for example, exploring the child’s view of the world; in organisations, for example, market research, vocational guidance and employee selection, and a wide range of other fields including social science (96).

Repertory grid technique (RGT) is an interview technique based on PCT. It is a structured interview procedure that allows an investigation into an individual’s personal construct system and the hierarchical structure of that process.

Researchers are provided with insight into the unique and subjective experience of the interviewee, at the same time it is possible to numerically compare grids and draw universal conclusions. It is the most widely used and researched constructivist technique to date, and numerous studies have confirmed its reliability by showing that constructs tend to remain stable over time (94).

3.2 Aims

This repertory grid study aims to explore clinical academics constructs of successful clinical academic practice. The objectives of the study are to:

1. Contribute to a definition of successful clinical academic practice
2. Identify the personal and environmental factors that contribute to a successful career as a clinical academic
3. Inform initiatives to support the career development of clinical academics

4. To address deficits in the concept analysis to move beyond fictitious model cases

3.3 Methodology

3.3.1 Participants

A qualitative study of perceptions of physician-scientists' success identified significant differences in the views of physician-scientists depending on gender and career stage (98). Therefore, to ensure views were representative of the group, purposive sampling was carried out and a balance between established and trainee clinical academics and male and female clinical academics was maintained. Established clinical academics were supervisors and directors on the ICAT programme, they have stated their identity as clinical academics on the ICAT website and have provided a CV for that purpose. Trainee clinical academics have successfully competed to enter a funded combined clinical academic training programme and are at HST level. Thus, different career stages from higher specialist training to full professorship were represented.

A list of established and trainee clinical academics was drawn up with the help of a director and programme manager of the ICAT programme and participants were purposively selected and invited to interview. Participants represented 10 different specialties and 2 healthcare systems (the HSE and NHS).

Participants were evenly divided between established and trainee clinical academics and male and female clinical academics (Table 3.1).

	Established	Trainee
Female	3	2
Male	2	3
Total	5	5

Table 3.1: Participant demographics

Informed written consent was obtained from all participants. Ten interviews were conducted virtually in line with government regulations at the time which precluded face to face meetings, and audio from each interview was recorded.

Approval for the study was granted by the Trinity College Dublin School of Medicine Research Ethics Committee in May 2020 (Appendix 2).

3.3.2 Interview technique

Data was entered into GridSuite 5 for Windows (Institut für Personal Construct Psychology, Stuttgart, Germany (99), a repertory grid software package which is freely available online, in real time, and the interviewee's grid was visible to them throughout the interview.

A pilot interview with an established clinical academic was initially carried out. This provided an opportunity to practice both the interview technique and use of GridSuite (99) and enabled the identification of the supplied constructs (Table 3.2).

Interviews were transcribed verbatim by the interviewer; transcripts were available to participants on request.

3.3.2.1 Identification of Elements

At the beginning of the interviews, participants were asked to think of six to eight clinical academics known to them. They were instructed asked to consider of a range of effectiveness, i.e., to include some academics who they consider to be excellent, some they consider very good or average, and finally one or two who they would consider less effective than the others. In contemplating a range of effectiveness, participants were invited to consider clinical academics who they admire and respect at one end of the scale, and at the other end of the scale, clinical academics they would prefer not to have to work with for professional reasons. These clinical academics are known as the elements. The criteria for inclusion of elements were not strictly described because doing so would impose the interviewer's perceptions of success on the participants; what is important is that there is a degree of contrast between the elements. Participants did not disclose the names of the elements to the interviewer, they assigned elements a letter A-H and referred to them only by their assigned letter. The interviewer therefore was not aware of the identities of the elements. This permitted a more open discussion and avoided concerns about identification of elements in a potentially negative way. A final element was included, the Ideal, an imaginary clinical academic who excels in all areas according to the participant's construal of excellence.

The Ideal element provides additional contrast to help ensure important constructs are not missed.

3.3.2.2 Use of Triadic Elicitation to identify Constructs

Constructs were then identified using a procedure known as triadic elicitation. Once elements A-H and Ideal were entered into the software, the programme selected three at random. Participants were then asked the following question:

“With respect to successful clinical academic practice, please identify a way in which two of these elements are similar but different to the third.”

The response provided is referred to as the emergent pole; participants are then asked, *“What is the opposite of this?”*, with the response becoming the implicit pole. Much of the individual nuance of a construct is contained within the implicit pole, e.g., “good mentor” could be contrasted with “not interested in mentoring” or “unsupportive mentor”, providing a slightly different meaning to the construct.

Below is an example of triadic elicitation taken from a screenshot of GridSuite 5. The elements A, F and Ideal have been randomly selected; with the interviewee indicating that A and Ideal are similar (Fig. 3.1).

The screenshot displays the 'Elicitation - Construct Elicitation with Triads' window. At the top, a blue instruction box says: 'Please click on the two elements which have something important in common opposed to the third.' Below this are buttons for 'Goto Rating', 'Skip Triad', 'Back', and 'Next'. The main area contains two yellow boxes. The left box, labeled 'Emergent pole', contains 'Ideal' and 'A' and asks 'What do these elements have in common?'. The right box, labeled 'Implicit pole', contains 'F' and asks 'Please indicate what distinguishes this element from the others!'. Both boxes have text input fields. Arrows point from the labels 'Emergent pole' and 'Implicit pole' to their respective boxes.

Fig. 3.1: Triadic elicitation using GridSuite 5 (99)

Constructs were further explored using a laddering technique to ensure clarity, contrast between the poles and a relationship to the concept of successful clinical academic practice. Laddering technique is a way of obtaining more information about a construct by asking questions about the implicit pole, e.g., “How...”, “In what way...” and “What kind of person is like that?” (95).

Once a construct has been elicited, all elements are rated according to the construct on a 5-point scale with the emergent pole at the top end (1) and the implicit pole at the bottom (5) (Fig. 3.2). In the example below, elements A, B and Ideal have all been rated 1, i.e., the best collaborators and elements E and H have been rated 5, the least interested in collaboration. In situations where the rating scale may not apply to an element or the participant wishes to give a neutral score, the element is rated 3.

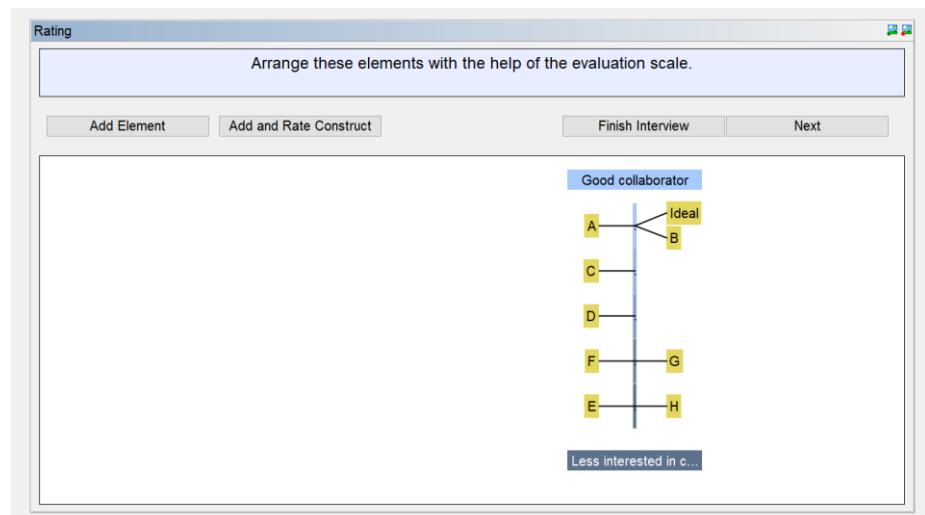


Fig. 3.2: Rating elements according to a construct

The entire process continues until no further constructs can be elicited. Once participants’ constructs were exhausted, the interviewer provided five supplied constructs which participants could agree with, amend, or discard as they saw fit. This ensured their views on the most commonly described attributes of clinical academics were included. The supplied constructs were based on clinical academic job descriptions, criteria used by major grant funders and findings from the pilot interview (Table 3.2).

Supplied Constructs
• Effective teacher/less effective teacher • Clinically focussed/less clinically focussed • Significant contribution to discipline/less significant contribution to discipline • Strong collaborator/less likely to collaborate • Strong public outreach/less focus on public outreach

Table 3.2: Supplied constructs

Finally, participants were asked to rate all elements according to the construct “Overall, an effective clinical academic vs Overall, a less effective clinical academic”. This enabled aggregate analysis of all 10 grids as described later.

Below is an example of a completed grid (Fig. 3.3). Elements A-Ideal are column headings and constructs are listed on the right-most and left-most rows, with the emergent pole on the left (1) and implicit pole on the right (5). Elements rated closest to the emergent pole are scored 1 whereas elements rated closest to the implicit pole are scored 5.

1	⋖	Ⓜ	⊙	⊠	Ⓢ	Ⓛ	Ideal	5
Established clinical rese...	5	5	1	4	2	3	2	Up and coming clinical re...
Enthusiasm for new proj...	1	1	4	3	5	4	2	Reluctant to take on new ...
Personable, approachab...	1	3	2	1	4	5	2	Aloof, stand-offish
Outstanding clinician	3	2	4	1	5	2	1	Average clinician
Poorly-resourced resear...	3	2	4	4	1	1	5	Well-resourced research...
Protected academic time	1	3	2	2	5	5	1	No protected academic t...
Less focus on undergra...	5	2	4	3	1	1	4	Strong focus on undergr...
Good mentors	1	4	2	3	4	5	1	Not interested in mentor...
Significant contribution to...	2	5	4	3	5	4	1	Less significant contribut...
Strong collaborator	1	4	3	2	3	5	1	Less likely to collaborate
Strong focus on public o...	1	2	4	2	4	5	1	Less focus on public out...
Overall, an effective clini...	2	4	4	3	5	5	1	Overall, a less effective ...

Fig. 3.3: Example of a completed grid

3.3.3 Improving credibility by triangulation

Asking participants to confirm the interpretation of their data is the most important credibility check in qualitative methodology (100). During the interviews, by viewing the interviewer’s screen, participants were able to view the creation of their grid in real time, the final grid and preliminary analysis, including cluster analysis and similarity scores between constructs and elements. Interviews were transcribed verbatim and were available to participants upon request, as were the grids and cluster analyses.

3.3.4 Statistical analysis of individual grids

To begin with, a sum of differences (SD) for each element was calculated from the ratings for each construct by subtracting the smaller number from the larger number along the rows and summing the total. To enable comparison across multiple grids, the SD is converted to a percentage similarity score using the following formula where LR= largest rating (in this case, 5 because a 5-point scale was used) and C= number of constructs in the grid:

$$\% \text{ similarity score} = 100 - \left\{ \frac{SD}{[(LR - 1) \times C]} \right\} \times 100$$

The higher the % similarity score, the more similar two elements are.

A similar process is followed to calculate the % similarity score for constructs, with one significant difference. Because constructs are bipolar, they have the same meaning when the ratings are reversed, and since triads are randomly selected, the designation of the emerging poles and implicit poles is arbitrary. Therefore, to ensure no relationships are missed, constructs are compared to each other twice: firstly, when the ratings are as given, and secondly when the ratings of one construct are reversed. When ratings are reversed, an element with a score of 1 becomes 5, a score of 2 becomes 4 and so on. The highest rating of the two is taken as the % similarity score. The formula for calculating % similarity scores of constructs is slightly different because the range of possible percentages is spread over a 200-point scale, rather than a 100-point scale:

$$\% \text{ similarity score} = 100 - \left\{ \frac{SD}{[(LR - 1) \times E]} \right\} \times 200$$

Where E= the number of elements (95).

This analysis is automatically computed by the software used (GridSuite 5 (99)) and can be represented visually as a dendrogram (Figs. 3.4 and 3.5 and Appendix 3). The point where two adjacent lines connect on a scale of 0-100 indicates the % similarity score, therefore two lines connecting high on the scale are closely related.

Participants were not supplied with elements and only supplied with a small number of constructs, and so all ten grids and dendrograms are heterogenous,

therefore dendrograms were not amalgamated but interpreted individually. All ten dendrograms were analysed and are included in Appendix 3. Two dendrograms were chosen as representative of the group based on their correlation with the aggregate analysis (described below) in terms of both the importance and frequency of constructs arising, with one dendrogram representing the views of an established clinical academic and the other representing a trainee's views.

3.3.5 Aggregate Analysis: Honey's content analysis

An aggregate analysis of all 10 grids was carried out using Honey's Content Analysis (95, 101), beginning with a core categorisation procedure and reliability check.

3.3.5.1 Core categorisation and reliability check

Similar constructs were grouped together under codes; the remaining items were then compared to existing codes and allocated accordingly. Similar codes were then grouped together under category headings or "Overarching constructs". Items which could not be allocated to an existing code were categorised as miscellaneous, with a rule that a maximum of 5% of constructs could fall into this category. The core categorisation was carried out independently by two researchers (MH and the interviewer, EB) and initial codes compared.

Following analysis and revision of the overarching constructs, a new category system was created and agreed upon, and both researchers re-categorised all constructs independently according to the agreed system. A final discussion and refinement of the category system was conducted until both researchers were satisfied with the categorisation.

3.3.5.2 H-I-L Value assignment

The next stage in the content analysis is to assign a H-I-L value of importance to each construct where H indicates a construct of high importance, I indicates intermediate, and L indicates low importance. A % similarity score between each construct and the supplied construct of "Overall, an effective clinical academic" is calculated as described above. Constructs are then awarded a value of high, intermediate, or low importance depending on this score (H, I or L). The use of the H-I-L index (as opposed to using % similarity scores) reflects

the fact that individual grids may differ in the range of their % similarity scores. Constructs whose similarity to “Overall, an effective clinical academic” are in the top third of the range of scores are allocated “H”; those in the middle third are allocated “I” and those in the lower third are allocated “L”. Individual constructs are then organised into their Overarching construct and H-I-L values are counted to see what the group has to say about a particular overarching construct. Overarching constructs with mostly H values are of particular importance; mostly I values are of intermediate importance and mostly L values are less important. Where H-I-L values are mixed, this indicates a high degree of ambivalence or diverse views towards a particular overarching construct.

3.3.6 Differential analysis

Participants were divided evenly into two groups: established clinical academics and trainee clinical academics. The constructs of each group were analysed separately according to the aggregate analysis described above to explore whether differences the construal of effective clinical academic practice exist between the groups. The frequency and importance (where a consensus was available) of constructs was summarised in a table.

A second differential analysis was conducted comparing the constructs of male participants with female. Participants were evenly divided by gender (Table 3.1).

3.4 Results

3.4.1 Credibility

3.4.1.1 *Triangulation: participant confirmation*

All participants had an opportunity to review their grids and preliminary analysis (similarity scores and dendrograms) at the end of the interview, and all agreed that the grids elicited were representative of their views on the topic of successful clinical academic practice. No further constructs were elicited at this stage, and all agreed that the similarity scores between constructs and elements were an accurate representation of their construal of the topic of successful clinical academic practice.

3.4.1.2 Data saturation

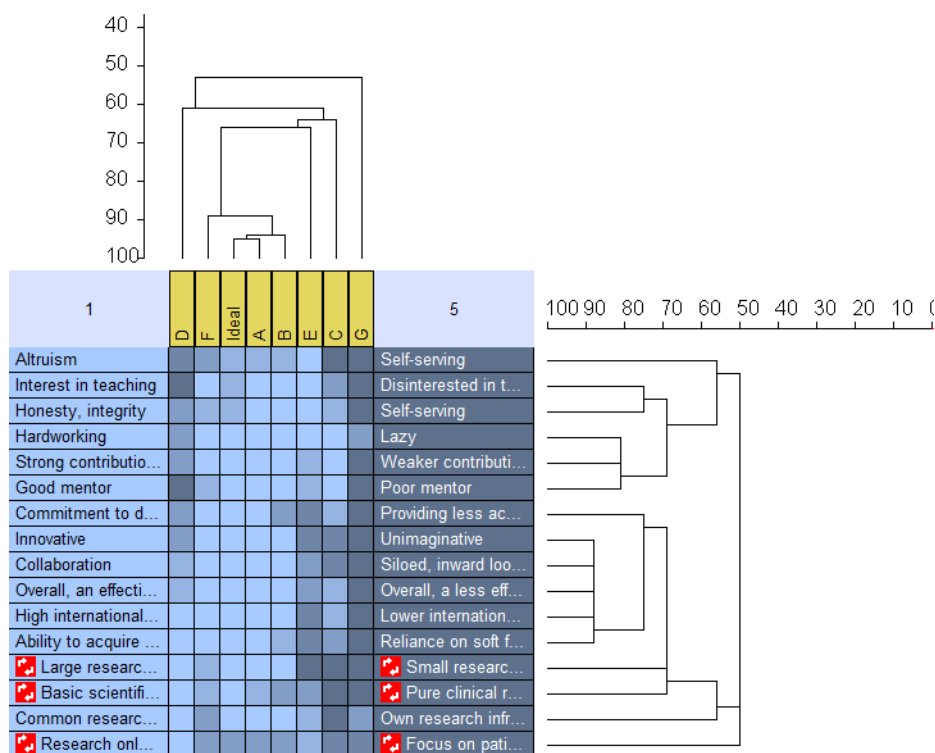
After completion of 10 grids, constructs were reviewed, and it was agreed by both researchers that data saturation had been reached and it was unlikely that further constructs would arise if additional interviews were conducted.

3.4.1.3 Content analysis: reliability check

During the aggregate analysis, both researchers re-categorised all constructs according to the agreed revised category system. There was 90.23% agreement on where constructs lay within the revised category system, indicating a robust system (95).

3.4.2 Individual grid analysis

Two grids were selected as representative of the group. Grid E2 and Grid T4 each had a high degree of correlation with the aggregate analysis in terms of both the importance of constructs and the presence of the most frequently arising constructs within the grid; they also had close to the average number of constructs. Grid E2 represents the views of an established clinical academic.

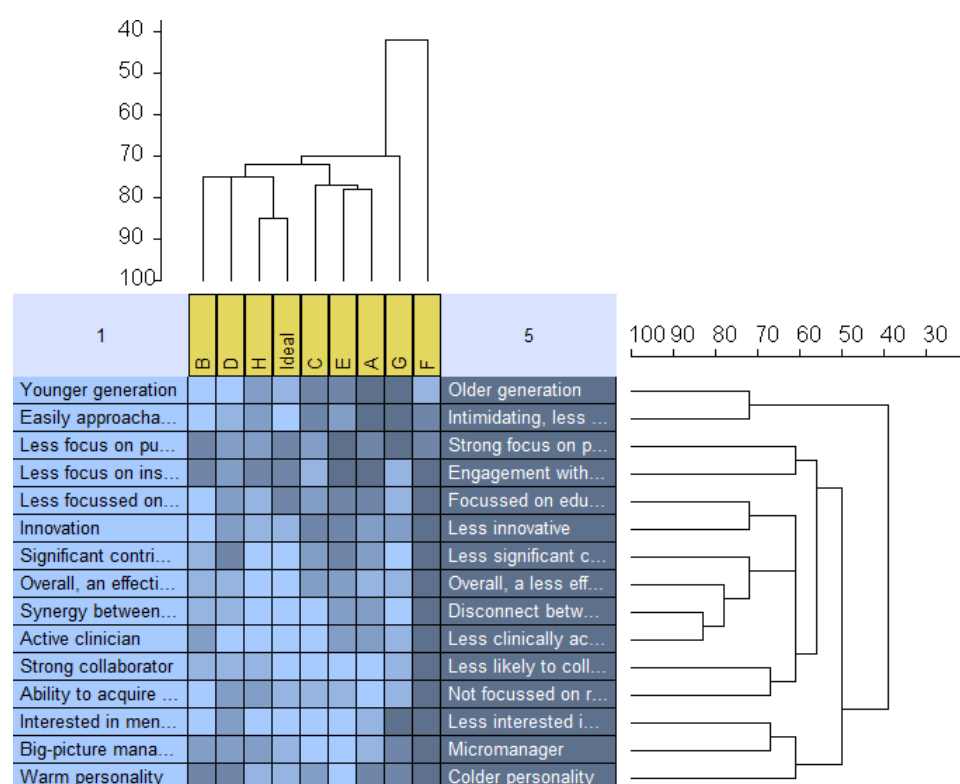


Dendrogram Grid: Clinical academics' constructs of successful clinical practice - Client: Participant 2

Fig. 3.4: Grid E2 Dendrogram

The constructs of this grid are broadly divided into two groups: The constructs whose emergent poles are Altruism; Interest in teaching; Honesty, integrity;

Hardworking, Strong contribution to discipline and Good mentor tend to cluster together, with the constructs whose emergent poles are Commitment to deliver accurate information to the public; Innovative; Collaboration; Overall, an effective clinical academic; High international impact; Ability to acquire research funding; Large research team; Basic scientific research and Common research infrastructure development clustering in a separate group, with the construct of Research only focussed vs focus on patient care being more dissimilar than the others. Within the second cluster there is one group of five constructs which is highly similar and includes the construct of Overall, an effective clinical academic, indicating that these constructs may be central to the participant's construal of an effective clinical academic: Innovative vs Unimaginative; Collaboration vs Siloed, inward-looking; High international impact vs Lower international impact and Ability to acquire peer-reviewed funding vs Reliance on soft funding.



Dendrogram Grid: Clinical academics' constructs of successful clinical academic practice - Client

Fig. 3.5: Grid T4 Dendrogram

Grid T4 represents the views of a trainee clinical academic. There is one large cluster among the constructs, and three smaller, more peripheral clusters. The large cluster, which includes the construct of Overall, an effective clinical

academic vs overall, a less effective clinical academic, indicating the importance of the other constructs in the cluster, includes: Less focussed on education vs focussed on education; Innovative vs less innovative; Significant contribution to discipline vs less significant contribution to discipline; Synergy between academic and clinical work vs disconnect between academic and clinical work; Active clinician vs less active clinically; Ability to acquire research funding vs not focussed on research funding. This suggests the idea of a clinical academic who remains heavily involved in patient care, and whose research is inspired by patient care, who is innovative and collaborative and whose research is robust enough to secure funding. Interestingly, for this participant, while research and patient care are emphasised, there is less emphasis on involvement in teaching; it is acknowledged that one must be involved with teaching but with the caveat that too much focus on teaching can be detrimental to other activities:

“I think people who are more focussed on it [teaching] tend to be better at it, therefore become better clinicians but it’s possible to be too focussed on it, focussed on it to the extent that you exclude your other activities.”

Interviewee T4, Trainee

Slightly more peripheral are the constructs pertaining to engagement with public outreach activities and institutional administration where again less focus on these activities is preferred to being overly focussed, indicating the importance of finding a balance amongst the many requirements of the clinical academic. Finally, there are constructs relating to personality and leadership style, creating an image of someone who is approachable, interested in mentoring junior colleagues, and who prefers to foster autonomy rather than micromanaging, though these are less like the construct of effective clinical academic practice and therefore potentially more peripheral in the participant’s construct system.

3.4.3 Aggregate analysis

Excluding the supplied summary construct of “Overall, an effective clinical academic vs overall, a less effective clinical academic”, 133 constructs were elicited. These constructs were grouped together into 57 codes and further organised into 20 overarching constructs. It was decided to retain the bipolar

nature of the constructs elicited during interview in order to retain as much of the nuance of the individual grids as possible. Table 3.3 below illustrates overarching constructs, the frequency with which they arose, and the category of factors predictive of career success according to SCCT. Appendix 4 illustrates the core categorisation procedure with codes and categories listed according to frequency. Appendix 5 includes representative quotes for each of the overarching constructs.

Overarching Construct	Frequency	Category
Willing to help others, altruistic vs focussed on own goals	20	PEF
Research outputs have significant impact vs outputs have lower impact	13	C
Agreeable, approachable vs antagonistic, intimidating	12	PEF
Works to build a network of collaborators vs prefers to work alone	11	PEF
Access to resources vs less access to resources	9	OF
Focus on clinical work vs focus on research	9	NC
Committed to public outreach vs not committed to public outreach	7	C
Established researcher, well-recognised in scientific community vs not well recognised as a researcher	7	PEF
Innovative, embracing new ideas vs closed-minded, lacking imagination	6	PF
Honesty and integrity vs self-serving	5	PF
Excellent, inspiring teacher vs poor, boring teacher	5	C
Experienced researcher vs early career, less experienced	5	PF
Greater demands on time outside work vs fewer demands on time outside work	4	PF
Democratic leader, fosters autonomy vs autocratic, micromanager	4	PF
Dedicated and hardworking vs lazy, inefficient	4	PF
Pure clinical research vs basic scientific research	3	C
Synergy between clinical and research work vs disconnect between clinical and research work	3	C
Good at communicating vs not good at communicating	2	C
Working excessive hours vs good work-life balance	2	NC
Surgeon vs physician	2	PF

Table 3.3: Overarching constructs, frequency, and category according to factor predictive of career success

PF= Personal Factor, OF= Organisational Factor, C= Competency, PEF= Person-environment Fit, NC= Not categorised

Individual constructs were deemed High, Intermediate or Low importance (according to their similarity to the construct of Overall, an effective clinical academic vs overall, a less effective clinical academic) and grouped together under the relevant overarching construct. The number of H, I or L constructs in each overarching construct was summed and an assessment of the importance of the overarching construct was made. There was a group consensus that 6 overarching constructs were of high importance, 8 were of intermediate importance and 4 were of low importance. There was no consensus regarding the importance of two overarching constructs, Clinical focus vs research focus and Working excessive hours vs good work-life balance, i.e., the H-I-L indices were mixed (Table 3.4).

Importance	Overarching Constructs
High	Research outputs have significant impact vs outputs have lower impact
	Works to build a network of collaborators vs prefers to work alone
	Established researcher, well-recognised in scientific community vs not well-recognised as a researcher
	Innovative, embracing new ideas vs lacking imagination, closed-minded
	Honesty and integrity vs self-serving
	Excellent, inspiring teacher vs poor, boring teacher
Intermediate	Willing to help others, altruistic vs focussed on own goals
	Agreeable, approachable vs antagonistic, intimidating
	Access to resources vs less access to resources
	Committed to public outreach vs not committed to public outreach
	Dedicated and hardworking vs lazy, inefficient
	Pure clinical research vs basic scientific research
	Synergy between clinical and research work vs disconnect between clinical and research work
	Good at communicating vs not good at communicating
Low	Experienced researcher vs early career, less experienced
	Democratic leader, fosters autonomy vs autocratic, micromanager
	Greater demands on time outside work vs fewer demands on time outside work
	Surgeon vs physician
No consensus	Focus on clinical work vs focus on research
	Working excessive hours vs good work-life balance

Table 3.4: Constructs in order of importance to the group as a whole

3.4.4 Differential analyses

Finally, a differential analysis was completed, comparing the construct systems of established clinical academics (n=5) with trainee clinical academics (n=5) (Table 3.5) and female clinical academics (n=5) with male clinical academics (n=5) (Table 3.6). Frequency of constructs arising is reported alongside importance to the group. Of note, it is not appropriate to statistically compare the frequency of constructs between groups in this type of analysis: the hierarchy of constructs within individuals' personal construct systems is represented by the importance rather than the frequency with which constructs arise. Furthermore, five constructs were supplied, therefore the frequency is not truly reflective of participants' views. Nonetheless, frequency can add to the richness of the data, and it is therefore included in the differential analysis.

3.4.4.1 Established vs. Trainee clinical academics

Established and trainee clinical academics provided similar numbers of constructs (68 and 65 respectively). There was agreement between the two groups on many of the overarching constructs both in terms of frequency and importance of constructs (Table 3.5) with a few notable differences. The construct of "Access to resources vs less access to resources" arose with greater frequency among the trainees compared to established clinical academics (10.8% of constructs vs 2.9% of constructs), and the construct of "Honesty and integrity vs self-serving" did not arise in the trainee group but was mentioned relatively frequently in the established clinical academics group (7.4% of constructs).

Five of the 20 overarching constructs not comparable between the groups either because there was no consensus among one group, or the overarching construct did not arise in one of the groups. There was agreement on the importance of 9 out of the remaining 15 overarching constructs. Established clinical academics rated the constructs relating to innovation, commitment to public outreach, agreeableness, and democratic leadership style as being of higher importance compared to trainee clinical academics. Trainees put higher importance on the constructs of "Willingness to help others vs. focussed on own goals" and

“excessive working hours vs. good work-life balance” compared to established clinical academics.

Overarching construct	Frequency Established (%)	Frequency Trainee (%)	Importance Established	Importance Trainee
Willing to help others, altruistic vs focussed on own goals	13 (19.1)	7 (10.8)	Intermediate	High
Research outputs have significant impact vs outputs have lower impact	6 (8.8)	7 (10.8)	High	High
Agreeable, approachable vs antagonistic, intimidating	5 (7.4)	7 (10.8)	Intermediate	Low
Works to build a network of collaborators vs prefers to work alone	6 (8.8)	5 (7.7)	High	High
Access to resources vs less access to resources	2 (2.9)	7 (10.8)	Intermediate	Intermediate
Focus on clinical work vs focus on research	5 (7.4)	4 (6.2)	No consensus	Intermediate
Committed to public outreach vs not committed to public outreach	3 (4.4)	4 (6.2)	High	Intermediate
Established researcher, well-recognised in scientific community vs not	3 (4.4)	4 (6.2)	High	High

well recognised as a researcher				
Innovative, embracing new ideas vs closed-minded, lacking imagination	2 (2.9)	4 (6.2)	High	Intermediate
Honesty and integrity vs self-serving	5 (7.4)	0 (0)	High	N/A
Excellent, inspiring teacher vs poor, boring teacher	3 (4.4)	2 (3.1)	High	High
Experienced researcher vs early career, less experienced	3 (4.4)	2 (3.1)	Low	No consensus
Greater demands on time outside work vs fewer demands on time outside work	3 (4.4)	1 (1.5)	Low	Low
Democratic leader, fosters autonomy vs autocratic, micromanager	1 (1.5)	3 (4.6)	Intermediate	Low
Dedicated and hardworking vs lazy, inefficient	3 (4.4)	1 (1.5)	Intermediate	Intermediate
Pure clinical research vs basic scientific research	2 (2.9)	1 (1.5)	No consensus	Intermediate
Synergy between clinical and research work vs disconnect between clinical	0 (0)	3 (4.6)	Not Applicable (N.A.)	Intermediate

and research work				
Good at communicating vs not good at communicating	1 (1.5)	1 (1.5)	Intermediate	Intermediate
Working excessive hours vs good work-life balance	1 (1.5)	1 (1.5)	Low	High
Surgeon vs physician	1 (1.5)	1 (1.5)	Low	Low

Table 3.5: Differential analysis established vs trainee clinical academics

3.4.4.2 Female vs. Male clinical academics

Female and male participants (who were divided evenly between the groups of established and trainee clinical academics) provided similar numbers of constructs (68 and 65, respectively) (Table 3.6). Once again, there was broad agreement on the frequency and importance of most of the overarching constructs with a few significant differences. Female participants were more likely than male to mention the construct relating to collaboration (10.3% vs 6.2%) although both groups agreed this was highly important; female participants were also more likely to mention the construct of “Committed to public outreach vs not committed to public outreach” (7.4% vs 3%) and the construct of “Greater demands on time outside work vs fewer demands on time outside work”, mostly reflecting family responsibilities, occurred exclusively among the female participants. By contrast, the construct of recognition within the scientific community was mentioned more frequently by male participants compared to female (9.2% vs 1.5%) although both groups agreed it was highly important, while innovation was mentioned more frequently and considered of greater importance by male participants compared to female (7.7% vs 1.5%).

There were seven overarching constructs where there was no consensus on the importance among one or both groups, or the construct did not arise for one of the groups. Of the remaining 13, there was concurrence between the groups on the importance of 8, with disagreement on the importance of 5. Male participants put greater importance than female on the constructs of agreeableness (although this arose more frequently among female participants), innovation and experience as a researcher. Of note, there were no overarching constructs which male participants agreed the importance was low; where there was agreement it was that the construct was either of high or intermediate importance.

Overarching construct	Frequency female (%)	Frequency male (%)	Importance female	Importance male
Willing to help others, altruistic vs focussed on own goals	8 (11.8)	10 (15.4)	Intermediate	Intermediate
Research outputs have significant impact vs outputs have lower impact	6 (8.8)	7 (10.7)	High	High
Agreeable, approachable vs antagonistic, intimidating	8 (11.8)	4 (6.2)	Intermediate	High
Works to build a network of collaborators vs prefers to work alone	7 (10.3)	4 (6.2)	High	High
Access to resources vs less access to resources	5 (7.4)	4 (6.2)	Intermediate	Intermediate
Focus on clinical work vs focus on research	5 (7.4)	4 (6.2)	High	No consensus

Committed to public outreach vs not committed to public outreach	5 (7.4)	2 (3)	Intermediate	No consensus
Established researcher, well-recognised in scientific community vs not well recognised as a researcher	1 (1.5)	6 (9.2)	High	High
Innovative, embracing new ideas vs closed-minded, lacking imagination	1 (1.5)	5 (7.7)	Intermediate	High
Honesty and integrity vs self-serving	2 (2.9)	3 (4.6)	High	High
Excellent, inspiring teacher vs poor, boring teacher	3 (4.4)	2 (3)	High	High
Experienced researcher vs early career, less experienced	2 (2.9)	3 (4.6)	Low	Intermediate
Greater demands on time outside work vs fewer demands on time outside work	4 (5.9)	0 (0)	Low	N/A
Democratic leader, fosters autonomy vs autocratic, micromanager	2 (2.9)	2 (3)	No consensus	No consensus
Dedicated and hardworking vs lazy, inefficient	1 (1.5)	3 (4.6)	Intermediate	Intermediate

Pure clinical research vs basic scientific research	3 (4.4)	2 (3)	Low	Intermediate
Synergy between clinical and research work vs disconnect between clinical and research work	2 (2.9)	1 (1.5)	No consensus	Intermediate
Good at communicating vs not good at communicating	0 (0)	2 (3)	N/A	Intermediate
Working excessive hours vs good work-life balance	1 (1.5)	1 (1.5)	Low	High
Surgeon vs physician	2 (2.9)	0 (0)	Low	N/A

Table 3.6: Differential analysis female vs male clinical academics

3.5 Discussion

By exploring the personal construct systems of established and trainee clinical academics and their experiences of working with other clinical academics, we have examined how they construe success. I have interviewed clinical academics at different career stages across multiple institutions on the island of Ireland, representing two different health systems (the National Health System in the UK and the Health Service Executive in Ireland) and multiple specialties. Findings are considered using SCCT as a framework which takes both personal and environmental factors into account and contributing to a holistic view of the characteristics that define the successful clinical academic.

3.5.1 Personal factors

Personal factors are important for career success because they form part of an individual's background which determines how the individual interacts

with and influences learning experiences and the environments to which they are exposed. Personal factors include demographics, personal resources and personality traits such as conscientiousness (102). Combined with other factors, e.g., organisational, personal factors determine career development and career performance (89).

Seven of the 20 overarching constructs are personal factors (Table 3.3). Of these, the constructs pertaining to innovation and honesty/integrity are of greatest importance.

Innovation, i.e., the ability to create and implement solutions to healthcare problems is seen as important for all healthcare practitioners (69, 103), and is fundamental to successful clinical academic practice. While innovation in healthcare is one of the major consequences of a clinical academic workforce, and research-active institutions have better patient outcomes (67), the ability to innovate is rarely mentioned as a key characteristic for clinical academics. Innovation potential is seldom used as part of the selection criteria for clinical academic training pathways, even though tools to measure creativity and innovation potential exist (69).

Similar studies looking at characteristics of clinical academics and academic leaders have found variable results in relation to the importance of innovation. While Daouk-Öyry et al list Innovation, Creativity and Dedication as key competencies for academic physicians under the heading of Research Skills (71), Innovation only comes 16th out of a list of 38 positive leadership values ranked by Deans and CEOs of Academic Medical Centres (AMCs) as being important to their leadership (104). Elsewhere, in a survey of American College of Surgeons Society of Surgical Chairs on the importance of certain personal traits leading to a chair position, only 4 participants out of 52 placed Creativity in the top 5 out of a list of 26 traits (innovation was not included in the list) (105). While these results are at odds with our finding that innovation is central to successful clinical academic practice, this may be because the latter two studies were

focussed on the importance of traits with respect to being an effective leader in an academic centre as opposed to a successful clinical academic; further research is needed to understand clinical academics' construal of innovation, and its overall importance to success as a clinical academic.

Work done on the Big Five personality dimensions in physicians found a negative correlation between some facets of Conscientiousness, a highly desirable trait among healthcare professionals, and Innovation, possibly because lower Conscientiousness is associated with greater flexibility (69). At the same time, Conscientiousness is positively associated with success in undergraduate medical school and academic success in general (106, 107). Given the importance of innovation for clinical academics, it may be useful to review selection processes to clinical academic training programmes which emphasise undergraduate academic performance without incorporating any specific measures of creativity and innovation. Notably, no participants in this study made any reference to excellence in undergraduate studies as an attribute of successful clinical academics.

Innovation can also be taught: a Canadian study of the education experiences of innovators identified several ways in which education supported their innovative work, including building a culture of innovation, access to resources and opportunities, mentorship, role models and direct teaching (108). Creating opportunities for transdisciplinary (interdisciplinary) learning and dedicated creativity training programmes for medical students are other strategies which can promote innovation (109, 110). Transdisciplinary learning has the added advantage of promoting collaboration (109), another key characteristic of successful clinical academic practice.

Participants described their ideal clinical academic as someone with the highest levels of honesty and integrity. Research integrity is critical in clinical research, and instances of misconduct can be career-ending. Interestingly, while the construct of integrity arose frequently among

established clinical academics and was highly important, it did not arise among trainees. There could be several reasons for this. It is unlikely that trainees do not consider probity to be important to successful clinical academic practice. It may be that the idea is so central that triadic elicitation (comparing known clinical academics) did not result in the construct arising because none of the elements were lacking it. It is also possible that they did not feel comfortable discussing a lack of probity when for the most part, they were discussing their senior colleagues.

The literature, however, presents a similarly mixed picture of the importance of integrity to success as a clinical academic. Gotian et al, interviewing 21 physician-scientists at different career stages identified 23 subjective and objective characteristics that were associated with success as a clinical academic, but honesty and integrity were not among the characteristics identified (98). In contrast, almost all of the 25 clinical academics interviewed in another study developing a competency framework for clinical academics mentioned the importance of professional ethics and integrity (71). Another study of leaders of academic medical centres found that integrity was considered the single most important trait (out of a list of 38 positive values) by 9 out of 18 academic leaders, and every participant listed it in their top four. Integrity was correlated positively with other traits such as respect and inspiration, however it correlated negatively with seizing opportunities and results (104). Clinical academics are rewarded more for their results (research outputs) than for any other characteristic, so the relationship between integrity and outputs may merit further investigation.

3.5.2 Organisational Factors

Organisational factors are relevant for career development and career success. A supportive work environment was identified as an antecedent to the role of the clinical academic in Chapter 2. Supportive environments can influence an individual's career interests, directing them towards fields where they are likely to perform well and with like-minded individuals (89).

Only one overarching construct is considered under the heading organisational factors: Access to resources vs. less access to resources. This construct arose with greater frequency amongst trainees compared to established clinical academics (10.8% vs 2.9%), although there was a consensus between both groups that access to resources was of intermediate importance. The concept analysis in Chapter 2 identified that access to resources are antecedents to clinical academic practice (111-116). It is possible that the well-established clinical academics may already have attained access to many of the resources they need or have moved beyond the career stage where they would have been helpful (e.g., dedicated training programmes), whereas trainees may have less access to resources by virtue of their lower rank, and the competition to acquire resources may be more to the forefront of their thinking. Because of this, trainees may be more likely to view the acquisition of resources as a marker for successful clinical academic practice.

3.5.3 Competencies

According to SCCT, learning experiences are critical to developing self-efficacy (belief in one's ability to perform career-related tasks) and outcomes expectations (the outcomes an individual expects to arise from pursuing a particular career-related activity). Self-efficacy and outcomes expectations both inform career goals and choices and ultimately influence performance (55, 89). Since individuals who engage in learning experiences are more likely to develop competencies which are related to career advancement, competencies and learning experiences can be considered under the same heading (89).

Six of the 20 overarching constructs can be considered to fall under the heading of competencies (Table 3.3). Of these, two were of high importance: constructs pertaining to significant research outputs and excellence in teaching.

Contributing significantly to knowledge in one's discipline, influencing public policy and transforming patient care was central to participants' construal of successful clinical academic practice. This is not surprising as research metrics remain key to promotion and the awarding of grants in academic medicine (17, 74). A qualitative study investigating clinical academics' perceptions of success found that junior faculty in particular considered publication and funding to be the critical measures of success (98). This study further confirms that clinical academics themselves tend to place an emphasis on research outputs as a marker for their success.

Excellence in teaching was also considered a highly important competency for clinical academics. Of note, this construct differed from the lower-order construct of being committed to teaching, which formed part of the construct of Altruism, a construct of intermediate importance. Being an inspiring teacher was important, rather than the actual amount of teaching undertaken. It is unsurprising that this construct arose as participants were considering clinical academics they admire and respect: those who are inspirational teachers are more likely to fall into this category.

Teaching is considered one of the four core competencies for clinical academics (71). However, our findings are similar to those of Gotian et al's study of perceptions of physician-scientist's success: although teaching arose as a measure of success, it was the least frequent of all objective measures of success (98). Teaching is central to the work of medical schools (73), and clinical academics are relied on to deliver teaching, but current structures do not reward teaching commitment to the same degree as research outputs. Emphasising research success over other attributes such as teaching excellence is thought to contribute to faculty attrition (117).

3.5.4 Person-environment Fit

Learning occurs through interactions with the environment (55). Person-environment fit (PEF) occurs when there is compatibility between

individuals and their work environment; it has several components including person-job fit (PJF), person-organisation fit (POF) and person-group fit (PGF). Studies have found a strong connection between PEF and employees' attitudes to their jobs (92).

Four of the overarching constructs may fall under the heading of PEF (Table 3.3). Of these, the two constructs relating to collaboration and recognition in the scientific community are of high importance, and the constructs relating to altruism and agreeableness are of intermediate importance.

It has been shown that cross-disciplinary teams have better outcomes and produce work of higher scientific impact (118), and clinical academic trainees rate opportunities to expand their collaborative network highly (119). Other studies have shown collaboration and relationship building are key measures of success as a clinical academic (98, 104). Willingness to help others and agreeableness are of intermediate importance to our participants, suggesting a need for balance between helping others with their goals and retaining focus on one's own goals.

The four constructs in the PEF category could be considered under the sub-category of person-group fit (PGF). PGF refers to compatibility between individuals and their workgroups. This is thought to be of particular importance to clinicians given the highly collaborative nature of medical practice and professionalism, and one study has shown that medical staff with higher PGF have both higher job satisfaction and higher professional efficacy (92). PGF has also been shown to be positively associated with innovation (120). Extrapolating from these findings, it is possible to suggest that clinical academics with high PGF have higher professional efficacy. However, this study did not directly measure PGF so further research would be required to investigate this signal.

3.5.5 Clinical focus vs. Research focus

The construct of being focussed on clinical work vs research arose very frequently but with a high degree of ambivalence. This construct is not

identifiable as one of the four factors which determine career success according to SCCT. Moreover, participants views were divided on whether one should focus more on clinical work or research work. Some participants viewed excelling clinically as being core to effective clinical academic practice, while others took the view that while clinical practice is important, you need to find a balance. Although not specifically investigated in this study, views may be influenced by the degree to which a chosen specialty is procedure-based. For trainees, there is also the unknown quantity of the type of post that will be available to them on completion of training, and they may be more likely to hedge their bets regarding focus on clinical work versus focus on research.

3.5.6 Differential analysis 1: Established versus trainee clinical academics

Trainees emphasised the importance of good work-life balance, whereas established clinical academics placed greater importance on innovation, agreeableness, and public outreach. Both groups placed an equal importance on research outputs. These findings are in keeping with a study from the US comparing perceptions of success among physician-scientists of different career stages: this study found that junior physician-scientists were more likely to emphasise research outputs, whereas more senior staff placed more emphasis on legacy. The legacy of established clinical academics in this study may be that they have made a difference to patients and the public through innovation and are recognised and accepted by their peers.

3.5.7 Differential analysis 2: Female versus male clinical academics

The construct of innovation arose more frequently and was considered more important for male participants compared to female. Three out of four constructs relating to PGF arose more frequently for female participants. Similar findings were seen in the US study comparing measures of success based on academic rank and gender: female participants in this study were substantially more likely to consider

networking an important measure of success compared to male (98). This is in keeping with stereotypes regarding gender, social connectedness, and creativity. In our society, creative thinking tends to be construed alongside stereotypically masculine traits of agency, autonomy and distinctiveness and is not associated with the stereotypically female traits of social harmony and interconnectedness. This masculinized construal of creative thinking explains the findings of studies that have shown that men are ascribed more creativity than women when they produce identical output, and men's ideas are considered more "ingenious" than women's ideas. Men's perceived enhanced creativity has been shown to be attributed to increased agency as opposed to increased competence (121). If a highly masculinized view of creativity persists in academia, this could result not only in unequal access to training programmes and promotion, but it may deter women from entering these careers to begin with.

The construct relating to demands on time outside work arose only for female participants. This overarching construct comprised two lower-order constructs relating to gender and childcare responsibilities. Gender was included in this overarching construct because participants felt female clinical academics are more likely to require time away from work for family and caring responsibilities and this in turn can affect career progression.

Both genders can face challenges brought about by balancing career with family responsibilities including childcare. However, there is evidence of significant differences in childcare responsibilities between male and female medical trainees, and female trainees are significantly more concerned about the impact of having a child on their career compared to their male counterparts (122). These concerns are not without foundation: female physicians with children have lower rates of employment and lower career success when measured in terms of publications, grants, scholarships and research activities (123); and the dearth of females in senior clinical academic positions has been well-documented (20, 21, 124).

This study confirms the finding that concerns about the impact of family responsibilities on career progression are greater for female clinical academics. The issue did not arise at all for male participants. This may be because they are less concerned about balancing their career with family responsibilities or they do not see it as being important with respect to successful clinical academic practice. It is also possible that there was a degree of reticence in discussing the issue with a female researcher. However, the issue of gender balance in academic medicine is one that affects everyone and tackling it will require the involvement of both male and female clinical academics. Chapter 5 further investigates the issue of gender balance in academic medicine.

3.5.8 Reflections on framework and methodology: SCCT, PCT and RGT

SCCT is a well-established theory of career development and career success and has been previously suggested as a useful framework for considering clinical academic careers (90, 91). Eighteen out of twenty overarching constructs can be categorised according to Rasdi's four factors which predict career success based on SCCT (personal factors, organisational factors, learning experiences/competencies and person-environment fit). The two constructs which did not readily fall into one of the four categories were: "Focus on clinical work vs. focus on research", and "working excessive hours vs. good work life balance". These were the two constructs for which there was no group consensus on their relative importance with respect to successful clinical academic practice, indicating a degree of ambivalence towards these constructs. This verifies the validity of applying the SCCT model of career success because the two constructs which don't readily fit into the framework were viewed with a high degree of ambivalence by participants.

PCT has undergone few theoretical developments since its initial formulation in the 1950's and proponents of the theory believe this is due to the comprehensiveness of the original vision and the fact that there is substantial evidence to support aspects of the theory. Kelly's theory is

considered far ahead of its time as it anticipated trends which dominated the second half of the 20th century. Newcomers to the theory would assume it is a branch of constructivism, however this is not the case. Personal construct theorists meet criteria for a cohesive scientific group, with their own journals and institutions. They tend to view the theory as individual and distinct from other theories and themselves as “radical outsiders”; attempts to draw similarities between PCT and other theories including constructivism have been met with resistance. According to PCT theorists, this resistance is because these attempts are often characterised by misinterpretations of Kelly’s philosophy. There is a fear that labelling PCT as a branch of constructivism will result in the finer points of the theory being forgotten, and eventually the theory will “sink without a trace” (96). This stance represents the embodiment of an intellectual ivory tower and a separation from the real world which is perhaps unsurprising given the underlying philosophy of PCT. However, there have been calls from within the field for personal construct theorists to acknowledge commonalities with other approaches to facilitate collaboration and evolution of the theory (96).

RGT was chosen as a technique because it minimises interviewer bias and facilitates an aggregate quantitative analysis which allows the ranking of constructs in order of importance to the group. This offers a greater degree of sophistication than simply inferring the importance of constructs from the frequency with which they arise. Practical advantages for the researcher include the speed with which the framework can be validated by a second researcher, and that constructs form the nodes, making qualitative analysis more straightforward. Participants can view the creation of their grid in real time, so validation with participants is also straightforward and immediate. All participants were asked their views on the procedure at the end of the interview: all were satisfied and agreed that it was robust but enjoyable. To the best of our knowledge, RGT has

never been applied in Medical Education, however it is a useful and valid approach with many potential applications to this field.

3.5.9 Limitations

Although both researchers felt that data saturation was reached, the sample size was small and therefore findings should be interpreted with caution, particularly when the sample is further divided for differential analysis.

Some constructs which would be typical of repertory grid studies of other professions were absent (e.g., “Intelligent vs. dull”). A construct relating to holding additional research qualifications might also have been expected. Constructs which are common to all elements will not arise during triadic elicitation, a potential drawback to the interview technique. Caution should therefore be employed when considering the absence of certain constructs.

Finally, there are some slight differences in terminology: during the elicitation of constructs, participants were asked to think of a range of effectiveness, from clinical academics they admire to those they would consider less effective. Effectiveness is not the same as success, however in such a competitive environment, it would be difficult to see ineffective practitioners being viewed as successful by their colleagues. Nonetheless, greater consistency with terminology during elicitation of elements may have produced a variation in the findings in relation to career success.

3.6 Conclusion

Social cognitive career theory is a suitable lens through which clinical academic careers can be viewed. Much of the literature on clinical academic careers focusses on organisational factors such as access to resources, and personal factors tend to be ignored. This study has highlighted the importance of interactions between the person and environment and characterised the important attributes of successful clinical academics which include personal and organisational factors as well

as learning experiences/competencies and person-environment fit. I have built on findings of the concept analysis and moved beyond fictitious cases to contribute to a more holistic view of the successful clinical academic.

A picture emerges of a successful clinical academic: they are collaborative, excellent teachers and well-recognised in their scientific communities. They are also highly innovative, and their research outputs have significant impact in their field. They embody the attributes of honesty and integrity. They are willing to help others and are approachable, while also maintaining professional boundaries and retaining focus on their own goals. They are dedicated, communicate well, and are committed to high quality public engagement. The bar is set high for clinical academics; few professions demand such a high degree of knowledge and skill combined with the personal, relational, and moral values described by the participants in the study. This workforce requires appropriate support for clinical academics in line with these high expectations and the provision of adequate resources including a clear career pathway and combined clinical academic training.

Self-efficacy beliefs are predictive of career choice, performance, and persistence. Early exposure to learning experiences strengthen self-efficacy beliefs and expectations of a positive outcomes (90). Findings from chapters 2 and 3 emphasise the importance of early exposure to combined clinical academic training. The next chapter of this thesis describes a practical application of these findings in the creation of the first dedicated training pathway for early career clinical academics in Ireland, the Academic Internship Track (AIT).

Chapter 4: Creation and evaluation of a combined clinical and academic training programme for junior doctors in Ireland: The Academic Internship Track

4.1 Background

The duration of training for those who wish to achieve both clinical and research excellence, and the financial debt accumulated during this prolonged training period have been identified as major barriers for the clinical academic workforce (15, 42). The provision of integrated training programmes for aspiring clinical academics which combine clinical and research training is a key strategy in overcoming this barrier to sustaining the clinical academic workforce for the future (15, 114, 125). Integrated training can occur in parallel with attaining a clinical qualification, for example, combined MD-PhD programmes in the United States, or during postgraduate clinical training. Internationally, most postgraduate combined training programmes are aimed at specialist trainees and programmes for doctors at earlier career stages appear to be uncommon, even though it is known that clinical academic careers take years to develop. The academic internship track is a programme aimed at junior doctors in their first year after graduation from medical school.

4.1.1 Benefits of early exposure to research

SCCT tells us that self-efficacy and outcomes expectations are key to forming career interests: individuals become interested in careers that they think they will be good at and in which they expect positive outcomes (55). Self-efficacy and outcomes expectations are positively influenced by experiences of personal success and exposure to successful role models (90). One qualitative study (from the USA) on factors influencing clinical academic career development, using SCCT as a framework, identified early exposure to research, mentorship, and clear career pathways as important themes. A participant in the study (4th year student and recipient of a Dean's Research Prize) is quoted as saying: *"I would love it if there were a residency where I had a half-day a week to do research. Even during*

internship that would be wonderful... I have lots of research questions and project in my mind that I want to do, but I feel like I have to put them on hold for 3 or 5 years..." (91).

International literature suggests that those who engage with research early in their clinical careers will continue to do so. Graduates of the UK's Academic Foundation Programme (UKAFP) are much more likely to progress to academic training compared to graduates of the standard foundation programme (9.5% vs 0.2%) (126). A review of 25 years of NIH-sponsored Medical Student Research Fellowship programmes found that up to half of former participants (n=1,000) considered themselves to be working in academic medicine, and the vast majority had conducted additional research after their medical student experience (127).

Publication during residency is recognised as a determinant of the capacity to publish in a future career. (128, 129). In Psychiatry for example, the decision to pursue a research career is already well established by residency and very few who have less than the highest level of interest in research by that time eventually enrol in research career tracks. Together these indicate the crucial importance of early influences. (130).

4.1.2 Combined clinical academic training programmes: experience overseas

Combined clinical and academic training programmes exist overseas, including in the UK, USA, Canada, and Australia, although these are largely aimed at doctors at the later postgraduate years. The UK Academic Foundation Programme (UKAFP) is like the Irish academic internship track (AIT), in that both offer protected time for academic activities and opportunities to develop skills in research and/or education and/or leadership. The UKAFP is a two-year programme representing 5% of all foundation posts and has great diversity in the range of projects on offer across multiple deaneries (131). Uptake of posts is around 98% (132).

4.1.3 Internship in Ireland

Doctors in their first postgraduate year in Ireland are referred to as Interns. They embark on a one-year clinical training programme during which they are provisionally registered with the Irish Medical Council (IMC), working in full-time clinical posts with 1-2 hours per week protected time for educational activities. On satisfactory completion of the intern year, interns are awarded a Certificate of Experience and become fully registered with the IMC. Full registration is a requirement to practice beyond intern year, advance in training and take up posts in other countries. Pre-COVID, there were 733 internship posts available in Ireland; currently the number stands at 854 including 24 academic internship posts (133).

The 12 months of intern year are divided into four three-month rotations beginning in July. Interns are required to complete a minimum of three months in general medicine and three months in general surgery; other rotations can incorporate specialties such as obstetrics and gynaecology, paediatrics, general practice, and anaesthesia.

4.1.3.1 Governance of Internship

Six Intern Networks deliver intern training in Ireland: Dublin Mid-Leinster, Dublin Northeast, Dublin Southeast, Midwest, South and West Northwest. Each intern network is affiliated with one of the six medical schools in Ireland and the activities of intern networks are co-ordinated nationally via an executive body, the Intern Network Executive (INE) (Fig. 4.1).

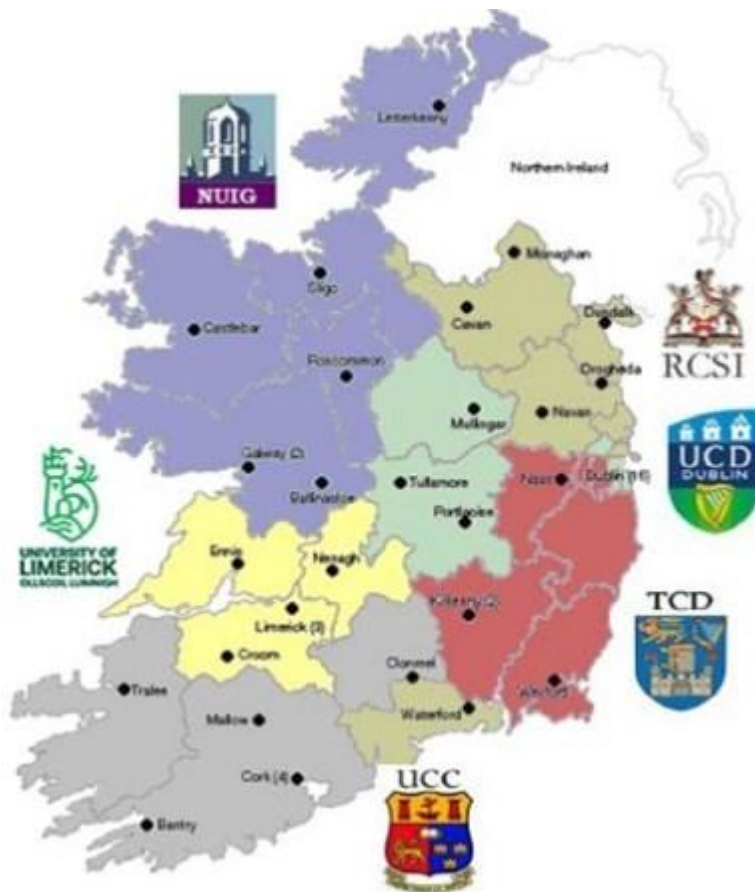


Fig. 4.1: Intern Networks in Ireland and their affiliated universities (133)

Governance of the intern year is a collaboration between the INE, universities, the employer (the Health Service Executive, HSE), specifically two committees, the Medical Intern Unit (MIU) which reports to the Medical Intern Board (MIB); and the medical regulatory body, the Irish Medical Council (IMC). There is cross-representation of the universities and the IMC at the MIU and MIB. Intern posts are funded by the employer (HSE) and intern training is co-ordinated and delivered by the INE and universities.

4.2 Aims

This chapter aims to use the creation of a combined clinical academic training programme, the Academic Internship Track (AIT) to investigate

educational strategies designed to help build and support the clinical academic workforce.

4.2.1 Objectives

1. Describe the learnings from the creation of a combined clinical academic training programme for junior doctors, the Academic Internship Track
2. Evaluate the AIT using the CIPP model (Context, Inputs, Process and Product)
3. Describe strengths and challenges of the programme and make recommendations for further improvements

4.3 Evaluation of the AIT

4.3.1 The Context, Input, Process and Product (CIPP) Model of Evaluation

The CIPP model incorporates four types of evaluation: Context, Input, Process and Product. It includes formative and summative assessments with an emphasis on not only proving that a programme works, but also seeking areas for improvement. Key to the process is equity, and engagement is sought with all stakeholders in a fair and balanced manner (134).

CIPP Model of Evaluation		
Type of Evaluation	Questions asked	Methods
Context	What educational need is being met? What goals should be pursued to meet the needs?	Literature review Meetings with key stakeholders Online survey of undergraduate medical students
Input	What are the most promising approaches to meeting the educational need? What might some of the barriers to successful implementation of the programme be?	Literature review Curriculum review of similar programmes Meeting with Director of UKAFP, an established programme Online survey of undergraduate medical students
Process	To what extent was the programme carried out as planned?	Review of recruitment to process: post uptake and attrition Survey of exiting academic interns seeking feedback on programme
Product	To what extent did the programme effectively address the original objectives?	Review of scientific outputs of previous participants in the programme Feedback from exiting interns on career intentions Monitoring of career trajectory and retention in Ireland

Table 4.1: Academic Internship Track Evaluation Model (adapted from Stufflebeam et al, (134))

4.3.2 Context Evaluation

A context evaluation is similar but more comprehensive than a needs assessment as it also incorporates an assessment of problems, assets and opportunities (134). A literature review identified a need to provide training pathways for clinical academics to build and sustain the workforce (15, 42, 125).

During the early stages of programme development, meetings were held with three groups who were key stakeholders: the INE, the IMC's Education Committee who oversee intern education and training, and the HSE's National Doctors Training and Planning (NDTP), the body responsible for ensuring the Irish Health Service is provided with the appropriate number of medical specialists. All stakeholders were in support of the development of an academic track for internship and funding was subsequently provided for 24 posts nationally, representing ~3% of all intern posts. The agreed objectives for the academic internship track were to:

1. Provide opportunities for doctors at the beginning of their careers to continue or develop research, education and healthcare leadership and management skills,
2. Promote scientific discovery and sustained academic development within the context of contemporary clinical practice, and
3. Retain medical talent in Ireland

Medical students may also be considered key stakeholders, so an anonymous online survey was distributed to medical students in their fourth (penultimate) year of training. Respondents indicated a high level of interest in a potential academic internship: 50% intended to apply for the AIT (response rate 24.6 %) when available, and many planned to apply for the UKAFP if it was not. Of these, 62% were female, the majority had no previous third level qualification. The most popular stream within the AIT was Clinical Research, (20/41) followed by Medical Education (17/41) and lastly Healthcare Leadership and Management (4/41). This is not surprising

since the latter is under-represented as a discipline within undergraduate curricula.

The most frequently cited reason for wanting to participate in the academic track was *“To progress my career in a particular specialty”* (28/42). This was followed by *“I wish to pursue a career in academic medicine, medical education or healthcare leadership and management”*, (27/42) and *“I am interested in clinical research and would like to participate in a research project”* (26/42).

The most common concern about participating in the academic track, cited by 58%, was uncertainty about their ability to achieve all of the clinical competencies in addition to research (135). This early concern was unfounded: since its inception, no academic intern has failed to reach the clinical competencies required of him or her and indeed many have been commended for their excellence in this domain. From this data, it was clear that the introduction of the AIT was welcomed both by students and by their trainers.

4.3.3 Input Evaluation

An Input Evaluation was undertaken to investigate approaches to implementing a combined clinical and academic training programme, and to identify potential barriers to successful implementation.

The initial stage of the input evaluation included a review of similar overseas programmes. The most similar programme to the Academic Intern Track in Ireland is the UKAFP (UK Academic Foundation Programme). The programme design and curriculum were examined, and a meeting was held with the Programme Director, Professor Derek Gallen, who provided further information and advice on programme design and implementation.

A review of the literature explored barriers to junior doctors' participation in clinical research. Obstetrics and Gynaecology residents in Canada (N=175) cited time constraints owing to clinical/workplace duties, personal reasons, and a lack of statistical knowledge (97%, 90% and 74% of trainees)

respectively as significant issues (136). Similarly, resident physicians in Saudi Arabia (n=191) found that lack of research training (93.2%), time (89.5%), work-related stress (83.2%) and lack of supervisors (73.3%) were perceived barriers to doing research; and while 97.9% agreed that research is essential, only 30.4% had any research involvement (137). Australian medical students who participated in a mixed methods study identified protected time, a clear training pathway, and funding as the three main factors that would encourage them to participate in research (111).

The survey of 4th year medical students asked what elements of a clinical academic training programme would be of greatest importance: they agreed that protected time within the working week, a named supervisor and access to training on basic and advanced research skills would be important or very important (135).

Collating the advice, evidence from the literature and feedback from students, the Academic Internship Track programme was designed to incorporate: protected time within the working week, usually occurring during one three-month rotation during which time is divided equally between clinical and academic work; a named academic supervisor; funding in the form of a €2,000 bursary to cover research and travel costs for the year; and study days and seminars to provide training in research, education and leadership skills.

4.3.3.1 Curriculum Design

A curriculum was designed to ensure the aims and objectives of the programme were communicated, and to provide information and guidance to academic interns and their supervisors about what they can expect to achieve. Interns are encouraged to identify realistic goals that are achievable having regard to the short space of time they are allocated to complete their project. Design of the curriculum was influenced by the UKAFP curriculum, with modifications, mainly increased emphasis on project conception and planning. The curriculum is divided into the three

streams of the academic track: Clinical Research, Medical Education and Healthcare Leadership and Management, with suggested outcomes listed along with competencies to be achieved, and the evidence that can be submitted to support these achievements. Interns are asked to select a minimum number, but not all, of the skills and competencies listed, document them at the start of the year along with their supervisor, and record those that have been achieved and which are pending at the end of the year (Appendix 6).

4.3.3.2 Clinical training and rotations

Academic track interns are required to achieve all the same competencies as interns on the standard intern-training programme, in addition to their academic goals, however they have a little less time in which to do so. In creating academic track rotations, each network identified an appropriate rotation that would provide clinical posts with excellent supervision, broad clinical exposure, and a wide range of skills, to compensate for any potential shortfall in rotational exposure (Table 4.2). Informal and formal feedback from consultant trainers regarding achievement of this standard is that academic interns perform exceptionally well in their clinical duties.

Network	Hospital	Academic Track Posts 2022/23
Dublin Northeast/Royal College of Surgeons of Ireland	Beaumont Hospital, Dublin	Academic/General surgery
		Gastroenterology
		Nephrology
		General/Vascular surgery
Dublin Mid-Leinster/University College Dublin	Mater Misericordiae University Hospital, Dublin	Academic/Nephrology
		Gastroenterology
		Medicine for the Elderly
		Orthopaedic surgery
Dublin South-East/Trinity College Dublin	St James's Hospital, Dublin	Academic medicine/ICU
		Clinical Pharmacology/GIM
		Respiratory Medicine
		General/Vascular surgery
Mid-West/University of Limerick	University Hospital Limerick	Academic/General Medicine
		Care of the Elderly
		Peri-operative medicine
		General/Colorectal surgery
South/University College Cork	Cork University Hospital	Academic/General Practice
		Immunology/Endocrinology
		Nephrology
		General surgery
West-Northwest/NUI Galway	University Hospital Galway (rotations change during the year)	Respiratory/GIM or Endocrinology
		Academic/Psychiatry or Dermatology or Radiation oncology or Radiology
		Surgery Breast/General
		Nephrology or Plastic surgery or Vascular surgery

Table 4.2: Academic intern posts and their locations (ICU = Intensive Care Unit; GIM= General Internal Medicine)

Academic track posts are also geographically well-distributed in major hospitals across the country (Fig. 4.2).

Recruitment stage	Opens	Closes
Stage 1 application	October	November
Submission of full application (CV and draft research proposal)	December	January
Shortlisting of full applications	February	
Interviews	March	
Conditional offers	March	April
Final year exams	May	June
Commencement of internship	July	

Table 4.3: Stages of recruitment process to the AIT

Running both processes in parallel ensures that all applicants remain eligible for internship until all offers are exhausted, thus removing any disadvantage from applying to the AIT that might otherwise cause anxiety. Application is encouraged by provision of information, presentations, and meetings with final year students across all networks, often complementing information provided about internship more generally.

4.3.4.1.1 Stage 1 Application

The first stage in application to internship for both the standard and academic programmes opens to candidates in October of the year prior to internship commencing. Expression of interest at Stage 1 is consistently high, between 335-450 applicants per annum, approximating to 27% of the cohort nationally. There has been no fall-off in interest suggesting the program remains popular and considered of benefit (Fig. 4.3).

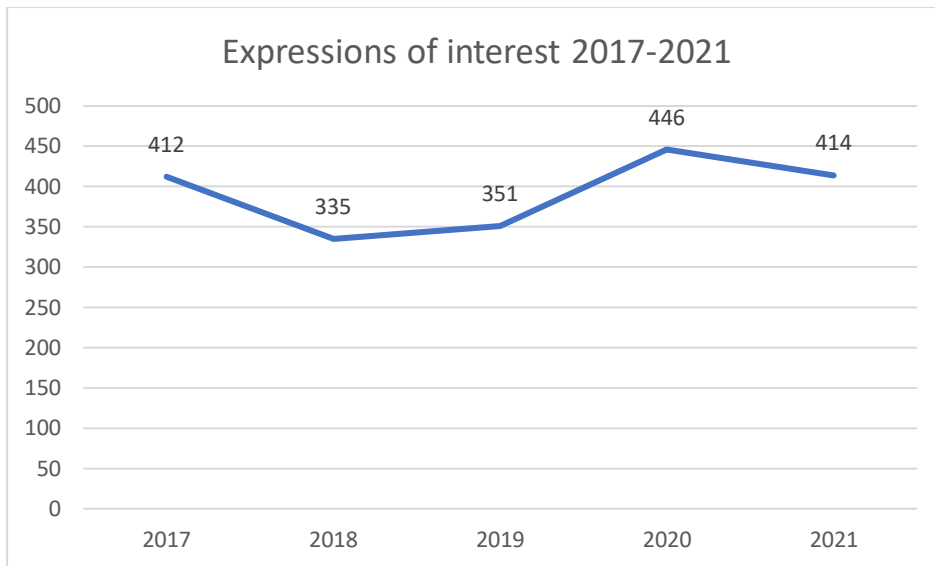


Fig. 4.3: Expression of interest at Stage 1 of internship application process

4.3.4.1.2 Stage 2 Application

Stage 2 is more rigorous. Applicants submit detailed Curriculum Vitae and research proposals, exam transcripts and a document ranking their choice of academic posts in order of preference. Each year 18-20% (60-80) of those who expressed an interest proceed to make a full application, resulting in 3-4 times as many applicants as places (Fig. 4.4).

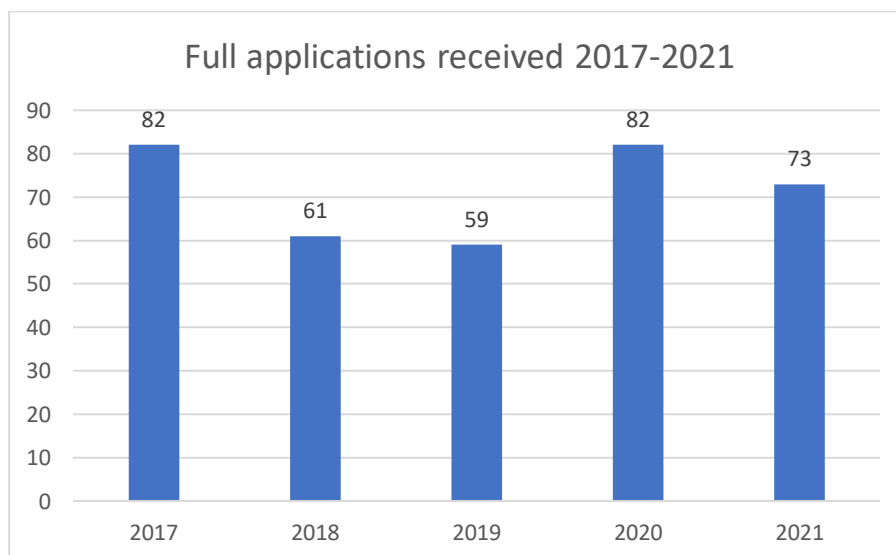


Fig. 4.4: Number of full applications for the Academic Track received per year

The recruitment process is open to all applicants, but the majority come from EEA students attending one of the six Irish medical schools. All Schools are represented with some variation in numbers noted according to the size (Fig. 4.5).

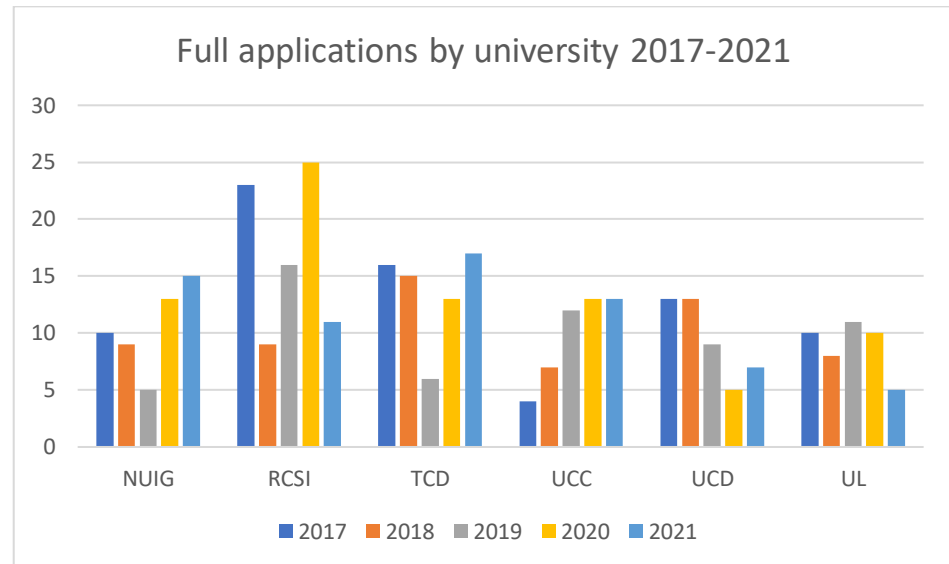


Fig. 4.5: Full Applications to the Academic Track by University 2017-2021

The effective result is that some 10% of the graduate pool make a full application, attesting to its popularity and their serious intent. However, with places for only 3% of the total cohort, two thirds will be unsuccessful.

4.3.4.1.3 Shortlisting and interviews

All candidates submitting a full application undergo a shortlisting process; successful candidates are then called to interview. These processes are dealt with in more detail in Chapter 5.

4.3.4.1.4 Post offers

Candidates who are successful at interview are tiered and matched according to HSE policy and offered a post. On average there is 90% acceptance on the first round of offers, and there has been 100% uptake of posts since the programme began. Notably, many candidates accept posts that were relatively low down on their preference list, and which require

them to move to another network. This speaks to the perceived benefit of the AIT relative to a standard intern post even if in a preferred network.

4.3.4.1.5 Reliability and validity

This approach is reliable and valid. There tends to be strong consensus across reviewers in the shortlisting process: in the first year of the recruitment process, the average deviation from the mean score for the CV section was 10%, and 15% for the research proposal. Any greater deviation from the mean score prompts an additional review. Regarding validity: in 2017, nine out of the top ten ranked eligible candidates from the shortlisting process also scored highly at interview and were offered a place on the academic track. This suggested that shortlisting score alone may be sufficient to make offers, however a re-analysis of this in 2020 showed sufficient change to the rank order after interview to justify maintaining the present approach, which will be kept under review.

4.3.4.1.6 Gender Balance

A review of the recruitment process from a gender perspective for the first two years of the programme found that although female and male candidates indicated similar levels of interest at Stage 1, successful male candidates outnumbered successful female by 3:1. This signal was explored further with the resumé study described in Chapter 5.

4.3.4.2 Exit feedback

An anonymous online feedback survey was distributed to the exiting interns of the 2017/18 and 2018/19 cohort (n=48). Eleven interns out of 24 responded in 2018 and 22/24 in 2019 giving an overall response rate of 69% (n=33).

In the first year of the programme 92% indicated that their experience of the clinical component of the year was good or excellent, and 83% indicated that the quality of experience of the academic part of the year was good or excellent. Of that first cohort, 42% had also applied for or

considered applying for the UKAFP prior to accepting the post on the AIT. Fifty-three per cent held another third level qualification.

Ninety-two per cent of respondents perceived a benefit from participating in the AIT. As well as learning new skills, producing papers for publication and learning good time-management skills, participants appreciated the opportunity to work closely with mentors and get a sense of life as a clinical academic. Several participants mentioned that they found the overall experience to be very fulfilling. Eighty-three per cent would recommend the academic track to a friend. The 2018/19 survey showed very similar results.

4.3.5 Product Evaluation

The product evaluation investigates to what extent the programme effectively addressed its original objectives which included providing junior doctors with opportunities to develop research, education and healthcare leadership and management skills, promote scientific discovery and retain medical talent in Ireland. Therefore, the product evaluation included both a literature review to identify scientific outputs of academic interns, and career trajectory monitoring.

4.3.5.1 *Early scientific outputs*

An individual search on PubMed for each of the 72 AIT participants from the first three years of the programme (July 2017-July 2018 to July 2019-July 2020) was conducted between 10th and 20th June 2020. Publications were attributed to an academic intern if the name, field of study and project supervisor correlated. Only original, peer-reviewed research papers, essays or review articles published ≤ 5 years prior to graduation and any time post-graduation were included, with letters, commentary, abstracts, conference proceedings and editorials excluded.

One hundred and thirty-five articles which named participants in the AIT from 2017-2019 (n=72) as authors were identified. Of these, 50 were

published in the five years prior to graduation and 85 either during or at 1-2 years post completion of the AIT (Fig. 4.6).

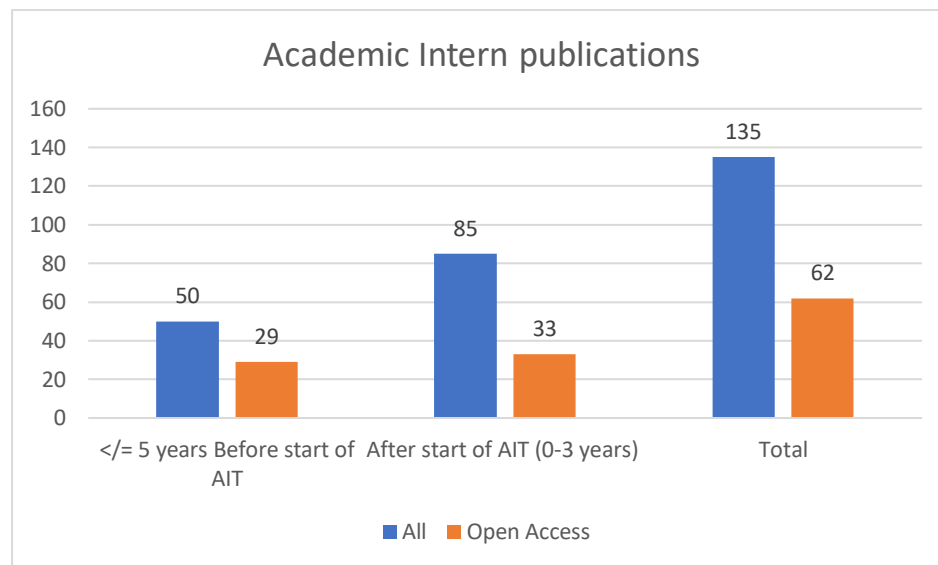


Fig. 4.6: Peer-reviewed publications of first three cohorts of academic interns (n=72)

Forty-one of the 72 former academic interns (56.94%) had achieved publication of a research paper/review article in a peer reviewed journal by June 2020; a substantial number of publications were open access.

The quality of publications based on journal impact factor is also an indicator for success of the programme (Table 4.4).

Journal	Number of Publications	Impact Factor*
British Journal of Anaesthesia	2	6.199
Free Radical Biology & Medicine	1	6.17
The American Journal of Sports Medicine	6	6.057
JCI Insight	1	6.014
Annals of Medicine	1	5.435

Table 4.4: Top five publications by journal impact factor (published after start of AIT)

*Journal Impact Factor at time of literature search, June 2020

Academic interns develop their own project proposal and identify an area of research that is of interest to them. On reviewing the project titles and primary supervisors' occupation, we found a total of 28 specialties represented, with oncology, anaesthetics, obstetrics and gynaecology, orthopaedic surgery and paediatrics being the most represented specialties (Table 4.5). Analysis suggests interns publish predominantly in the specialty represented by their academic track projects: 64 of the 85 publications attributed to academic interns during and after the AIT are within the same field as their academic track project.

Specialty	Number of interns
Oncology	8
Obstetrics and gynaecology	6
Anaesthesia	6
Orthopaedic surgery	5
Paediatrics	5
Public health	4
Endocrinology	3
Ophthalmology	3
Emergency medicine	3
Psychiatry	3
Neurology	3
Infectious diseases	3
Respiratory medicine	2
Nephrology	2
Dermatology	2
Pathology	2
Gastroenterology	1
Health informatics	1
Medicine for the elderly	1
Radiation oncology	1
Microbiology	1
Haematology	1
Vascular surgery	1
Otorhinolaryngology	1
Colorectal surgery	1
Inclusion medicine	1
Medical education	1
Immunology	1

Table 4.5: Specialties represented by academic interns (n=72)

Feedback from exiting interns indicated outputs other than publication or presentation, these included outreach activities, gaining additional qualifications, achieving awards and accolades for their academic work, gaining teaching experience and learning new research skills.

4.3.5.2 Career Trajectory

In 2017/18 on formal reporting, 10/12 participants confirmed they were remaining in Ireland for their first SHO year, with two planning to travel abroad. However, informally 22/24 or (92%) planned to stay in Ireland and subsequently did. In 2018 /19 none of the respondents reported an intention to apply for a training scheme abroad and just 10% planned to take up non-training scheme work abroad. Of the remainder, most (42.6%) planned to take up a training post in Ireland; others planned to join a GP scheme, take a stand-alone post, or undertake further study.

The first AIT cohort provided open-ended responses regarding 5-year career intentions, most reported that they were aiming for higher specialist training schemes without indicating a specific location; only 1 indicated a preference to train abroad. By the second cohort, 66.7% indicated an aspiration for HST in Ireland and the ICAT programme. Other preferences such as non-integrated research/academia are shown (Fig. 4.7).

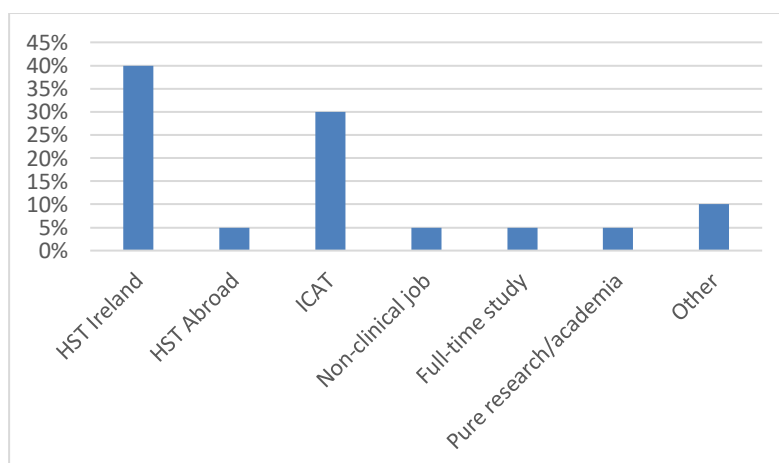


Fig. 4.7: Longer term career plans (HST= Higher Specialist Training, ICAT = Irish Clinical Academic Training Programme)

With the programme just in its fifth year, it is too early to determine its effects on career trajectory, however this will be monitored as a key outcome going forward.

4.4 Discussion

Evaluation of the Academic Internship Track in Ireland from 2017-2021 has shown four key findings: a significant demand for combined clinical academic training posts, a demand to develop key research skills by early career junior doctors, the capacity to translate these skills and contribute to a chosen field of study, and that satisfying these needs may contribute to the retention of this valuable expertise.

4.4.1 Demand for combined clinical academic training

The survey of undergraduate students indicated a significant interest in the programme, and this has been borne out in the recruitment process. Similar numbers apply for academic internship annually, with applications received far exceeding the places available. In four years, we have never had a post unfilled, and no-one has left the programme early. The level of interest in the programme has been sustained, even during the uncertainties of the COVID pandemic, indicating the perceived quality of the programme and its benefit to one's career. It is likely that there is great scope for expansion of the programme.

4.4.2 Participants' outputs

Even at the earliest career stage, participants in a combined clinical academic training programme have the potential to contribute substantially to their field of interest. Many participants in the first three years of the academic track have already contributed to publications as named authors and it is anticipated that this number will rise significantly given the lengthy process of manuscript preparation and publication. Publications either during or after the academic track outnumber publications in the five years before the academic track (when participants would have been undergraduate medical students). A substantial number

of publications (38.8%) were open access, and many were published in high calibre journals.

Data from a similar programme run in the UK, the UK Academic Foundation Programme indicates that on exiting the two-year programme, 33% of participants have submitted or prepared papers for publication, with no information on how many of these resulted in a peer-reviewed publication (138). While it is not a direct comparison, 57% of AIT participants having achieved publication at 0,1 and 2 years post-academic track would suggest that they are prolific compared to their peers.

Medical doctors at all levels, clinical academics or not, are thought to publish at a rate of 0.47 papers per year. Publication rate is much lower at the earliest career stages (139). Taking one year of the academic track, 2018/19 as an example, the 24 participants succeeded in publishing at an average rate of 1.27 papers each per year in the two years since their academic internship start date, indicating a rate of publication over twice that of the average doctor, despite being at the earliest career stage.

This suggests that being a named author on a peer reviewed paper is a reasonable long-term goal for academic interns, with most participants in the programme at 0,1 and 2 years having already achieved this. Given the lengthy process that publication can often be, it is likely that contributions from this cohort of academic interns will increase, and it is noted that an expectation to publish during intern year may be unrealistic. Since the programme began, there has been a shift away from research metrics towards DORA compliant CVs, and this has been reflected in increasing science communication and PPI training for academic interns. It is too early to judge the effect of this on building a research profile, but future programme evaluations and career trajectory monitoring may investigate the effects of this shift.

4.4.3 Retention of expertise and job satisfaction

Retention of medical talent in Ireland for the immediate and longer terms through the creation of early career opportunities was one of the main objectives of the academic internship track. Participants in the AIT tend to remain in Ireland after completion of the programme; in contrast, almost two thirds of interns who have completed the standard intern-training programme plan to emigrate abroad at least for a year (140). Ireland has ongoing problems recruiting and retaining health personnel, and despite producing the most doctors among Organisation for Economic Co-operation and Development (OECD) countries, it remains below average for practicing doctors per 1,000 population. A national doctor retention strategy has been in place since 2015 but has enjoyed limited success (141). Factors influencing the higher retention rate may include intrinsic factors such as focus on a career plan or a fruitful area of research. Alternatively, academic interns having fostered relationships with other researchers may wish to continue to build their networks, emphasising the importance of mentors to early career clinical academics.

A different perspective might suggest that the academic track creates greater job satisfaction and hence greater retention. Participants in the exit survey indicated high levels of satisfaction with both the clinical and academic parts of the year. Burnout is high among Irish junior doctors, and this contributes to the decision to emigrate (142). A highly demanding job combined with low or scarce resources can negatively impact on employee wellbeing, whereas a highly demanding job with high levels of support and resources can have a positive impact (143). The hypothesis that clinical academics are intrinsically motivated, as discussed in Chapter 2, might also help explain this finding of high levels of satisfaction and retention within the Irish system. Intrinsic motivation in education is associated with higher engagement, higher persistence, enhanced well-being, and lower rates of dropout. It requires fulfilment of three psychological needs: autonomy, relatedness and competence (76). Academic interns undergo a rigorous

selection process, enhancing feelings of competence; study days and the showcase event enhance feelings of relatedness and their projects are self-determined, facilitating autonomy. Further study is required to investigate the hypothesis that academic interns are motivated at a high level because these three psychological needs are met by the academic track programme, and that this enhances job satisfaction and contributes to a decision to remain in Ireland after intern training. Establishing this would have implications for postgraduate medical training beyond the AIT.

4.4.4 Areas for improvement

The AIT is not without its challenges. Academic track posts represent less than 3% of all intern posts, and an increase in intern posts in response to COVID did not include an increase in academic intern posts. A very small number of posts nationally means many excellent candidates miss out on posts each year. Furthermore, limited funding for study days and other events can impact on their delivery, and the arrival of COVID-19 has necessitated a move to online educational sessions as well as a potential increase in conflict between clinical responsibilities and academic goals.

4.4.4.1 Under-representation of General Practice and Surgery Projects

There have been no projects in General Practice (GP) in the first three years of the programme, despite the fact the GP is the largest medical discipline in the country. This is reflective of the problem of under-involvement of GPs in clinical research that is seen on a national level (144). General practice has much to contribute given the scope of clinical practice in the community in terms of both the numbers of patients seen and the number of locations across the country, and therefore it would be worth considering how to encourage research in this field at the earliest career stage.

Surgery is also under-represented compared to medical specialties. Removing orthopaedic surgery projects leaves only three surgery projects out of 72: one each of colorectal surgery, vascular surgery, and otorhinolaryngology. Whether this reflects a limited interest in a career as

an academic surgeon or surgical careers in general, fewer visible potential supervisors, or other factors would require further investigation. It is noted in Chapters 2 and 3 that clinical academics working in technical and procedure-based specialties may encounter additional challenges in balancing requirements to maintain clinical competence with academic goals and responsibilities, and this may make academic surgery a less inviting prospect. Both GP and surgical training are run-through programmes which may preclude research at an early career stage. However as with general practice, methods to encourage surgical projects should be considered.

4.4.4.2 Curriculum development and assessment

Curriculum development of the academic track and assessment of academic interns are areas which requires further attention. The current curriculum is modelled closely from the UKAFP curriculum, which is a two-year programme and not directly comparable to the AIT. The primary function of the curriculum has been to act as a guide to help interns identify their academic goals for the year, but its usefulness in contributing to the training or assessment of academic interns has been limited.

The standard internship programme in Ireland, in keeping with other postgraduate medical training programmes internationally, is moving towards a competency-based curriculum, with a plan to implement Entrustable Professional Activities (EPAs) as a means of assessment. A competency-based curriculum has advantages over the traditional time-based apprenticeship model because the advancement of trainees to the next career stage is determined by competency as opposed to time spent in the role (145).

EPAs provide a model for a competency-based curriculum; they are defined as “units of professional practice” and describe tasks that a competent trainee can be trusted to perform without supervision (146). In addition to providing a means of assessment, EPAs offer a way to bridge the gap from knowledge to clinical or professional practice and can be used to inform

training programmes and curriculum development. They allow for assessment of training programmes by providing standards for quality assurance, and by affording opportunities for supervisors to check that trainees are acquiring the relevant knowledge and skills. A set of 17 EPAs for translational scientists has been developed by international experts in translational research which includes sections on identifying and translating unmet clinical needs to research, conducting studies, dissemination, academic collaboration and translating outcomes to care (147). EPAs for teachers in health professions education have also been developed, including EPAs for lecturing, bedside teaching, mentoring and tutoring (146). These EPAs could form the basis for developing a set of EPAs for clinical academic trainees in Ireland, perhaps in collaboration with other clinical academic training programmes such as ICAT. Doing so would allow for the full integration of the AIT curriculum with the standard internship programme, enhance the trainee experience, ensure competencies are reached, provide guidance on best practices for trainees, allow for quality assurance of the training programmes and provide transparency to reassure key stakeholders including patients and the public about the proficiency and competency of the clinical academic skills pool.

4.4.5 Limitations

Exit feedback survey questions differed between the two years and not all interns provided feedback on the programme. The literature search for scientific outputs was conducted by one researcher only, and only one database (PubMed) was searched. Therefore, it is possible that papers which should have been attributed to participants in the programme were missed, whereas others may have been misattributed. Further, it was not possible to compare the research outputs of participants with a control group, e.g., a group of interns who did not participate in the academic track, due to a lack of other identifying factors such as field of interest or supervisor.

I have been involved in the creation and implementation of the AIT and my involvement in the programme remains. Therefore, it is possible that a conflict of interest exists in my evaluation of a programme which I helped create.

4.5 Conclusion

This chapter describes an evaluation of the first combined clinical academic training programme for interns in Ireland, and one of only a small number internationally to offer combined training at the earliest career stage. I have described the strengths and challenges of the programme and made recommendations for further improvements. Previous chapters have highlighted the importance of providing adequate resources including early learning experiences to clinical academics, and these findings have been translated into a successful training programme for early career clinical academics. Chapters 2 and 3 also provide a window of insight into the attributes of successful clinical academics. Our evaluation of the AIT, the experiences and outputs of participants has shown that successful clinical academics may be identified from the very beginning of their careers.

The AIT provides early exposure to research training, as well as exposure to the reality of balancing clinical and academic commitments. Feedback from participants indicates that this is a positive experience. The AIT also provides mentorship and the beginning of a clear career pathway (albeit one that is interrupted between intern year and HST). Thus, the AIT promotes self-efficacy beliefs and outcomes expectations, contributing early clinical academic career development in keeping with recommendations based on SCCT (55, 91).

The AIT has been shown to be a highly sought-after programme, and it has fulfilled its aims of providing opportunities for doctors at the beginning of their careers, promoting scientific discovery and sustained academic development, and retaining medical talent in Ireland. Areas for improvement are highlighted as well as the successes of the programme. A

description of how the programme was developed from its inception is provided, this information may be useful for other educators seeking to implement a combined clinical academic pathway for early career clinicians.

A finding of gender imbalance in the first two years of the programme has prompted further investigation. This investigation is described in Chapter 5.

Chapter 5: Gender Balance in Clinical Academic Careers: a real world resumé study

5.1 Background

Female participants in the repertory grid study in Chapter 3 describe a tension between family responsibilities and career development. Cultural stereotypes of women as collaborative and relationship-focussed and men as agentic, dynamic and innovative were replicated in the study, and these stereotypes reinforce masculinized perceptions of innovation (121). The first two years of recruitment to the AIT (2017 and 2018) saw successful male candidates outnumber successful female candidates by 3:1, even though male and female candidates indicated their interest in similar numbers. These findings prompted a further investigation into gender balance and gender stereotyping in the AIT.

Reviewing the literature seeking frameworks to address the potential problem of gender bias led to an interesting finding: although same-gender mentoring is often promoted as a potential solution to gender bias, there is little evidence to back up this intervention (22) which requires time and energy on the part of both the mentor and mentee (148, 149). A disparity in the distribution of academic labour (such as mentoring) towards females may act as a perverse barrier to female academic careers, and may unintentionally advantage male colleagues (150). An exploration of the gender of supervisors named by AIT candidates was prompted by this information.

This chapter describes a modified resumé study with two components. The first part of the study seeks to answer the question of whether implicit bias against female candidates applying for the academic track results in lower reviewer scores. The second part explores the question of whether aspiring female clinical academics are more likely to nominate a female supervisor compared to their male counterparts.

5.1.1 Gender bias in academic medicine

Gender bias exists in all professions and academic medicine and surgery are no different. Women are under-represented at the highest levels in academia across all specialties. Even though the majority of third level staff in Ireland are female (54%), only 23% of professors are female (20). A report from the American Association of Medical Colleges (AAMC) indicates that although 48% of medical school graduates are female and the proportion of female faculty has risen to 41%, this is mostly at the lower levels and women make up only 25% of full professors and 18% of Department Chairs (19).

There are many reasons for gender imbalance in academic medicine. One paper describes a vicious cycle whereby gender stereotyping and bias results in under-representation by women in higher levels or leadership roles, with less funding, therefore less productivity and visibility, thus reinforcing gender stereotypes and biases (151). Female clinical academics are less likely to succeed when funding reviews focus on the investigator compared to reviews focussed solely on the scientific proposal (152). Attention has been called to the gender bias in academic publishing: while progress was made in the 1990's and 2000's with women in first authorship in six high impact journals (Annals of Internal Medicine, JAMA- Internal Medicine, BMJ, JAMA, Lancet and NEJM), increasing from 27% to 37%, since 2009 progress has either halted or declined (153). Even when women attain leadership roles, they are stereotypically associated with specific types of work including institutional education, mentorship and community-based public service research as opposed to traditionally male-associated activities such as basic and clinical research (154).

Following the initial two years of recruitment to the academic internship track programme, a highly competitive process where applicants greatly outnumber the number of posts available, it was noticed that successful male candidates outnumbered female by approximately 3:1 for both years. In response to this finding, the Academic Track recruitment team decided

to undertake a field experiment to investigate the presence of implicit bias against female candidates. We chose an approach similar to a résumé study because candidates fill out a standardised application form and indicate their gender at the beginning of the process; each application is scored independently by a minimum of three reviewers therefore it was possible to compare the scores of male and female candidates.

5.1.2 Résumé studies and implicit bias

A résumé study (also known as natural field experiment with résumés) is a type of experiment which allows for the investigation of the presence of bias in a recruitment process. This approach has the advantage of taking place in the real world as opposed to a laboratory setting; additionally, researchers can keep variables constant apart from the variable of interest (gender, ethnicity etc.) and researchers can use fictitious applications sent to a large number of reviewers, thereby facilitating the collection of large amounts of data (155).

Implicit, or unconscious bias, occurs when automatic associations are made between members of a social group and a particular attribute or negative evaluation (156). When it comes to recruiting women to academic roles, implicit bias is known to play a significant role, and this is particularly true for women at early career stage. A randomised double-blind résumé study carried out in 2012 asked senior academics to rate student applications for a lab manager position; applications were randomly assigned either a male or female name. Male candidates were rated as significantly more hireable and more competent and were afforded more mentoring and a higher salary compared to the identical female applicant. Female faculty and male faculty were equally likely to exhibit bias against female applicants (157).

Healthcare professionals are known to manifest implicit bias against women: a systematic review of studies investigating implicit bias in healthcare professionals, which included studies from different countries and using different methodologies, found that they exhibit implicit bias to a

similar degree as the general population, including bias against women (158). A large study from 2017 of almost 43,000 healthcare workers (of whom 82% were female) using the Harvard Implicit Association Test (IAT) found they held implicit biases associating men with career and women with family; in the same study a sample of 131 surgeons, (34.4% female) associated men with surgery and women with family medicine. This demonstrates the unconscious nature of implicit bias: individuals may explicitly reject negative ideas and images associated with disadvantaged groups, but are still unconsciously influenced by immersion in a culture where these groups are depicted in negative ways (158).

5.1.3 The need for gender equality

Gender equality is one of the UN's Sustainable Development Goals (159) and discrimination on the basis of biological sex is prohibited by the European Union Charter of Fundamental Rights (160). Gender inequality represents a serious problem for recruitment to highly competitive and challenging training programmes, where only the most talented are likely to succeed. There is an onus on those who develop clinical academic training programmes to investigate for and mitigate implicit bias in the recruitment processes.

Gender-based discrimination is a distinct threat to the clinical academic workforce. In the world of business, organisations with greater gender diversity in leadership outperform less diverse organisations because discrimination limits access to talent (161). If we want clinical academics who can meet all the expectations described in Chapters 2 and 3 and tackle the healthcare problems of the 21st century there is a need to continue to create and refine strategies that promote the development of a truly inclusive workforce.

5.1.4 Same-gender supervisors

Prominent female mentors and role models may mitigate gender imbalance, with the presence of female role models thought to be of

particular importance for women in the early career stages (162). Conversely, a lack of senior female role models resulting in fewer female mentors can be seen by junior staff to be an impediment to career development (149). However, senior female faculty may be stereotypically associated with educational activities (154), which take time and effort (149), potentially at the expense of other activities which could further their own careers such as research publication (17).. Moreover, while studies show gender-specific mentoring is a popular intervention, there is little evidence that it is actually effective in improving gender balance (22), and a systematic review found outcomes of mentorship programmes aimed at women were unchanged whether the mentors are all-female or both male and female (149). Providing early career female clinical academics with same-gender mentors and role models must be balanced with a need to avoid stereotyping senior female faculty by increasing their nurturing and educational workload, particularly considering there are far fewer senior female figures available compared to male.

Candidates to the academic track have the option of indicating who they want their supervisor to be at the stage of full application. In the second part of this resumé study I wished to compare the gender of supervisors indicated by male and female candidates to see if female candidates would be more likely than male to associate with a female supervisor.

5.2 Aims

This chapter aims to further explore findings from Chapters 3 and 4 which suggest that gender imbalance, bias and stereotyping are significant barriers to clinical academic career development for women. The objectives of the study are to:

1. Test the hypothesis that female applicants to the academic track are subject to implicit bias, and this is reflected in their application scores

2. Explore the effects of anonymising applications to the academic track on gender balance
3. Explore whether female candidates to the AIT recruitment process are more likely to nominate a female supervisor compared to male candidates

5.3 Methodology

5.3.1 Ethical considerations

This study was approved by the Trinity College Dublin School of Medicine's Research Ethics Committee (September 2020, Application Number 20200502, Appendix 7). Reviewers were contacted individually in November 2020, after completion of both recruitment processes, provided with an information leaflet about the study and asked to provide written consent that their scores could be used as part of the study. If a response was not obtained after three emails, or if a reviewer declined to give their consent, the reviewer's score was removed from the data, therefore only the scores from reviewers who provided written consent are included in the analysis.

5.3.2 Investigating the presence of gender imbalance

Our study takes the form of a resumé study using real applications and real reviews. Applicants to the AIT are asked to identify their gender during the recruitment process by selecting one of two options (Male/Female); non-binary options are not offered in accordance with HBS policy. Numbers of female and male applicants were counted at four stages of the recruitment process: from initial expression of interest to shortlisting, interview and finally post acceptance for the first four years of the programme (2017-2020). An imbalance in favour of male applicants as the process progresses could indicate the presence of gender bias.

5.3.3 Comparing anonymised and named scores

Each full application to the AIT is reviewed and scored out of 100 by a minimum of three reviewers during the shortlisting. The three scores are

averaged, and candidates with the highest average scores are called to interview. Reviewers are senior clinical academics, and all six medical universities in Ireland are represented. There are approximately 24 reviewers (4 from each of the 6 universities) involved in the shortlisting process annually. Reviewers may differ from year to year, but many continue their engagement annually.

During the recruitment processes for 2019 and 2020 (the year indicated is the year of post allocation) three out of six Irish Medical Schools were randomly selected. Reviewers affiliated with these three schools received anonymous applications. Applications were anonymised by deleting or redacting the candidate's name from the application form and accompanying documents (e.g., exam transcripts). On receipt of the applications to be shortlisted, all reviewers were provided with a set of instructions and informed that some applications were anonymised in keeping with international recommendations on minimising implicit bias; included with the instructions was a link to the League of European Universities' 2018 Advice paper on implicit bias in academia (163) (Appendix 8).

The analysis looked at the difference between scores when the application was named and when it was anonymous using a paired t-test. For an application to be included, it had to have been scored from both an anonymous and named perspective for comparison. Scores of reviewers who did not consent to participate were removed. Where there were three reviews, two of the scores came from either an anonymous or a named review and an average of these scores was taken. Where there were two reviews, only those who had both anonymous and named reviews were included (see Fig. 5.1).

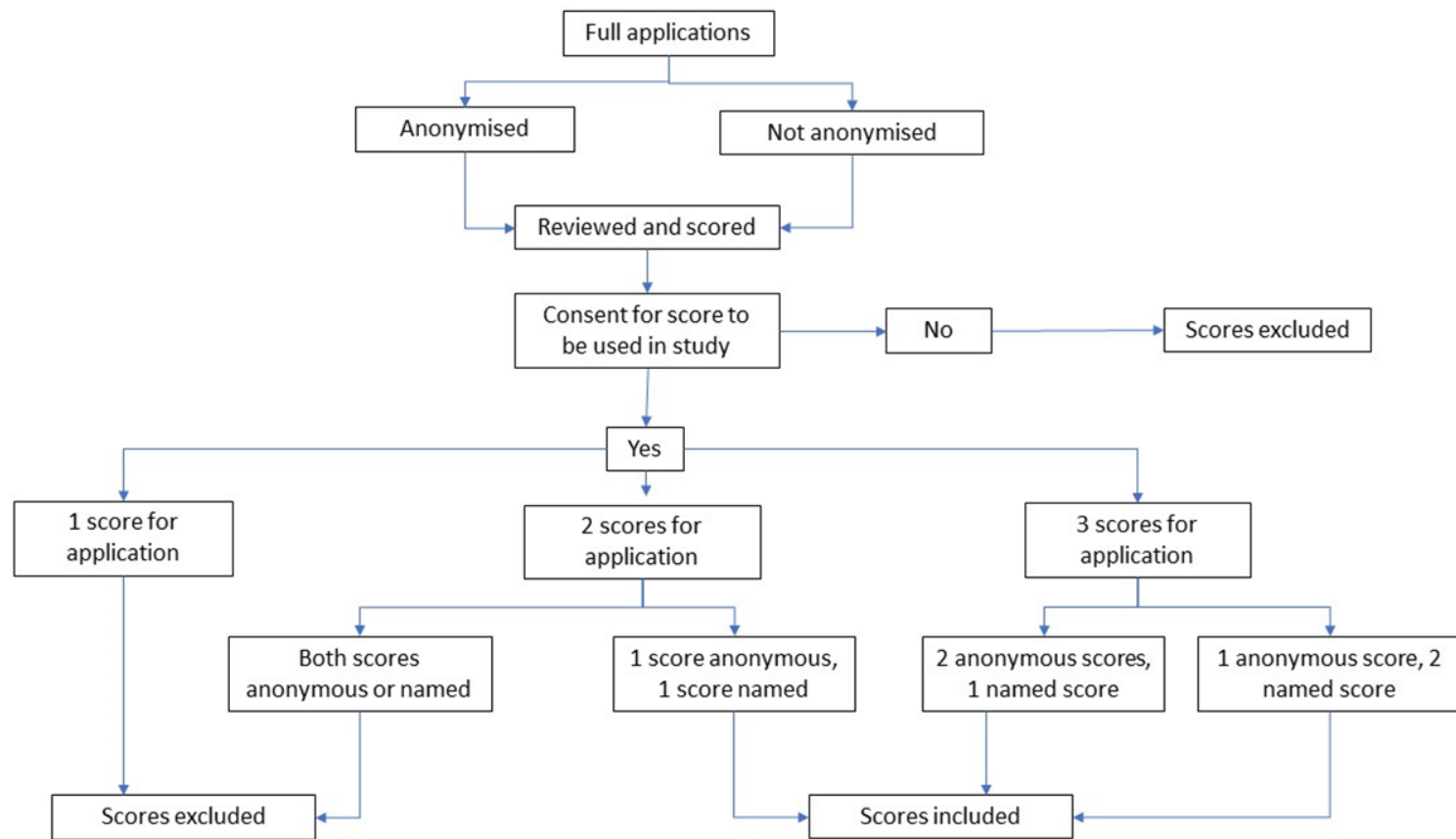


Fig 5.1: Flowchart explaining inclusion and exclusion criteria for data analysis

As an additional measure to tackle unconscious bias in the recruitment process, in 2019 and 2020, interviewers were asked to undertake unconscious bias training (e.g., Living Equality and Diversity online training programme) prior to the interviews if they had not previously done so, and provided with links to their own institutions' online unconscious bias training programmes. There is a degree of overlap between reviewers and interviewers, i.e., some, though not all, reviewers also interview candidates.

5.3.4 Gender of supervisors

Applicants to the AIT can name a potential project supervisor or supervisors at the point of full application. While this is not mandatory and does not carry a mark, in practice most applicants will identify at least one potential supervisor, with a small number of candidates identifying more than one. It is expected that the applicant will have met with and discussed the proposed project with the supervisor prior to submission of the application.

Full applications from 2017-2020 were reviewed to identify the gender of the named supervisor(s) and to compare the gender of female candidates' named supervisors with male candidates' named supervisors.

5.4 Results

5.4.1 Gender balance during recruitment to the AIT

One thousand five hundred and forty-seven internship applicants have indicated their interest in the academic track at Stage 1 of the application process in the first four years of the AIT (2017-2020). Two hundred and seventy-nine full applications have been received, 156 interviews held, and 96 academic interns appointed. Gender data (M/F) is available for all applicants (Table 5.1).

	Number of Candidates by Stage of Process			
Year	Stage 1	Full application	Interview	Post acceptance
2017	413	80	48	24
2018	336	61	48	24
2019	352	56	48	24
2020	446	82	42	24
Total	1547	279	186	96

Table 5.1: Number of applicants to academic track by stage of recruitment process

A similar number of male and female applicants have indicated interest in the academic track at Stage 1 over all four years. In the first two years, male candidates progressively outnumbered female candidates as the recruitment process continued: in 2017, 58.7% and in 2018, 57.4% of full applications received were from male candidates; 62.5% and 60.4% respectively of those offered an interview were male and male appointees outnumbered female by almost 3:1 for both years (Table 5.2 and Fig. 5.2).

Following the introduction of anonymised applications and the request for interviewers to undertake unconscious bias training, ratios of male to female candidates remained similar throughout the process: 50% and 45.2% of those interviewed were female in 2019 and 2020, and there was almost 50:50 gender balance among appointees to the programme (Table 5.2 and Fig. 5.3).

	Stage 1		Full application		Interview		Post	
Year	%F	%M	%F	%M	%F	%M	%F	%M
2017	50.8	49.2	41.3	58.7	37.5	62.5	25	75
2018	50.3	49.7	42.6	57.4	39.6	60.4	29.2	70.8
2019	53.1	46.4	46.4	53.6	50	50	45.8	54.2
2020	50.2	49.8	54.9	45.1	45.2	54.8	45.8	54.2

Table 5.2: Ratio of male to female candidates during recruitment process by year

- Prior to introducing measures to address gender balance
- After introducing measures to address gender balance

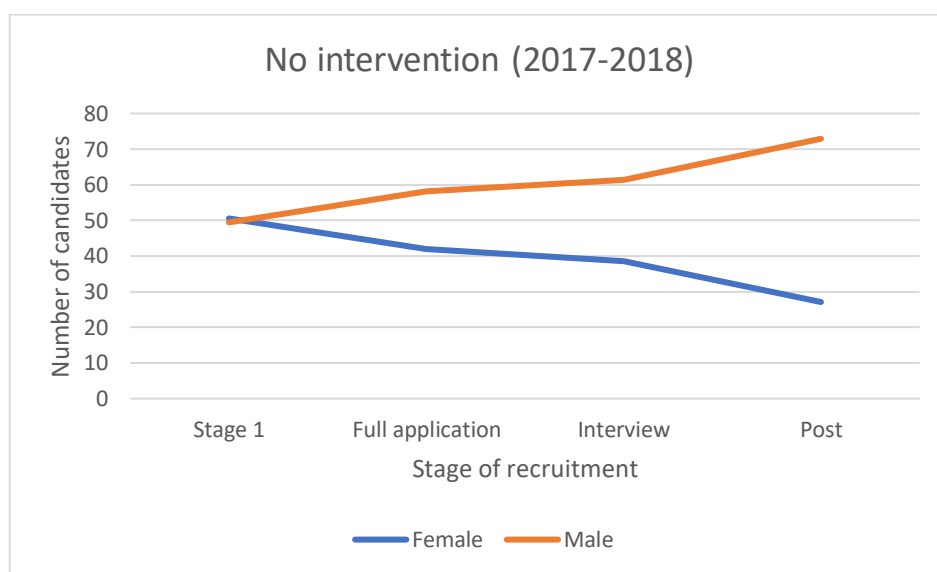


Fig. 5.2: Gender balance prior to interventions

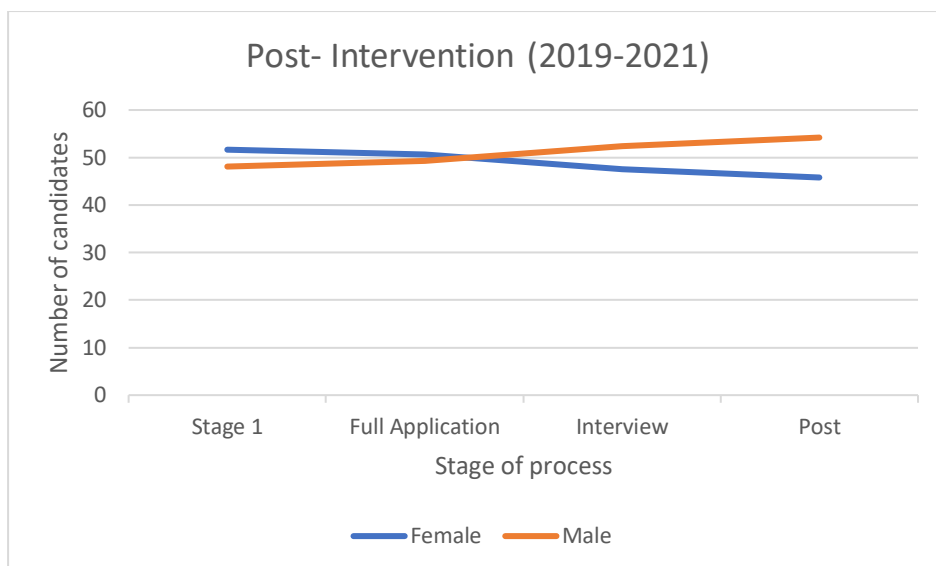


Fig. 5.3: Gender balance after introduction of interventions

5.4.2 Comparison of anonymised versus anonymised applications shortlisting scores

5.4.2.1 Data summary: reviewers and applications

Between 2019 and 2020, 32 reviewers out of 40 consented to participate in the study. No reviewers declined to allow their scores to be included, but eight did not respond to three emails. Thirteen reviewers were involved in the 2019 process only, and 9 in the 2020 process only, with 10 being involved in both years. Reviewers were evenly divided between those who received anonymised applications (n=17) and those who received named applications (n=15) (Fig. 5.4). Of the 32 reviewers whose scores were included in the study, 12 were female and 20 were male (37.5% vs. 62.5%). Applications received by reviewers were either all anonymous or named. The same schools received anonymous reviews for 2019 and 2020, so reviewers that partook in the process for both years only received either anonymous or named applications.

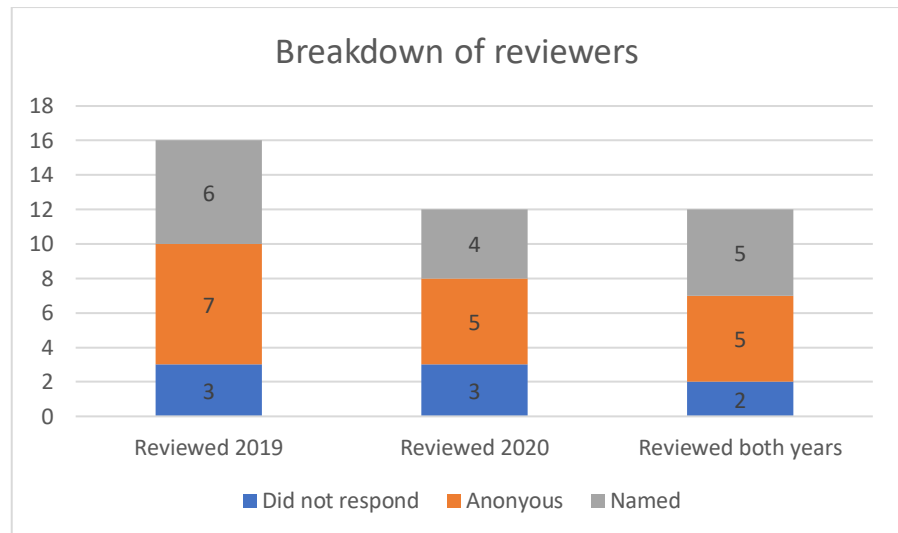


Fig. 5.4: Reviewer characteristics

Scores of one hundred and thirty-seven applications were reviewed. Eleven applications were reviewed by one reviewer, 65 by two reviewers, and 61 by three reviewers. No applications had more than three reviews (Fig. 5.5). One hundred and sixty-six reviews were anonymous (51.2%), 158 were named (48.8%) (Fig. 5.6). Seventy-one applicants (51.8%) were female, 66 (48.2%) were male. After averaging scores for applications which had two anonymous or two named scores, thirty-six applications were excluded because they had only one score (Fig 5.1).

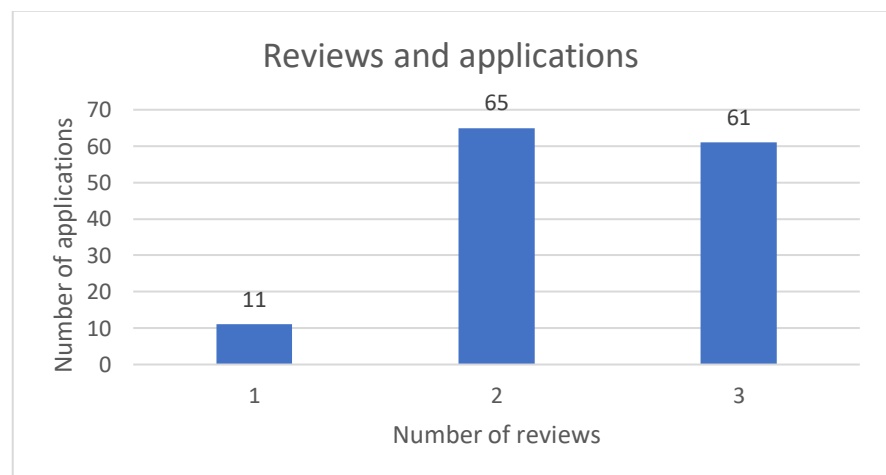


Fig. 5.5: Reviews per application

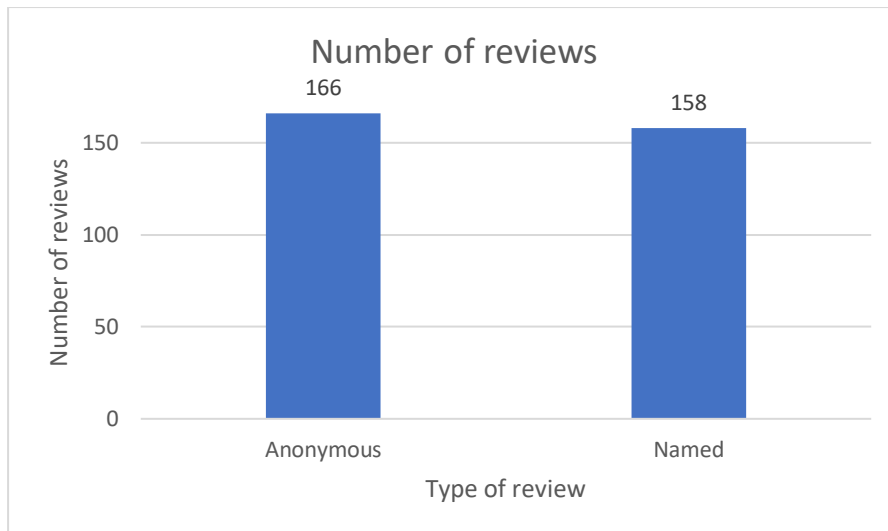


Fig. 5.6: Reviews of anonymous and named applications

5.4.2.2 Comparison of anonymous and named application total scores

Anonymous scores were compared to named scores using a paired t-test as there are two scores per application (Fig. 5.7). For a given individual, applications scored an average of 1.19% lower when they were anonymous compared to named. This difference was not statistically significant. The 95% confidence interval for the difference between anonymous and named scores was [-3.19%, 0.82%], p-value 0.2439.

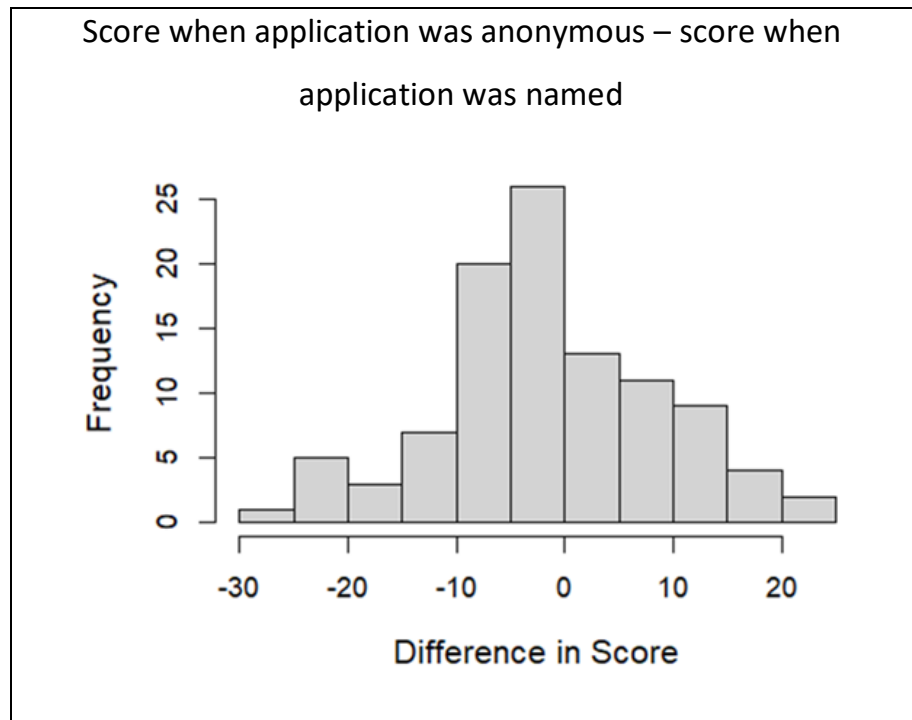


Fig. 5.7: Histogram of difference between scores when the application was anonymous compared to named

5.4.2.3 Comparison of anonymous and named application total scores with males and females considered separately

The female anonymous scores are on average 0.74% lower than female named application scores (Fig. 5.8). This difference is not statistically significant. 95% confidence interval for difference between anonymous and named scores: [-3.40%, 1.92%], p-value = 0.5787.

The male anonymous scores were on average 1.72% lower than male named scores (Fig. 5.8). This difference is not statistically significant. 95% confidence interval for difference between anonymous and named scores: [-4.87%, 1.44%], p-value = 0.279.

Appendix 9 includes mean difference plots for all candidates and for female and male candidates separately.

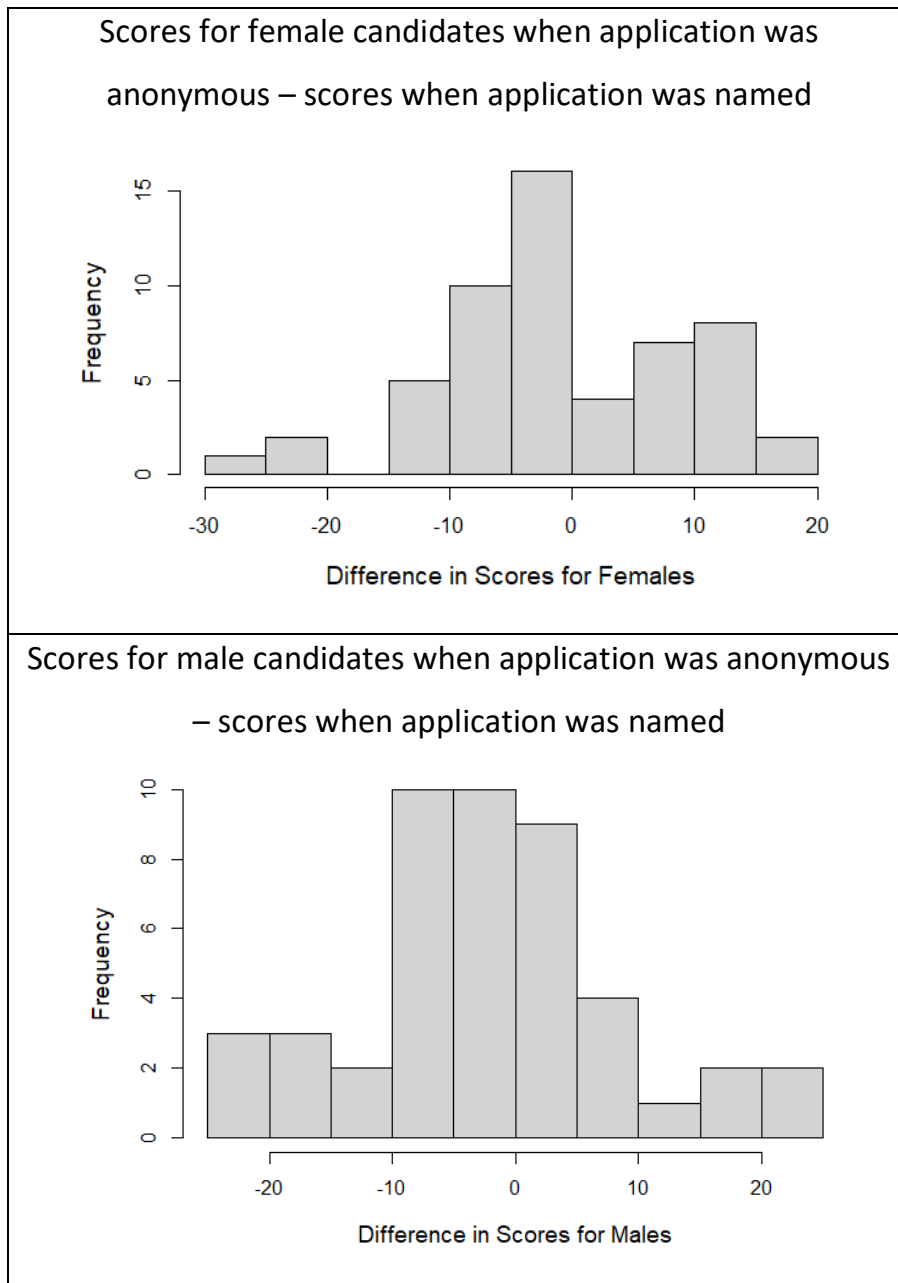


Fig. 5.8: Histogram of differences between anonymous and named scores when for female and male candidates

5.4.3 Gender of proposed supervisors

Two hundred and nine candidates submitting full applications (74.91%) identified one or more potential supervisors. Seventy candidates did not name a supervisor, 101 candidates named one, 29 candidates named two, and 2 candidates named 3 supervisors.

Female candidates were on average more likely to name female investigators as supervisors compared to male candidates: 40.7% of supervisors named by female candidates were female compared to 25.2% of supervisors named by male candidates (Table 5.3).

Year	Total supervisors	Female supervisor (%)	Male supervisor (%)
Female candidates			
2017	23	10 (43.5)	13 (56.5)
2018	25	7 (28)	18 (72)
2019	25	10 (40)	15 (60)
2020	40	19 (47.5)	21 (52.5)
Total	113	46 (40.7)	67 (59.3)
Male candidates			
2017	24	1 (4.2)	23 (95.8)
2018	31	12 (38.7)	19 (61.3)
2019	32	6 (18.8)	26 (81.3)
2020	40	13 (32.5)	27 (67.5)
Total	127	32 (25.2)	95 (74.8)

Table 5.3: Number and % of supervisors named by candidate by gender and year

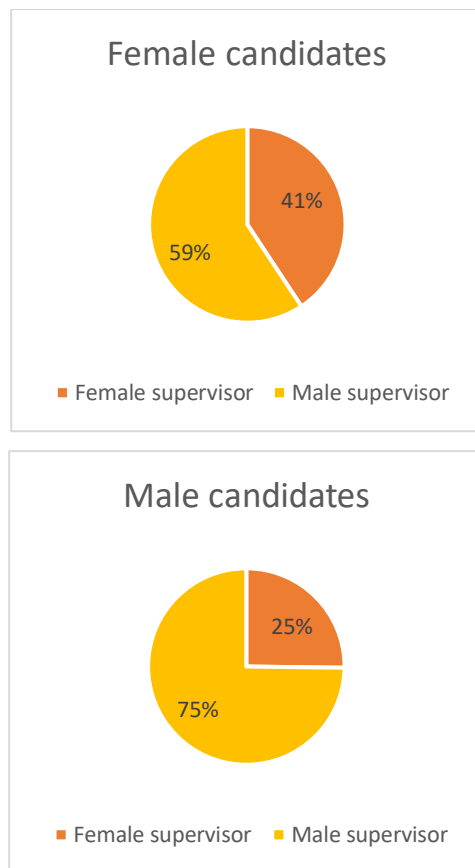


Fig. 5.9: Ratio of female to male supervisors by gender 2017-2020

5.5 Discussion

5.5.1 Bias against female candidates and the effect of anonymisation

The first two years of recruitment to the academic internship track show a higher success rate for male candidates compared to female candidates: while both male and female students initiated the application process in similar numbers, successful male candidates outnumbered female by 3:1. Recruitment processes where the proportion of male candidates continually outnumbers female as the process progresses could be subject to unconscious bias against female candidates. Introduction of anonymised applications for some reviewers and a request for interviewers to undertake unconscious bias training resulted in better gender balance, with the proportion of female to male candidates remaining stable throughout the recruitment process. Despite seeing an improvement in gender

balance, anonymising applications did not make a significant difference to scores.

Removing identifiers from applications seems like a reasonable approach to mitigating unconscious bias: reviewers cannot be biased if they are unaware of the applicant's gender. However, studies of the effects of anonymising job applications have had mixed results, with some studies finding that anonymising applications resulted in increasing women's chances of interview, and others finding a reduced chance (161, 164). An investigation of the effects of anonymisation on recruitment to an ophthalmology residency programme found no significant effect on applicant scores overall or specifically for female candidates (165). A study of managers' views of anonymising applications found that in the absence of explicit signals (e.g., names), managers sought implicit signals to categorise applicants according to gender, and in doing so, used stereotypes of employment patterns and communications styles, thus activating biases which the anonymisation procedure sought to suppress (161). Our study is in keeping with these findings that anonymising applications alone may not be sufficient to tackle implicit bias.

5.5.2 Alternative explanations: Cues for control and differences in cohorts

Although the activation of stereotypes is automatic, when the activation results in behaviour that is discordant with the individual's beliefs and values (e.g., that people should be treated equally regardless of gender), and there is awareness of this discordance, it becomes possible for individuals to exert control over prejudiced responses. Recognition by an individual that their responses are not in keeping with their egalitarian values results in negative self-affect (e.g., guilt) which results in the development of cues for control: environmental stimuli which, when present, prompt prospective reflection, or a more carefully considered response which doesn't constitute prejudice. In other words, certain environmental cues can halt and override automatic stereotyping and

minimise bias (166). It is likely that reviewers for the academic track who were included in this analysis would wish to behave in a manner that is not prejudiced by virtue of their personal values and medical training. The fact that they agreed to participate in a study on gender bias provides evidence for this. It is possible that the email instructions received by reviewers, indicating that measures were being taken to minimise implicit bias along with a link to a paper on the effects of bias (Appendix 8), in addition to the request to take unconscious bias training and the training itself, could constitute cues for control. This would mean that the presence of these reminders of the effects of unconscious bias resulted in reviewers and interviewers employing prospective reflection and arresting unconscious stereotypes. This might explain our findings that although the first two years of the programme suggested that implicit bias against women was present, these findings were not replicated when reminders were issued about the effects of unconscious bias. However, the effect of cues for control has been elucidated in experimental studies but not in real life (166), the exact nature of cues for control has yet to be described, and further research would be required to investigate this signal.

An alternative view could be that there were differences between applicants in the first two years of the programme compared to later years. Applicants to the first two years would have had limited knowledge of what the academic track programme would be like and whether it would be worth investing the time and effort in submitting a full application. Unlike applicants in later years, they would not have had the benefit of advice from recent or current participants in the programme to guide them through the recruitment process. Applicants for the early years could be considered more pioneering, dynamic, and adventurous, incidentally these are the types of behaviours for which men tend to be rewarded and women punished (167).

SCCT has identified gender as an important personal factor which impacts career choice and career progression (55). Female participants in the

repertory grid study reported a tension between career and family responsibilities which male participants did not report. Furthermore, the findings from the repertory grid study supported the existence of the cultural stereotypes of women being less innovative and more relationship-building. The present study suggests that there may have been bias against female candidates in the first two years of the academic track programme, which was mitigated by the introduction of measures to tackle implicit bias, although the exact mechanism for this is uncertain. The nature of the bias against female candidates to the academic track is also unclear. It is rare for interns to take maternity leave, so concerns about female interns leaving the programme for family reasons may not have played a significant role. Cultural stereotypes that suggest women are less innovative, less mathematical, and less scientifically capable than men persist even when there is objective evidence to the contrary (121, 168). How these assumptions interact with other factors such as familial responsibilities are topics which require further exploration.

5.5.3 Female candidates and same-gender supervisors

Female candidates were more likely than male candidates to identify a female potential supervisor for their project. Applicants to the academic track may choose any supervisor, and supervisors can come from any healthcare or related discipline, the only stipulation is that they should have an academic background and supervision experience. Most candidates identify a supervisor that they have already built up a relationship with and have worked with in the past, so the supervisor may also be considered a mentor. While not all potential supervisors are necessarily professors, it is interesting to note that the average proportion of female supervisors selected by male candidates (25%) is closely aligned to the known distribution of professorial posts among women in higher level institutions in Ireland (23%)(20) and internationally in academic medicine (25%)(19). This might suggest that male candidates' choice of supervisor is more in keeping with the proportion of senior faculty who are

female, and potentially less influenced by the gender of the supervisor.

This finding is supported in the literature: in a study of the impact of gender on mentor-mentee success in dermatology, <40% of male participants (mentees) indicated that they would prefer a mentor of the same gender, while 80% of female participants reported that they would prefer a female mentor (169).

There are many reasons why female candidates may be more inclined to identify female supervisors compared to male candidates. Female mentors can act as role models and share their experiences on issues specific to women e.g., balancing a career with the family responsibilities that usually fall to women. Protégés may also feel they have a greater connection and easier communication with same-gender mentors (169). There are also specialties that are stereotypically associated with women (e.g. Obstetrics and gynaecology, paediatrics) (170) and it is possible that female candidates are drawn more to these specialties than male, hence will meet a higher proportion of potential supervisors who are female. It is also possible that male supervisors may be more reluctant to take on female mentees in the wake of the #MeToo movement: male leaders have reported fear of false accusations of misconduct and this may have a profound effect on women's careers (171). However, with senior female faculty currently outnumbered approximately 3:1 in Ireland, and junior female faculty equalling junior male faculty in terms of numbers (20), the tendency of junior female academics to seek same-gender supervision could potentially result in excessively burdening female staff with the work of mentoring and supervision at the expense of other work which would help advance their own careers e.g., publication.

Providing access to female mentors to early career female researchers while also ensuring the equitable distribution of academic labour and non-research activities among senior researchers presents an interesting challenge given the current shortage of senior female faculty. Moving away from more traditional dyadic or 1:1 mentoring towards other models

such as peer-mentoring, group mentoring or networking models may provide part of the solution because these models are less reliant on individual senior faculty member (148). Recognising the value of mentoring and rewarding mentors accordingly in recruitment, promotion and funding decisions might also mitigate any paradoxical effects of same-gender mentoring on female clinical academic career progression. It is also noted that protégés benefit from mentorship regardless of gender concordance (169), so providing opportunities for mentoring relationships to develop without emphasising a need for same-gender mentoring is likely to benefit early career researchers while avoiding inequitable distribution of mentoring responsibilities.

Much of the literature focusses on the benefits of mentoring to the mentees while neglecting the effects on the mentors (149). This is the first study to investigate whether junior and aspiring female clinical academics are more likely than their male counterparts to seek female supervisors. This study draws attention to a potential disparity in the allocation of mentoring duties which may represent another barrier to career progression for female clinical academics.

5.5.4 Limitations

Our study has the advantage of including data from real-life job applications and reviewer scores, however there are potential drawbacks to this approach. Firstly, the sample size was small and potentially not powered to detect a significant difference between scores of anonymised and named applications. Information on when interviewers had undertaken unconscious bias training was not collected, and therefore, it is not possible to comment on the effects of this training.

It is difficult to fully anonymise academic applications because publications are listed, and verification of a publication will often result in revealing the candidate's name and gender; furthermore gender-specific information can be inadvertently revealed in the CV section (e.g., member of a camogie

team); in some cases, it might have been possible to identify the gender of the candidate based on their application, and this may be another explanation as to why there was little difference between the scores when applications were anonymised.

Finally, implicit bias is an issue that doesn't affect only women, there are recognised minority groups who are underrepresented in medicine (URiM). Due to a reliance on data gathered by the HSE's recruitment body, the Health Business Services (HBS), which currently only collects data relating to gender (M/F), it was not possible to analyse data related to other applicant characteristics including representation of groups who are URiM; this is an extremely important area which requires further investigation.

5.6 Conclusion

This chapter has examined the recruitment to the AIT over four years for evidence of gender bias and explored the impact of anonymising applications on shortlisting scores. The gender of supervisors nominated by female candidates has been compared to the gender of supervisors nominated by male candidates, highlighting a potential disparity.

Findings from the study in Chapter 3 (the repertory grid study) indicated that female clinical academics may experience additional barriers to career development. A signal suggesting gender imbalance in recruitment to the AIT led to this investigation of the presence of implicit bias and the effects of anonymisation on applications. Concerns about inequality in the distribution of mentoring duties described in the literature prompted an exploration of the genders of supervisors nominated by candidates to the AIT. To the best of our knowledge, this is the first study to investigate the effect of anonymisation on recruitment to a combined clinical academic training programme for junior doctors, and the first to consider whether junior female clinical academics tend to select same-gender supervisors.

The findings of this study have revealed a complex picture. Gender balance in the AIT appears to have improved following the introduction of

anonymised applications and reminders to undertake unconscious bias training, however this change does not appear to be fully explained by the interventions. Anonymising applications can have mixed results and is not sufficient to tackle unconscious bias. Cues for control may play a role, but this remains poorly understood.

Junior female clinical academics are more likely to seek female mentors. The benefits of same-gender mentoring to women at early career stages have been well-documented, but the effects of such initiatives on senior female faculty have not been described. Same-gender mentoring is an approach that seeks to “fix the women” e.g., by boosting confidence, but women are not the source of gender inequality. It is an intervention that relies on female faculty while asking nothing of male faculty. Like the anonymising of applications, it is an overly simplified approach to a complex issue and does little to address the root of the problem: a culture abounding with the subtle and sometimes negative stereotypes of women that underlie unconscious bias. Gender discrimination is a societal predicament which limits access to talent and represents a threat to sustaining the clinical academic workforce. Tackling this problem will be challenging, but perhaps by employing the innovative and collaborative nature which clinical academics pride themselves on, it will not be insurmountable.

Chapter 6: Conclusion and Recommendations

6.1 Introduction

This thesis was conceived in recognition of the important contributions that clinical academics make to the future of healthcare, and that they are a workforce under threat. There is a need among the academic healthcare community to develop understanding of how to build capacity and support such individuals to sustain the workforce for the future. This thesis considered the professional identity of the group from multiple perspectives, starting at the most fundamental level with a definition of the term. I have investigated the current usage of the term clinical academic in scientific literature to describe the attributes, antecedents, and consequences of the role of the clinical academic and used real and fictional cases to provide a further explanation of the term. This investigation provided a stepping-stone to move beyond the literature to exploring the views of established and trainee clinical academics and their construal of successful clinical academic practice using repertory grid technique. Findings from these studies included the importance of combined clinical academic training and early career opportunities, and the next chapter describes learning from the evaluation of the first early career combined clinical academic training programme for junior doctors in Ireland, the AIT. Female participants in the repertory grid study raised concerns about the effect of gender on career development as a clinical academic, and further concerns were raised when successful male candidates to the academic track outnumbered successful female by 3:1 in the first two years of the programme. This led to an investigation into the presence of implicit bias in recruitment to the AIT and the effects of measures to mitigate it.

6.2 Summary of key findings

The tripartite role of the clinical academic as clinician, researcher and teacher still prevails but it may be more accurate to consider a quadripartite role including that of the academic administrator.

Contributions to discipline and academic institutions are often delivered by being in a managerial or leadership role within disciplines, and such roles require a significant amount of time and skill. The four components of the clinical academic role are not awarded equal recognition in recruitment and promotion: research outputs are the primary means by which academic careers progress. However, the role is continually evolving, and may over time become subdivided into dual roles, e.g., clinician-educator or researcher-administrator. The rate of evolution of the role may be increased by a move towards a narrative CV such as the DORA CV, but the impact of this shift on clinical academics remains to be seen.

Antecedents to the role include the provision of adequate resources, training pathways and supportive work environments. There are papers describing consequences of the role including advancements in patient care, benefits to students, and benefits to clinicians. However, much of the literature is focussed on the barriers to the clinical academic workforce and measures to support it without truly justifying the existence of this workforce and the resources required to sustain it. Clinical academics may be uniquely positioned to translate basic science into research, but currently evidence for this uniqueness in the literature is limited. There is also a major gap in the literature regarding non-physician clinical academics, suggesting that the concept is not well-supported outside medicine.

There is an abundance of literature on developing supports for the clinical academic workforce, but papers are primarily focussed on organisational factors. The result is that little has changed over the past number of years, and the workforce continues to dwindle. Recruitment and promotion criteria and decisions on allocation of funding are predominantly determined by one competency, research skills. But research metrics alone are not an adequate assessment of the overall performance of clinical academics, and clearly, addressing organisational factors without consideration of personal factors has not succeeded in reversing the

decline of the workforce. Social Cognitive Career Theory (SCCT) holds that personal factors, learning experiences and person group fit all interact with each other and with organisational factors to determine career development and career success. Clinical academics are complex, as are the environments they inhabit, and to succeed requires a multitude of person-group, person-job, and person-organisation fits, with the right experiences and interactions occurring at the right time. Using SCCT as a framework to interpret findings from interviews with clinical academics, personal and environmental attributes which support a successful career have been identified, contributing to a more holistic view of the role.

According to SCCT, self-efficacy beliefs are a major component to career interest, development and performance, and they can be positively influenced by early learning experiences (55). The creation of the Academic Internship Track in Ireland has provided early career learning experiences for junior clinical academics and an evaluation of the programme has shown that there is a sustained demand for clinical academic training at the earliest career stage, that participants in the programme contribute significantly to knowledge in their field of interest, they are satisfied with their experience and are more likely than their peers to remain in Ireland upon completion of internship. Through a robust recruitment process, it is possible to identify those with potential to become future clinical academics from the earliest career stage. Career trajectory monitoring will provide further information on the long-term effects of early career clinical academic training. Self-determination theory may provide some insight into what attracts candidates to the programme and why participants tend to stay in Ireland: it may be that by fulfilling the psychological needs of autonomy, competence, and relatedness, that the AIT maintains intrinsic motivation, and hence job satisfaction and perseverance.

Gender bias represents a threat to the clinical academic workforce because discrimination and a lack of diversity limit access to talent. Gender is a

significant personal factor affecting career development and there is a body of evidence demonstrating the existence of implicit bias and discordant stereotyping of women in scientific careers. There was evidence of the presence of implicit bias in recruitment to the AIT for the first two years of the programme, but this was not evident in the following two years after the introduction of anonymising applications. The differences between scores for applications when they were anonymous compared to named were not statistically significant, and anonymisation may not have been the reason things improved. A separate finding was that female candidates were more likely to seek a female mentor. Given that senior female faculty are outnumbered by 3:1, this finding, should it carry through, may exacerbate an imbalance in the mentoring responsibilities of senior female faculty. This is a complex issue, and reactive interventions that simply increase the exposure of women to women may not be helpful. While it wasn't possible to look at factors beyond gender in this thesis, these would be an important area for future work.

Despite the complex issues of gender inequality, there are women who overcome these barriers to succeed as clinical academics. The model case discussed in the concept analysis (Chapter 2), Professor Louise Gallagher, is an example of this. She has overcome stereotypes regarding women in scientific careers to become a leader in her field. She is both extremely well-respected within the scientific community, and very well-liked among her colleagues. She has shown that it is possible to transcend gender stereotypes that juxtapose innovation with communality, suggesting women don't belong in the scientific community, and provided a model for female clinical academics. There is still much work to be done, but the presence of Professor Gallagher and others like her at the top of their fields offers inspiration and hope for the future.

6.3 Limitations

Limitations to each chapter are already alluded to, however it should also be mentioned that COVID-19 also had an also some impact on the planned

work, significantly the abandonment of plans to run focus groups with 2nd year medical students. An online survey was created instead and circulated to the 2nd year class, but due a very low response rate it was ultimately decided not to include this work in the PhD, with the result that undergraduate student voices are absent.

6.4 Recommendations

Interventions to build the clinical academic workforce should be hypothesis-driven and evidence-based. Investigations should be positioned within an explicit theoretical framework to justify approaches and methodology, and to aid interpretation of findings.

Providing a well-defined career pathway for clinical academics may help to raise awareness about clinical academic careers and provide structure for those who wish to pursue this career. In Ireland, this would require the development of clinical academic Senior House Officer (SHO) posts to bridge the gap between intern year and HST. Consideration should also be given to the development of career pathways for non-physician clinical academics.

It is recognised that interest in a clinical academic career takes many years to develop, so aspiring clinical academics should be nurtured from an early undergraduate stage. Early exposures at undergrad level are probably quite important and need to be promoted and investigated in their own right to see how they impact on career trajectory and the attributes that make for a successful but satisfying career.

Self-Determination Theory (SDT) might provide a useful paradigm for the development of combined clinical academic training programmes.

Consideration of how combined

programmes can support autonomy, competence, and relatedness to promote intrinsic motivation may contribute to career development, job satisfaction and perseverance. Further curricular components to consider might be the inclusion of innovation training and assessments, and the

promotion and facilitation of collaboration, particularly interdisciplinary collaboration. Such training programmes may also consider the development of specific assessments for clinical academics, e.g., EPAs.

Excellence in teaching and non-research based academic leadership/contributions to discipline and institution should be recognised and rewarded and dedicated faculty development for this should be available for all clinical academics engaged in education. Criteria for promotion and rewards should be considered more holistically, and the impact of narrative CVs needs to be rigorously gathered.

Mentor relationships are contextual, and a recognition of diversity is important. However, the positioning of senior female faculty in mentorship roles needs to be considered from both the perspective of the mentor and mentee. Interventions designed to enhance gender equality should avoid unintentional harming of women by increasing the type of academic labour which currently goes largely unrecognised. Male colleagues can support their female counterparts by sharing the institutional housekeeping, i.e., the workload associated with advancing gender equality.

6.5 Future research

There are questions which have arisen as a result of the work undertaken. The views of undergraduate students, who are key stakeholders in the development of interventions to support clinical academic careers, should be investigated. SCCT may provide a framework to undertake this work. An investigation into the barriers and incentives to pursuing a career as a clinical academic would inform curriculum development and early undergraduate support for aspiring clinical academics.

Programmes such as the AIT provide insight into the professional identity formation of clinical academics. Longer-term explorations into the effect of early career combined clinical academic training could contribute to the understanding of the essence of the successful clinical academic. As the AIT programme matures, follow up of participants e.g., via online surveys,

on factors such as career trajectory, scientific outputs and job satisfaction could form part of the ongoing programme evaluation. Applicants to the AIT who were deemed appointable but not offered a post due to limited post availability could form a control group; scoping out this pool of talent could also provide evidence for expanding the programme.

Investigation into whether programmes such as the AIT improve motivation would also be warranted. Self-determination theory could provide a theoretical framework for this work. There are validated scales to measure factors such as intrinsic motivation. e.g., the Intrinsic Motivation Inventory (68). This scale could be adapted and used to assess levels of motivation among applicants to the academic track, e.g., at interview stage or the beginning of intern year, with measurements repeated at the end of the intern year. Dividing study participants into two groups depending on whether they were successful at interview and completed the AIT or were unsuccessful at interview and completed a standard internship would facilitate a comparison in scores between the groups. Given the importance of intrinsic motivation in relation to learning, creativity, performance, and persistence (76), understanding the effect of the AIT on participants' motivation could have implications for clinical academic training programmes and more widely for medical education in general.

There are validated tools to measure innovation potential (69).

Investigations of innovation and creativity among those with an interest in a career as a clinical academic might enhance understanding of the nature of early clinical academics as well as unlocking the potential of this group. Interactions between facets of Conscientiousness and Innovation in this group would also be an interesting area to explore. It would also be important to investigate other attributes of clinical academics such as Altruism and Integrity, whether these can be accurately measured, and views of key stakeholders on whether they should be included in criteria for rewards and promotion.

The nature of assumptions regarding female clinical academics which underpin unconscious bias and stereotypes warrant further exploration. The additional, invisible work undertaken by women to address issues of gender inequality in their institutions – institutional housekeeping – should be quantified. Together with issues like a masculinized construal of innovation, this can create a toxic environmental milieu for women which is not addressed by interventions like Athena SWAN. Given that much of this bias is unconscious, shining a light on these issues may provide part of the solution.

6.6 Researcher perspectives and learning

My original research questions were: how is the term clinical academic currently understood; what are the attributes of a successful clinical academic; and can early career combined training programmes provide a viable solution to promoting clinical academic careers? In approaching these questions, I employed a range of techniques and methodologies. Some of these methodologies have rarely or never been applied to the field of medical education (concept analysis and repertory grid technique). I have gained a perspective on the utility of these methodologies as well as an understanding of how they might be applied. I have also drawn on theories from educational and organisational psychology to provide frameworks for interpreting my findings. In doing so, I have gained a deep knowledge of the identity of the clinical academic, and an understanding of strategies to help reverse the decline of the past number of years and strengthen the workforce for the future.

This thesis was inspired by my work with the intern programme in TCD and the development of the AIT. Working with academic interns and interns on the standard programme has shown me the tremendous pool of talent that is available to the Irish healthcare system, and I believe it is imperative that this pool of talent be appropriately supported. Participants in the AIT have exceeded all expectations in their ability to contribute to their field even at the earliest career stage. Undertaking this PhD has given me an

opportunity to explore what makes this group tick and apply theoretical frameworks to develop a deep understanding.

My sense of my own positioning in the academic healthcare ecosystem is that of the clinician-educator as opposed to clinical academic. However, I understand of the demands of clinical practice and how they compete with academic goals. I have also had experiences of working with clinical academics at different levels. In recognition of how this might affect how I interpret my findings, I have taken steps to minimise my own biases, e.g., the use of repertory grid technique which essentially eliminates interviewer bias. I consider my perspective to be slightly removed, and this removal permits insight without excessive prejudice.

The world has changed since this PhD began in March 2018. The COVID-19 pandemic has shown us that much which was considered immutable can change overnight. The effects of new challenges like climate change are increasingly evident, even as we continue to grapple with humanity's age-old enemies of war and plague. But the situation is not hopeless. Our greatest resources in tackling these problems will be innovation and collaboration. It is my belief that if we can implement effective strategies to ensure the survival of the role of the clinical academic, then their attributes, contributions and unique perspectives will be critical in finding solutions and maintaining the health of our society into the future.

References

1. Sherbino J, Frank JR, Snell L. Defining the Key Roles and Competencies of the Clinician–Educator of the 21st Century: A National Mixed-Methods Study. *Academic Medicine*. 2014;89(5):783-9.
2. Schafer AI. The vanishing physician-scientist? *Translational research : the journal of laboratory and clinical medicine*. 2010;155(1):1-2.
3. Willcox S. Creating and sustaining the next generation of the clinical academic workforce. A discussion paper prepared for Medical Deans Australia and New Zealand.: Health Policy Solutions Pty Ltd.; 2011.
4. British Medical Association. The Role of the Medical Academic. Medical Academic Staff Committee; 2014 Accessed 12/10/18.
5. Roser M, Ortiz-Ospina E, Ritchie H. Life Expectancy 2013 [Available from: <https://ourworldindata.org/life-expectancy>.
6. Rourke S. The 25 Most Influential Physicians in the Past Century: Medscape; 2017 [Available from: <https://www.medscape.com/slideshow/2017-influential-physicians-6009095>.
7. Sanchez JA, Daly JM. Stanley J. Dudrick, MD: A Paradigm Shift. *Archives of Surgery*. 2010;145(6):512-4.
8. Spataro K. Larry Einhorn: The Breakthrough, The Cure, The Vision, The Legacy, The Teacher 2015 [Available from: <https://medicine.iu.edu/magazine/larry-einhorn>.
9. Wikipedia Contributors. Barry Marshall 2022 [updated 22/04/2022. Available from: https://en.wikipedia.org/wiki/Barry_Marshall.
10. Chasty B. Stuart-Smith J. Denis Burkitt [Webpage]. 2020 [Available from: <https://litfl.com/denis-burkitt/>.
11. Wyngaarden JB. The Clinical Investigator as an Endangered Species. *New England Journal of Medicine*. 1979;301(23):1254-9.
12. Ashrafian H, Patel VM, Skapinakis P, Athanasiou T. Nobel Prizes in medicine: are clinicians out of fashion? *J R Soc Med*. 2011;104(9):387-9.

13. Macleod MR, Michie S, Roberts I, Dirnagl U, Chalmers I, Ioannidis JPA, et al. Biomedical research: increasing value, reducing waste. *The Lancet*. 2014;383(9912):101-4.
14. Rimmer A. Clinical academic workforce continues to shrink. *BMJ*. 2017;358.
15. National Institutes of Health. NIH Physician-Scientist Workforce Group Report 2014. NIH Website; 2014.
16. Rosenblum ND, Kluijtmans M, ten Cate O. Professional Identity Formation and the Clinician–Scientist: A Paradigm for a Clinical Career Combining Two Distinct Disciplines. *Academic Medicine*. 2016;91(12).
17. Zaorsky NG, O’Brien E, Mardini J, Lehrer EJ, Holliday E, Weisman CS. Publication Productivity and Academic Rank in Medicine: A Systematic Review and Meta-Analysis. *Academic Medicine*. 2020;95(8).
18. McKinney REJ. The Daunting Career of the Physician–Investigator. *Academic Medicine*. 2017;92(10):1368-70.
19. Association of American Medical Colleges. The state of women in academic medicine 2018-2019 [Report]. 2020 [Available from: <https://www.aamc.org/data-reports/data/2018-2019-state-women-academic-medicine-exploring-pathways-equity>].
20. Higher Education Authority. HEA National Review of Gender Equality in Irish Higher Education Institutes 2016 [Available from: http://www.heai.ie/sites/default/files/hea_review_of_gender_equality_in_irish_higher_education.pdf].
21. Association of American Medical Colleges. The state of women in academic medicine statistics, 2015-2016 2016 [Available from: <https://www.aamc.org/data-reports/faculty-institutions/data/state-women-academic-medicine-statistics-2015-2016>].
22. House A, Dracup N, Burkinshaw P, Ward V, Bryant LD. Mentoring as an intervention to promote gender equality in academic medicine: a systematic review. *BMJ open*. 2021;11(1):e040355.

23. World Health Organisation. WHO Coronavirus (COVID-19) Dashboard 2022 [updated 18th April 2022. Available from: <https://covid19.who.int/>.
24. Zhang J, Zhou L, Yang Y, Peng W, Wang W, Chen X. Therapeutic and triage strategies for 2019 novel coronavirus disease in fever clinics. *The Lancet Respiratory Medicine*. 2020;8(3):e11-e2.
25. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *The Lancet*. 2020;395(10223):497-506.
26. Coppo A, Bellani G, Winterton D, Di Pierro M, Soria A, Faverio P, et al. Feasibility and physiological effects of prone positioning in non-intubated patients with acute respiratory failure due to COVID-19 (PRON-COVID): a prospective cohort study. *The Lancet Respiratory Medicine*. 2020;8(8):765-74.
27. RECOVERY Collaborative Group. Dexamethasone in Hospitalized Patients with Covid-19. *New England Journal of Medicine*. 2020;384(8):693-704.
28. Fogarty F, McCombe G, Brown K, Van Amelsvoort T, Clarke M, Cullen W. Physical health among patients with common mental health disorders in primary care in Europe: a scoping review. *Irish journal of psychological medicine*. 2020:1-17.
29. Butler D. Translational research: Crossing the valley of death. *Nature*. 2008;453(7197):840-2.
30. Kluijtmans M, de Haan E, Akkerman S, van Tartwijk J. Professional identity in clinician-scientists: brokers between care and science. *Medical education*. 2017;51(6):645-55.
31. Weggemans MM, Friesen F, Kluijtmans M, Prakken B, ten Cate O, Woods NN, et al. Critical Gaps in Understanding the Clinician–Scientist Workforce: Results of an International Expert Meeting. *Academic Medicine*. 2019;94(10).
32. Jones RD, Griffith KA, Ubel PA, Stewart A, Jagsi R. A Mixed-Methods Investigation of the Motivations, Goals, and Aspirations of Male and

Female Academic Medical Faculty. *Academic medicine : journal of the Association of American Medical Colleges*. 2016;91(8):1089-97.

33. Stein SL. Scholarship in academic surgery: history, challenges, and ideas for the future. *Clinics in colon and rectal surgery*. 2013;26(4):207-11.

34. Beasley SW. Academic paediatric surgery in Australia and New Zealand: Its governance, drivers, successes and challenges. *Seminars in pediatric surgery*. 2021;30(1):151017.

35. van Dijk SJ, Domenighetti AA, Gomez-Ospina N, Hunter P, Lindemans CA, Melotte V, et al. Building a Professional Identity and an Academic Career Track in Translational Medicine. *Frontiers in medicine*. 2019;6:151.

36. van Oostveen CJ, Goedhart NS, Francke AL, Vermeulen H. Combining clinical practice and academic work in nursing: A qualitative study about perceived importance, facilitators and barriers regarding clinical academic careers for nurses in university hospitals. *J Clin Nurs*. 2017;26(23-24):4973-84.

37. Cronin P RF, Coughlan M. Concept Analysis in Healthcare Research. *International Journal of Therapy and Rehabilitation*. 2013;17(2).

38. Campbell J. Concept Analysis: Salem Press; 2020 [Available from: <https://elib.tcd.ie/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=ers&AN=100039068>].

39. Joyce J. Fitzpatrick PMBARNF, Geraldine McCarthy PMSNMDRRGNFR. *Nursing Concept Analysis : Applications to Research and Practice*. New York, NY: Springer Publishing Company; 2016.

40. Walker L, Avant K. *Strategies for Theory Construction in Nursing*. 5th ed: Pearson; 2011.

41. QSR International Pty Ltd. (2020) NVivo (released in March 2020). NVivo2020.

42. Hall AK, Mills SL, Lund PK. Clinician–Investigator Training and the Need to Pilot New Approaches to Recruiting and Retaining This Workforce. *Academic Medicine*. 2017;92(10):1382-9.

43. Cianciolo AT, Mitselfelt J, Ghareeb A, Zahid MF, Akbar R, Ghias K. Physician-scientist or basic scientist? Exploring the nature of clinicians' research engagement. *Advances in health sciences education : theory and practice*. 2021;26(2):353-67.
44. Andriole DA, Wolfson RK. The Physician–Investigator Workforce: Looking Ahead. *Academic Medicine*. 2021;96(4).
45. Kumar K, Roberts C, Thistlethwaite J. Entering and navigating academic medicine: academic clinician-educators' experiences. *Medical education*. 2011;45(5):497-503.
46. Arah OA, Heineman MJ, Lombarts KM. Factors influencing residents' evaluations of clinical faculty member teaching qualities and role model status. *Medical education*. 2012;46(4):381-9.
47. Tariq M, Ali SA. Motivation of clinical faculty towards teaching and learning. *Journal of the College of Physicians and Surgeons Pakistan*. 2014;24(11):785-6.
48. Ziedonis D, Ahn MS. Professional Development for Clinical Faculty in Academia: Focus on Teaching, Research, and Leadership. *Psychiatric Clinics of North America*. 2019;42(3):389-99.
49. What does a clinical researcher do? : *New Scientist*; 2019 [updated 08/05/2019. Available from: <https://jobs.newscientist.com/en-gb/article/what-does-a-clinical-researcher-do/>].
50. Henshall C, Kozłowska O, Walthall H, Heinen A, Smith R, Carding P. Interventions and strategies aimed at clinical academic pathway development for nurses in the United Kingdom: A systematised review of the literature. *Journal of Clinical Nursing*. 2021;30(11-12):1502-18.
51. Carrick-Sen D, Richardson, A., Moore, A., Dolan, S. Transforming healthcare through clinical academic roles in nursing, midwifery and allied health professions: A practice resource for healthcare provider organisations, AUKUH, London 2016 [Available from: <https://www.medschools.ac.uk/media/2325/aukuh-transforming-healthcare.pdf>].

52. Obremskey WT, Archer KR. Research: getting started in an academic setting. *Journal of Orthopaedic Trauma*. 2011;25:S124-7.
53. Lingard L, Zhang P, Strong M, Steele M, Yoo J, Lewis J. Strategies for Supporting Physician–Scientists in Faculty Roles: A Narrative Review With Key Informant Consultations. *Academic Medicine*. 2017;92(10):1421-8.
54. Rosengart TK, Mason MC, LeMaire SA, Brandt ML, Coselli JS, Curley SA, et al. The seven attributes of the academic surgeon: Critical aspects of the archetype and contributions to the surgical community. *American journal of surgery*. 2017;214(2):165-79.
55. Lent RW, Brown SD, Hackett G. Toward a unifying social cognitive theory of career and academic interest, choice, and performance. *Journal of vocational behavior*. 1994;45(1):79-122.
56. Dziak M. Social cognitive career theory (SCCT): Salem Press; 2020 [Available from: <https://elib.tcd.ie/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=ers&AN=146920703>].
57. McDonald A, Paterson H, Herbison P. Registrar interest in academic obstetrics and gynaecology: a cross-sectional survey. *The Australian & New Zealand journal of obstetrics & gynaecology*. 2012;52(5):476-82.
58. Goldacre MJ, Lambert TW, Goldacre R, Hoang U. Career plans and views of trainees in the Academic Clinical Fellowship Programme in England. *Medical teacher*. 2011;33(11):e637-43.
59. Ryan RM, Deci EL. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*. 2000;55(1):68-78.
60. Marbach JA, Almufleh A, Froeschl M, Hibbert B. The Next Generation of Physician-Scientists: Adapting to Academic Cardiology in the 21(st) Century. *The Canadian journal of cardiology*. 2018;34(9):1225-8.
61. Cox AL. Balancing Research, Teaching, Clinical Care, and Family: Can Physician-Scientists Have it All? *The Journal of infectious diseases*. 2018;218(suppl_1):S32-s5.

62. Menger MD, Schilling MK, Schäfers HJ, Pohlemann T, Laschke MW. How to ensure the survival of the surgeon-scientist? The Homburg Program. *Langenbeck's archives of surgery*. 2012;397(4):619-22.
63. Parker K, Burrows G, Nash H, Rosenblum ND. Going Beyond Kirkpatrick in Evaluating a Clinician Scientist Program: It's Not "If It Works" but "How It Works". *Academic Medicine*. 2011;86(11).
64. Brown K. Alexander Fleming
<https://www.britannica.com/biography/Alexander-Fleming>. 1999 [updated Dec 14 2021. Available from:
<https://www.britannica.com/biography/Alexander-Fleming>.
65. de Groot E, Baggen Y, Moolenaar N, Stevens D, van Tartwijk J, Damoiseaux R, et al. Clinician-Scientists in-and-between Research and Practice: How Social Identity Shapes Brokerage. *Minerva*.59(1):123-37.
66. Norvell JG, Baker AM, Carlberg DJ, Diller D, Dziedzic JM, Finnell JT, et al. Does academic practice protect emergency physicians against burnout? *Journal of the American College of Emergency Physicians open*. 2021;2(1):e12329.
67. Ozdemir BA, Karthikesalingam A, Sinha S, Poloniecki JD, Hinchliffe RJ, Thompson MM, et al. Research activity and the association with mortality. *PloS one*. 2015;10(2):e0118253-e.
68. Touré-Tillery M, Fishbach A. How to Measure Motivation: A Guide for the Experimental Social Psychologist. *Social and Personality Psychology Compass*. 2014;8(7):328-41.
69. Patterson F, Zibarras LD. Selecting for creativity and innovation potential: implications for practice in healthcare education. *Advances in health sciences education : theory and practice*. 2017;22(2):417-28.
70. Christensen R, Knezek G. Comparative measures of grit, tenacity and perseverance. *International Journal of Learning, Teaching and Educational Research*. 2014;8(1).
71. Daouk-Öyry L, Zaatari G, Sahakian T, Rahal Alameh B, Mansour N. Developing a competency framework for academic physicians. *Medical teacher*. 2017;39(3):269-77.

72. Beasley SW. Academic paediatric surgery in Australia and New Zealand: Its governance, drivers, successes and challenges. *Seminars in pediatric surgery*. 2021;30(1).
73. Stewart PM. Academic medicine: a faltering engine. *BMJ (Clinical research ed)*. 2002;324(7335):437-8.
74. Venable GT, Khan NR, Taylor DR, Thompson CJ, Michael LM, Klimo P, Jr. A correlation between National Institutes of Health funding and bibliometrics in neurosurgery. *World neurosurgery*. 2014;81(3-4):468-72.
75. Science Foundation Ireland. SFI joins DORA: SFI; 2019 [Available from: <https://www.sfi.ie/research-news/news/sfi-joins-dora/>].
76. Kusurkar R, ten Cate O. AM Last Page: Education Is Not Filling a Bucket, but Lighting a Fire: Self-Determination Theory and Motivation in Medical Students. *Academic Medicine*. 2013;88(6).
77. MacDonald SE, Sharpe HM, Shikako-Thomas K, Larsen B, MacKay L. Perspective: Entering Uncharted Waters: Navigating the Transition From Trainee to Career for the Nonphysician Clinician–Scientist. *Academic Medicine*. 2013;88(1):61-6.
78. Oostveen CJ, Goedhart NS, Francke AL, Vermeulen H. Combining clinical practice and academic work in nursing: A qualitative study about perceived importance, facilitators and barriers regarding clinical academic careers for nurses in university hospitals. *Journal of Clinical Nursing (John Wiley & Sons, Inc)*. 2017;26(23-24):4973-84.
79. Draper P. A critique of concept analysis. *Journal of advanced nursing*. 2014;70.
80. Butcher HK, Kagan P, Whall AL. Book Review: *Strategies for Theory Construction in Nursing* (4th ed.). *Nursing Science Quarterly*. 2006;19(2):174-80.
81. Rodgers BL, Jacelon CS, Knafl KA. Concept analysis and the advance of nursing knowledge: state of the science. *Journal of Nursing Scholarship*. 2018;50(4):451-9.
82. Elcock K. Lecturer practitioner: a concept analysis. *Journal of Advanced Nursing*. 1998;28(5):1092-8.

83. Kellogg MB. Secondary Traumatic Stress in Nursing: A Walker and Avant Concept Analysis. *Advances in Nursing Science*. 2021;44(2):157-70.
84. Burke E. Ireland is a home for 24 of the world's top biotech and pharma companies 2017 [29/05/2017]:[Available from: <https://www.siliconrepublic.com/careers/biotech-pharma-companies-ireland>].
85. European Commission. European and Regional Innovation Scoreboards 2021 2021 [Available from: <https://interactivetool.eu/EIS/index.html>].
86. Department of Jobs Enterprise and Innovation. Innovation 2020 2015 [Available from: <https://www.djei.ie/en/Publications/Publication-files/Innovation-2020.pdf>].
87. Clinical Research Facility St James's Hospital Dublin. The Wellcome-HRB Clinical Research Facility at St James's Hospital. <http://www.sjhcrf.ie/>.
88. ICAT. Irish Clinical Academic Training 2021 [Available from: <https://icatprogramme.org/>].
89. Rasdi RM, Ismail M, Uli J, Noah SM. Towards Developing a Theoretical Framework for Measuring Public Sector Managers' Career Success. *Journal of European Industrial Training*. 2009;33(3):232-54.
90. Bakken LL, Byars-Winston A, Wang M-f. Viewing Clinical Research Career Development Through the Lens of Social Cognitive Career Theory. *Advances in Health Sciences Education*. 2006;11(1):91-110.
91. O'Sullivan PS, Niehaus B, Lockspeiser TM, Irby DM. Becoming an academic doctor: perceptions of scholarly careers. 2009;43(4):335.
92. Xiao Y, Dong M, Shi C, Zeng W, Shao Z, Xie H, et al. Person?environment fit and medical professionals' job satisfaction, turnover intention, and professional efficacy: A cross-sectional study in Shanghai. *PloS one*. 2021;16(4):1-14.
93. O'Shea D. Job Analysis. In: Burke E, editor. PowerPoint slides ed2020.
94. Gaines-Hardison H, Neimeyer RA. Assessment of Personal Constructs: Features and Functions of Constructivist Techniques. In: Caputi

- P, Viney LL, Walker BM, Crittenden N, editors. *Personal Construct Methodology*. 1 ed: Wiley-Blackwell; 2012. p. 3-51.
95. Jankowicz D. *The easy guide to repertory grids*. 1 ed. University of Luton, UK: Wiley; 2004. 308 p.
 96. Winter DA. What Does the Future Hold for Personal Construct Psychology? 2015;5:28-63.
 97. Rozenszajn R, Kavod GZ, Machluf Y. What do they really think? the repertory grid technique as an educational research tool for revealing tacit cognitive structures. *International Journal of Science Education*. 2021;43(6):906-27.
 98. Gotian R, Andersen OS. How perceptions of a successful physician-scientist varies with gender and academic rank: toward defining physician-scientist's success. *BMC medical education*. 2020;20(1):50.
 99. Fromm M. GridSuite Germany2020 [updated 18th May 2020. 5:[Available from: <http://www.gridsuite.de/45623/home.html>.
 100. Linda L Viney SN. Qualitative methods in personal construct research: a set of possible criteria. In: Peter Caputi LLV, Beverly M. Walker, Nadia Crittenden, editor. *Personal Construct Methodology*: Wiley-Blackwell; 2012. p. 53-68.
 101. Honey P. The repertory grid in action. *Industrial and Commercial Training*. 1979;11(9):358-69.
 102. Zacher H, Rudolph CW, Todorovic T, Ammann D. Academic career development: A review and research agenda. *Journal of Vocational Behavior*. 2019;110(Part B):357-73.
 103. Snow F. Creativity and Innovation: An Essential Competency for the Nurse Leader. *Nursing Administration Quarterly*. 2019;43(4).
 104. Souba WW, Day DV. Leadership values in academic medicine. *Academic Medicine*. 2006;81(1):20-6.
 105. Lee TC, Reyna C, Shah SA, Lewis JD. The road to academic surgical leadership: Characteristics and experiences of surgical chairpersons. *Surgery*. 2020;168(4):707-13.

106. Ferguson E, James D, Madeley L. Factors Associated With Success In Medical School: Systematic Review Of The Literature. *BMJ: British Medical Journal*. 2002;324(7343):952-7.
107. Jackson JJ, Roberts BW. Conscientiousness. In: Widiger T, editor. *The Oxford Handbook of the Five Factor Model*: Oxford University Press Inc.; 2017. p. 133-45.
108. Soleas E, Bolden B. What Helped Me Innovate: Identified Motivation Factors from Canadian Innovators' Education Experiences. *Canadian Journal of Education*. 2020;43(3):740-69.
109. Brazile T, Hostetter Shoop G, McDonough CM, Van Citters DW. Promoting innovation: Enhancing transdisciplinary opportunities for medical and engineering students. *Medical teacher*. 2018;40(12):1264-74.
110. Ness RB. Commentary: Teaching Creativity and Innovative Thinking in Medicine and the Health Sciences. *Academic Medicine*. 2011;86(10).
111. Eley DS, Jensen C, Thomas R, Benham H. What will it take? Pathways, time and funding: Australian medical students' perspective on clinician-scientist training. *BMC medical education*. 2017;17(1):242.
112. Ranieri V, Barratt H, Fulop N, Rees G. Factors that influence career progression among postdoctoral clinical academics: A scoping review of the literature. *BMJ open*. 2016;6(10).
113. Yoon S, Koh WP, Ong MEH, Thumboo J. Factors influencing career progress for early stage clinician-scientists in emerging Asian academic medical centres: a qualitative study in Singapore. *BMJ open*. 2018;8(3):e020398.
114. Windsor J, Searle J, Hanney R, Chapman A, Grigg M, Choong P, et al. Building a sustainable clinical academic workforce to meet the future healthcare needs of Australia and New Zealand: report from the first summit meeting. *Internal medicine journal*. 2015;45(9):965-71.
115. Lambert TW, Smith F, Goldacre MJ. Making clinical academic careers more attractive: views from questionnaire surveys of senior UK doctors. *JRSM open*. 2015;6(8):2054270415602644.

116. Yin HL, Gabrilove J, Jackson R, Sweeney C, Fair AM, Toto R. Sustaining the Clinical and Translational Research Workforce: Training and Empowering the Next Generation of Investigators. *Academic medicine : journal of the Association of American Medical Colleges*. 2015;90(7):861-5.
117. Sabine C. Girod MF, Roseanne Menorca, Henry Etzkowitz, Sherry M Wren. Reasons for faculty departures from an academic medical center: a survey and comparison across faculty lines. *BMC medical education*. 2017;17(8).
118. Hall KL, Vogel AL, Huang GC, Serrano KJ, Rice EL, Tsakraklides SP, et al. The science of team science: A review of the empirical evidence and research gaps on collaboration in science. *American Psychologist*. 2018;73(4):532-48.
119. Minich LL, Pemberton VL, Shekerdemian LS, Millar MM, Newburger JW, Glatz AC, et al. The Pediatric Heart Network Scholar Award programme: a unique mentored award embedded within a multicentre network. *Cardiology in the Young*. 2018;28(6):854-61.
120. Jena LK, Goyal S. Emotional intelligence and employee innovation: Sequential mediating effect of person-group fit and adaptive performance. *European Review of Applied Psychology*. 2022;72(1).
121. Proudfoot D, Kay AC, Koval CZ. A Gender Bias in the Attribution of Creativity: Archival and Experimental Evidence for the Perceived Association Between Masculinity and Creative Thinking. *Psychological Science*. 2015;26(11):1751-61.
122. Kin C, Yang R, Desai P, Mueller C, Girod S. Female trainees believe that having children will negatively impact their careers: results of a quantitative survey of trainees at an academic medical center. *BMC medical education*. 2018;18(1):260.
123. Buddeberg-Fischer B, Stamm M, Buddeberg C, Bauer G, Haemmig O, Knecht M, et al. The impact of gender and parenthood on physicians' careers--professional and personal situation seven years after graduation. *BMC health services research*. 2010;10:40.

124. Rochon PA, Davidoff F, Levinson W. Women in Academic Medicine Leadership: Has Anything Changed in 25 Years? *Academic Medicine*. 2016;91(8):1053-6.
125. Windsor J, Garrod T, Talley NJ, Tebbutt C, Churchill J, Farmer E, et al. The clinical academic workforce in Australia and New Zealand: report on the second binational summit to implement a sustainable training pathway. *Internal medicine journal*. 2017;47(4):394-9.
126. UK, Foundation, Programme. 2019 F2 Careers Destination Survey 2019. Available from:
<https://healtheducationengland.sharepoint.com/sites/UKFPOT/WebDocs/Forms/AllItems.aspx?id=%2Fsites%2FUKFPOT%2FWebDocs%2F6%2E%20Resources%2FReports%2FF2%20CDS%5F2019%2Epdf&parent=%2Fsites%2FUKFPOT%2FWebDocs%2F6%2E%20Resources%2FReports&p=true>.
127. Solomon SS, Tom SC, Pichert J, Wasserman D, Powers AC. Impact of medical student research in the development of physician-scientists. *Journal of investigative medicine : the official publication of the American Federation for Clinical Research*. 2003;51(3):149-56.
128. Yang G, Zaid UB, Erickson BA, Blaschko SD, Carroll PR, Breyer BN. Urology resident publication output and its relationship to future academic achievement. *The Journal of urology*. 2011;185(2):642-6.
129. Macknin JB, Brown A, Marcus RE. Does research participation make a difference in residency training? *Clinical orthopaedics and related research*. 2014;472(1):370-6.
130. Silberman EK, Belitsky R, Bernstein CA, Cabaniss DL, Crisp-Han H, Dickstein LJ, et al. Recruiting researchers in psychiatry: the influence of residency vs. early motivation. *Academic psychiatry : the journal of the American Association of Directors of Psychiatric Residency Training and the Association for Academic Psychiatry*. 2012;36(2):85-90.
131. Carney S, Kelley T, Derbyshire L, Marlais M, J R. Rough Guide to the Academic Foundation Programme 2013 [Available from:
<http://www.foundationprogramme.nhs.uk/pages/resource-bank/fp-afp>.

132. Gallen D. Personal Communication. In: Elaine Burke, Martina Hennessy, editors. 2016.
133. Health Service Executive (HSE). Intern Training 2021 [Available from: <https://www.hse.ie/eng/staff/leadership-education-development/met/ed/interns/>].
134. Daniel L Stufflebeam CLC. Evaluation Theory, Models and Applications, 2nd Edition. 2014.
135. Burke E, Teeling M, Hennessy M. Introduction of an academic internship in Ireland: views of undergraduate medical students. Irish Journal of Medical Science (1971 -). 2019;188(3):1025-32.
136. Clancy AA, Posner G. Attitudes Toward Research During Residency: A Survey of Canadian Residents in Obstetrics and Gynecology. Journal of surgical education. 2015;72(5):836-43.
137. Mitwalli HA, Al Ghamdi KM, Moussa NA. Perceptions, attitudes, and practices towards research among resident physicians in training in Saudi Arabia. Eastern Mediterranean health journal = La revue de sante de la Mediterranee orientale = al-Majallah al-sihhiyah li-sharq al-mutawassit. 2014;20(2):99-104.
138. Kelley T. National Evaluation of the Academic Foundation Programme. Unpublished.
139. Rørstad K, Aksnes DW. Publication rate expressed by age, gender and academic position – A large-scale analysis of Norwegian academic staff. Journal of Informetrics. 2015;9(2):317-33.
140. Frances Cronin NC, Louise Hendrick, Ronan Conroy, Ruairi Brugha. The impacts of training pathways and experiences during intern year on doctor emigration from Ireland. Human Resources for Health. 2019;17(74).
141. Brugha R, Clarke N, Hendrick L, Sweeney J. Doctor Retention: A Cross-sectional Study of How Ireland Has Been Losing the Battle. International journal of health policy and management. 2020;x (x):1-11.
142. Hannan E, Breslin N, Doherty E, McGreal M, Moneley D, Offiah G. Burnout and stress amongst interns in Irish hospitals: contributing factors

- and potential solutions. *Irish Journal of Medical Science* (1971 -). 2018;187(2):301-7.
143. Page KM, Milner AJ, Allisey A, Noblet A, LaMontagne AD. Wellbeing-Enhancing Workplaces. In: Jarden A, Oades L, Slade M, editors. *Wellbeing, Recovery and Mental Health*. Cambridge: Cambridge University Press; 2017. p. 289-99.
 144. Ward O, H K. Review of clinical research infrastructure in Ireland. Report. Dublin, Health Research Board; 2019 August 2019.
 145. O'Dowd E, Lydon S, O'Connor P, Boland J, Offiah G, Byrne D. The development of a framework of entrustable professional activities for the intern year in Ireland. *BMC medical education*. 2020;20(1):273.
 146. van Bruggen L, van Dijk EE, van der Schaaf M, Kluijtmans M, ten Cate O. Developing entrustable professional activities for university teachers in the health professions. *Medical teacher*. 2022;44(4):425-32.
 147. Weggemans MM, Ter Haar NM, Prakken B, Ten Cate O. Developing Entrustable Professional Activities for the Training of Translational Scientists: A Modified Delphi Study. *Academic medicine : journal of the Association of American Medical Colleges*. 2021;96(10):1461-6.
 148. Burgess A, Diggele C, Mellis C. Mentorship in the health professions: a review. *Clinical Teacher*. 2018;15(3):197-202.
 149. Farkas AH, Bonifacino E, Turner R, Tilstra SA, Corbelli JA. Mentorship of Women in Academic Medicine: a Systematic Review. *Journal of general internal medicine*. 2019;34(7):1322-9.
 150. Angervall P, Beach D, Gustafsson J. The unacknowledged value of female academic labour power for male research careers. *Higher Education Research & Development*. 2015;34(5):815-27.
 151. Besselaar PVD, Sandström U. Vicious circles of gender bias, lower positions, and lower performance: Gender differences in scholarly productivity and impact. *PloS one*. 2017;12(8).
 152. Witteman HO, Hendricks M, Straus S, Tannenbaum C. Are gender gaps due to evaluations of the applicant or the science? A natural

- experiment at a national funding agency. *The Lancet*. 2019;393(10171):531-40.
153. Lundine J, Bourgeault IL, Clark J, Heidari S, Balabanova D. The gendered system of academic publishing. *The Lancet*. 2018;391(10132):1754-6.
154. Schor NF. Women in medical school leadership positions: Implications for research. *Annals of Neurology*. 2019;85(6):789-92.
155. Adamovic M. Analyzing discrimination in recruitment: A guide and best practices for resume studies. *International Journal of Selection and Assessment*. 2020;28(4):445-64.
156. FitzGerald C, Martin A, Berner D, Hurst S. Interventions designed to reduce implicit prejudices and implicit stereotypes in real world contexts: A systematic review. *BMC Psychology*. 2019;7.
157. Moss-Racusin CA, Dovidio JF, Brescoll VL, Graham MJ, Handelsman J. Science faculty's subtle gender biases favor male students. *Proceedings of the National Academy of Sciences*. 2012;109(41):16474.
158. FitzGerald C, Hurst S. Implicit bias in healthcare professionals: a systematic review. *BMC Medical Ethics*. 2017;18(1):19.
159. United Nations. Transforming our world: the 2030 Agenda for Sustainable Development 2015 [Available from: <https://sdgs.un.org/2030agenda>].
160. European Union. European Charter of Fundamental Rights - Title III - Article 21 Non-Discrimination 2012 [Available from: <https://fra.europa.eu/en/eu-charter/article/21-non-discrimination>].
161. Foley M, Williamson S. Does anonymising job applications reduce gender bias?: Understanding managers' perspectives. *Gender in Management: An International Journal*. 2018;33.
162. Bettis J, Thrush CR, Slotcavage RL, Stephenson K, Petersen E, Kimbrough MK. What makes them different? An exploration of mentoring for female faculty, residents, and medical students pursuing a career in surgery. *The American Journal of Surgery*. 2019;218(4):767-71.

163. LERU. Implicit bias in academia: A challenge to the meritocratic principle and to womens' careers - and what to do about it. Advice Paper No. 23 [Advice Paper]. 2018 [updated January 2018. Available from: <https://www.leru.org/files/Publications/Implicit-bias-in-academia-Full-Paper.pdf>.
164. Behaghel L, Crepon B, Le Barbanchon T. Unintended Effects of Anonymous Resumes. American Economic Journal: Applied Economics. 2015;7(3):1-27.
165. Pershing S, Stell L, Fisher AC, Goldberg JL. Implicit Bias and the Association of Redaction of Identifiers With Residency Application Screening Scores. JAMA ophthalmology. 2021;139(12):1274-82.
166. Monteith MJ, Ashburn-Nardo L, Voils CI, Czopp AM. Putting the brakes on prejudice: On the development and operation of cues for control. Journal of Personality and Social Psychology. 2002;83(5):1029-50.
167. Eagly AH, Karau SJ. Role congruity theory of prejudice toward female leaders. Psychological Review. 2002;109(3):573-98.
168. Roper RL. Does Gender Bias Still Affect Women in Science? Microbiol Mol Biol Rev. 2019;83(3):e00018-19.
169. Lin G, Murase JE, Murrell DF, Godoy LDC, Grant-Kels JM. The impact of gender in mentor-mentee success: Results from the Women's Dermatologic Society Mentorship Survey. International journal of women's dermatology. 2021;7(4):398-402.
170. Murphy B. These medical specialties have the biggest gender imbalance [News piece]. 2019 [updated 01/10/2019. Available from: <https://www.ama-assn.org/residents-students/specialty-profiles/these-medical-specialties-have-biggest-gender-imbalances>.
171. Daar DA, Abdou SA, Wilson SC, Hazen A, Saadeh PB. A Call to Action for Male Surgeons in the Wake of the #MeToo Movement: Mentor Female Surgeons. Annals of surgery. 2019;270(1).

Appendix 1: List of studies used for Concept Analysis

2021 Concept Analysis

BAKEWELL-SACHS, S. 2016. Academic-Practice Partnerships. *Journal of Perinatal & Neonatal Nursing*, 30, 184-186.

BAY, E. H. & TSCHANNEN, D. J. 2017. An Academic-Service Partnership: A System-Wide Approach and Case Report. *The Journal of nursing education*, 56, 373-377.

BEASLEY, S. W. 2021. Academic paediatric surgery in Australia and New Zealand: Its governance, drivers, successes, and challenges. *Seminars in Pediatric Surgery*, 30.

CIANCIOLO, A. T., MITZELFELT, J., GHAREEB, A., ZAHID, M. F., AKBAR, R. & GHIAS, K. 2021. Physician-scientist or basic scientist? Exploring the nature of clinicians' research engagement. *Adv Health Sci Educ Theory Pract*, 26, 353-367.

GOLDACRE, M. J., LAMBERT, T. W., GOLDACRE, R. & HOANG, U. 2011. Career plans and views of trainees in the Academic Clinical Fellowship Programme in England. *Med Teach*, 33, e637-43.

HENSHALL, C., KOZLOWSKA, O., WALTHALL, H., HEINEN, A., SMITH, R. & CARDING, P. 2021. Interventions and strategies aimed at clinical academic pathway development for nurses in the United Kingdom: A systematised review of the literature. *Journal of Clinical Nursing*, 30, 1502-1518.

JONES, R. D., GRIFFITH, K. A., UBEL, P. A., STEWART, A. & JAGSI, R. 2016. A Mixed-Methods Investigation of the Motivations, Goals, and Aspirations of Male and Female Academic Medical Faculty. *Academic medicine: journal of the Association of American Medical Colleges*, 91, 1089-1097.

KLUIJTMANS, M., DE HAAN, E., AKKERMAN, S. & VAN TARTWIJK, J. 2017. Professional identity in clinician-scientists: brokers between care and science. *Medical education*, 51, 645-655.

- LAMBERT, T. W., SMITH, F. & GOLDACRE, M. J. 2015. Making clinical academic careers more attractive: views from questionnaire surveys of senior UK doctors. *JRSM Open*, 6, 2054270415602644.
- LINGARD, L., ZHANG, P., STRONG, M., STEELE, M., YOO, J. & LEWIS, J. 2017. Strategies for Supporting Physician-Scientists in Faculty Roles: A Narrative Review with Key Informant Consultations. *Acad Med*, 92, 1421-1428.
- MARBACH, J. A., ALMUFLEH, A., FROESCHL, M. & HIBBERT, B. 2018. The Next Generation of Physician-Scientists: Adapting to Academic Cardiology in the 21(st) Century. *Can J Cardiol*, 34, 1225-1228.
- MCDONALD, A., PATERSON, H. & HERBISON, P. 2012. Registrar interest in academic obstetrics and gynaecology: a cross-sectional survey. *Aust N Z J Obstet Gynaecol*, 52, 476-82.
- MEADOR, K. J. 2015. Decline of clinical research in academic medical centers. *Neurology*, 85, 1171-1176.
- MENGER, M. D., SCHILLING, M. K., SCHÄFERS, H. J., POHLEMANN, T. & LASCHKE, M. W. 2012. How to ensure the survival of the surgeon-scientist? The Homburg Program. *Langenbecks Arch Surg*, 397, 619-22.
- NATIONAL INSTITUTES OF HEALTH 2014. NIH Physician-Scientist Workforce Group Report 2014. NIH Website.
- NORVELL, J. G., BAKER, A. M., CARLBERG, D. J., DILLER, D., DZIEDZIC, J. M., FINNELL, J. T., GREENBERGER, S., KESSLER, C., LO, B. M., MOUNGEY, B. M., SCHILLER, E. & WALTER, L. A. 2021. Does academic practice protect emergency physicians against burnout? *J Am Coll Emerg Physicians Open*, 2, e12329.
- OBREMSKEY, W. T. & ARCHER, K. R. 2011. Research: getting started in an academic setting. *Journal of Orthopaedic Trauma*, 25, S124-7.
- OOSTVEEN, C. J., GOEDHART, N. S., FRANCKE, A. L. & VERMEULEN, H. 2017. Combining clinical practice and academic work in nursing: A qualitative

study about perceived importance, facilitators and barriers regarding clinical academic careers for nurses in university hospitals. *Journal of Clinical Nursing* (John Wiley & Sons, Inc.), 26, 4973-4984.

PARKER, K., BURROWS, G., NASH, H. & ROSENBLUM, N. D. 2011. Going beyond Kirkpatrick in evaluating a clinician scientist program: it's not "if it works" but "how it works". *Acad Med*, 86, 1389-96.

ROSENBLUM, N. D., KLUIJTMANS, M. & TEN CATE, O. 2016. Professional Identity Formation and the Clinician–Scientist: A Paradigm for a Clinical Career Combining Two Distinct Disciplines. *Academic Medicine*, 91.

ROSENGART, T. K., MASON, M. C., LEMAIRE, S. A., BRANDT, M. L., COSELLI, J. S., CURLEY, S. A., MATTOX, K. L., MILLS, J. L., SUGARBAKER, D. J. & BERGER, D. A. 2017. The seven attributes of the academic surgeon: Critical aspects of the archetype and contributions to the surgical community. *Am J Surg*, 214, 165-179.

SHERBINO, J., FRANK, J. R. & SNELL, L. 2014. Defining the key roles and competencies of the clinician-educator of the 21st century: a national mixed-methods study. *Acad Med*, 89, 783-9.

STEIN, S. L. 2013. Scholarship in academic surgery: history, challenges, and ideas for the future. *Clin Colon Rectal Surg*, 26, 207-11.

VAN DIJK, S. J., DOMENIGHETTI, A. A., GOMEZ-OSPINA, N., HUNTER, P., LINDEMANS, C. A., MELOTTE, V., VAN ROSSUM, A. M. C. & ROSENBLUM, N. D. 2019. Building a Professional Identity and an Academic Career Track in Translational Medicine. *Front Med (Lausanne)*, 6, 151.

WEGGEMANS, M. M., FRIESEN, F., KLUIJTMANS, M., PRAKKEN, B., TEN CATE, O., WOODS, N. N. & ROSENBLUM, N. D. 2019. Critical Gaps in Understanding the Clinician-Scientist Workforce: Results of an International Expert Meeting. *Acad Med*, 94, 1448-1454.

ZIEDONIS, D. & AHN, M. S. 2019. Professional Development for Clinical Faculty in Academia: Focus on Teaching, Research, and Leadership. *Psychiatric Clinics of North America*, 42, 389-399.

2018 Concept analysis

BMA 2014. The Role of the Medical Academic.

CLOUGH, S., FENTON, J., HARRIS-JOSEPH, H., RAYTON, L., MAGEE, C., JONES, D., COTTERILL, L. A. & NEILSON, J. 2017. What impact has the NIHR Academic Clinical Fellowship (ACF) scheme had on clinical academic careers in England over the last 10 years? A retrospective study. *BMJ Open*, 7, e015722.

COLLABORATION, A. C. S. O. M. M. C. C. A. U. C. R. 2005. Medically- and dentally- qualified academic staff: Recommendations for training the researchers and educators of the future.

COOMBS, M., LATTE, S. & RICHARDSON, A. 2012. Developing a clinical academic career pathway for nursing. *Br J Nurs*, 21, 1084-6, 1088-90.

DELUCA, G. C., OVSEIKO, P. V. & BUCHAN, A. M. 2016. Personalized medical education: Reappraising clinician-scientist training. *Science Translational Medicine*, 8.

ELEY, D. S. 2018. The clinician-scientist track: an approach addressing Australia's need for a pathway to train its future clinical academic workforce. *BMC Medical Education*, 18, 227.

ELEY, D. S., JENSEN, C., THOMAS, R. & BENHAM, H. 2017. What will it take? Pathways, time and funding: Australian medical students' perspective on clinician-scientist training. *BMC Medical Education*, 17, 242.

FOSTER, S. 2018. The need for clinical academic roles. *Br J Nurs*, 27, 229.

GANETZKY, R. D. 2017. Becoming a Physician–Scientist: A View Looking Up From Base Camp. *Academic Medicine*, 92.

GLASPER, A. 2012. Escaping the ivory tower: emancipation of the modern clinical academic. *Br J Nurs*, 21, 496-7.

HALL, A. K., MILLS, S. L. & LUND, P. K. 2017. Clinician–Investigator Training and the Need to Pilot New Approaches to Recruiting and Retaining This Workforce. *Academic Medicine*, 92, 1382-1389.

HARDING, C. V., AKABAS, M. H. & ANDERSEN, O. S. 2017. History and Outcomes of 50 Years of Physician–Scientist Training in Medical Scientist Training Programs. *Academic Medicine*, 92, 1390-1398.

INTERNATIONAL WORKING PARTY TO, P. & REVITALISE ACADEMIC, M. 2004. Icram (The International Campaign To Revitalise Academic Medicine): Agenda Setting. *BMJ: British Medical Journal*, 329, 787-789.

JAMES, W. D. 1998. On the importance of the clinician-educator: Dermatology fellowship for academic clinician teachers. *Archives of Dermatology*, 134, 151-153.

KHAJURIA, A., CHENG, K. & LEVY, J. 2017. Effect of a national focused course on academic medicine for UK candidates applying for a Clinical Academic Programme. *J R Coll Physicians Edinb*, 47, 65-69.

KUMAR, K., ROBERTS, C. & THISTLETHWAITE, J. 2011. Entering and navigating academic medicine: academic clinician-educators' experiences. *Medical Education*, 45, 497-503.

LAMBERT, T. W., SMITH, F. & GOLDACRE, M. J. 2015. Making clinical academic careers more attractive: views from questionnaire surveys of senior UK doctors. *JRSM Open*, 6, 2054270415602644.

LOPES, J., RANIERI, V., LAMBERT, T., PUGH, C., BARRATT, H., FULOP, N. J., REES, G. & BEST, D. 2017. The clinical academic workforce of the future: a cross-sectional study of factors influencing career decision-making among

clinical PhD students at two research-intensive UK universities. *BMJ Open*, 7, e016823.

MCKINNEY, R. E. J. 2017. The Daunting Career of the Physician–Investigator. *Academic Medicine*, 92, 1368-1370.

NATIONAL HEALTH SERVICE. 2018. Clinical Academic Medicine [Online]. Available: <https://www.healthcareers.nhs.uk/explore-roles/doctors/career-opportunities-doctors/clinical-academic-medicine> [Accessed 8/11/2018 2018].

RANIERI, V., BARRATT, H., FULOP, N. & REES, G. 2016. Factors that influence career progression among postdoctoral clinical academics: A scoping review of the literature. *BMJ Open*, 6.

RANIERI, V. F., BARRATT, H., REES, G. & FULOP, N. J. 2018. A Qualitative Study of the Influences on Clinical Academic Physicians' Postdoctoral Career Decision Making. *Acad Med*, 93, 1686-1693.

RIMMER, A. 2017. Clinical academic workforce continues to shrink. *BMJ*, 358.

SHAPIRO, J. M., GOULD SUAREZ, M. & TURNER, T. L. 2017. Cracking the Clinician Educator Code in Gastroenterology. *Clinical Gastroenterology and Hepatology*, 15, 1828-1832.

SHERBINO, J., FRANK, J. R. & SNELL, L. 2014. Defining the Key Roles and Competencies of the Clinician–Educator of the 21st Century: A National Mixed-Methods Study. *Academic Medicine*, 89, 783-789.

SKLAR, D. P. 2017. We Must Not Let Clinician–Scientists Become an Endangered Species. *Academic Medicine*, 92, 1359-1361.

SMITH, M. C. & RATTRAY, J. 2009. 2020 – Clinical Academic Careers: implications for critical care nursing. *Nursing in Critical Care*, 14, 2-3.

STERN, K. A. 2005. Academic-clinician partnerships: a model for outcomes research. *Occup Ther Health Care*, 19, 95-106.

TONG, C. W., MADHUR, M. S., RZESZUT, A. K., ABDALLA, M., ABUDAYYEH, I., ALEXANDERSON, E., BUBER, J., FELDMAN, D. N., GOPINATHANNAIR, R., HIRA, R. S., KATES, A. M., KESSLER, T., LEUNG, S., RAJ, S. R., SPATZ, E. S., TURNER, M. B., VALENTE, A. M., WEST, K., SIVARAM, C. A., HILL, J. A., MANN, D. L. & FREEMAN, A. M. 2017. Status of Early-Career Academic Cardiology: A Global Perspective. *J Am Coll Cardiol*, 70, 2290-2303.

TSO, S. 2017. Clinical academic career: an alternative viewpoint. *Clin Teach*, 14, 141-142.

WINDSOR, J., GARROD, T., TALLEY, N. J., TEBBUTT, C., CHURCHILL, J., FARMER, E., BAUR, L. & SMITH, J. A. 2017. The clinical academic workforce in Australia and New Zealand: report on the second binational summit to implement a sustainable training pathway. *Intern Med J*, 47, 394-399.

WINDSOR, J., GARROD, T., TAN, L., TALLEY, N. J., CHURCHILL, J., FARMER, E. & SMITH, J. A. 2018. Progress towards a sustainable clinical academic training pathway. *ANZ J Surg*, 88, 952-953.

WINDSOR, J., SEARLE, J., HANNEY, R., CHAPMAN, A., GRIGG, M., CHOONG, P., MACKAY, A., SMITHERS, B. M., CHURCHILL, J. A., CARNEY, S., SMITH, J. A., WAINER, Z., TALLEY, N. J. & GLADMAN, M. A. 2015. Building a sustainable clinical academic workforce to meet the future healthcare needs of Australia and New Zealand: report from the first summit meeting. *Intern Med J*, 45, 965-71.

YIN, H. L., GABRILOVE, J., JACKSON, R., SWEENEY, C., FAIR, A. M. & TOTO, R. 2015. Sustaining the Clinical and Translational Research Workforce: Training and Empowering the Next Generation of Investigators. *Academic medicine : journal of the Association of American Medical Colleges*, 90, 861-865.

YOON, S., KOH, W. P., ONG, M. E. H. & THUMBOO, J. 2018. Factors influencing career progress for early stage clinician-scientists in emerging

Asian academic medical centres: a qualitative study in Singapore. *BMJ Open*, 8, e020398.

Appendix 2: Ethics approval for Repertory Grid study



Coláiste na Tríonóide, Baile Átha Cliath
Trinity College Dublin
Ollscoil Átha Cliath | The University of Dublin

29th May 2020

Re: **Clinical academics' construction of successful clinical academic practice: a repertory grid analysis**

Application No: 20200201

Dear Dr. Burke,

Your revised application has been reviewed by the School of Medicine Research Ethics Committee (REC) and we are pleased to inform you that the above project has been approved.

Please note that documents submitted for GDPR purposes within your ethics application are approved by the REC from an ethical perspective only and this approval does not confirm GDPR compliance. Where a Data Protection Impact Assessment (DPIA) is required please submit the DPIA to the Data Protection Office (DPO) and seek comment from the DPO prior to commencing your study.

It is the responsibility of the researcher/research team to ensure all aspects of the study are executed in compliance with the General Data Protection Regulation (GDPR), Health Research Regulations and Data Protection Act 2018.

This Level 1 REC approval has been granted based on the information which you have outlined in your REC application and supporting documentation. You, and the named research team (if applicable), are responsible for conducting the research strictly in the manner outlined in your application and supporting documentation, and in compliance with it. Deviation from the study as outlined in the approved REC application will invalidate this REC approval. Any changes or amendments to the approved study must be re-submitted to the REC for approval in advance of any changes or amendments being implemented.

Yours sincerely,

Dr. Tadhg Stapleton,
Chairperson,
School of Medicine Research Ethics Committee,
Trinity College Dublin

An tOllamh Michael Gill MD FTCD MRCPsych
Ceann Scoil an Leighis

Dr. Alex McKee
Riarthóir na Scoile

Scoil an Leighis
Institiúid Eolaíochtaí Bithleighis Choláiste na Tríonóide
152-160 Sráid an Phiarsaigh
Coláiste na Tríonóide,
Baile Átha Cliath,
Ollscoil Átha Cliath
Baile Átha Cliath 2, Éire.

Professor Michael Gill MD FTCD MRCPsych
Head of School of Medicine

Dr. Alex McKee
School Administrator

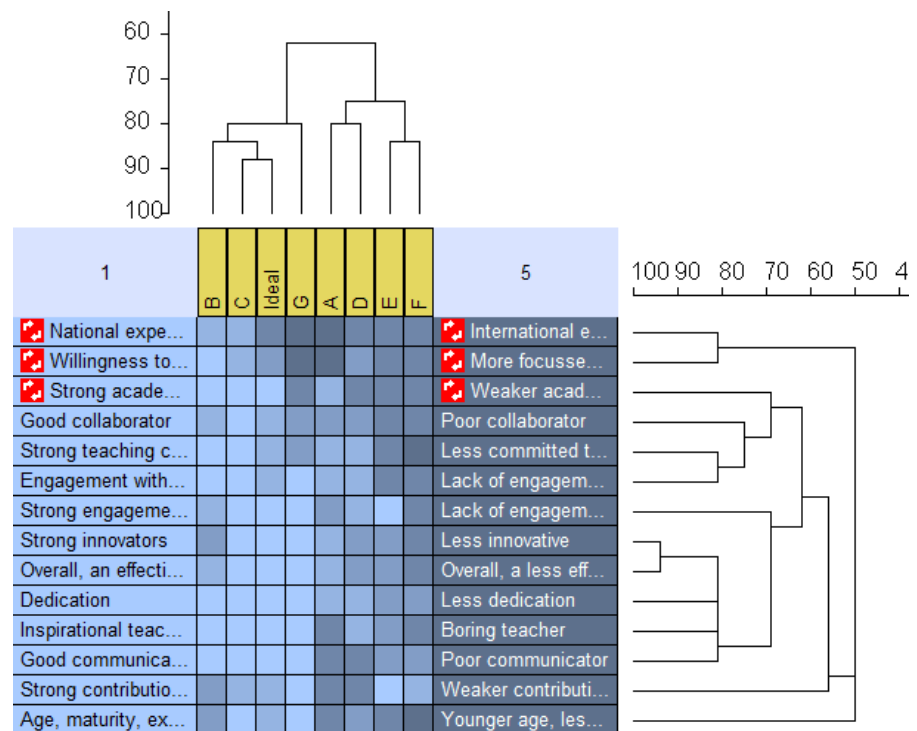
School of Medicine
Trinity Biomedical Sciences Institute
152-160 Pearse Street
Trinity College Dublin,
the University of Dublin
Dublin 2,
Ireland

T: +353 1 896 1476
medicine@tcd.ie
www.tcd.ie/medicine

Appendix 3: Repertory Grid Study Results:

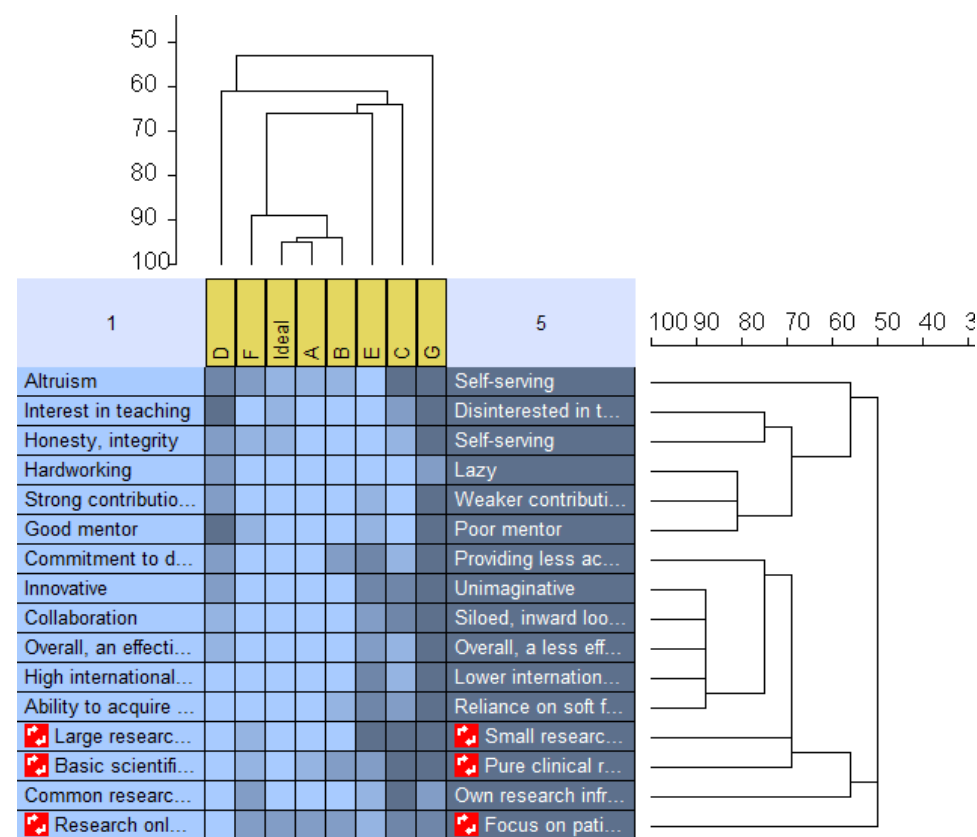
Dendrograms

Grid E1 (Established, Male)



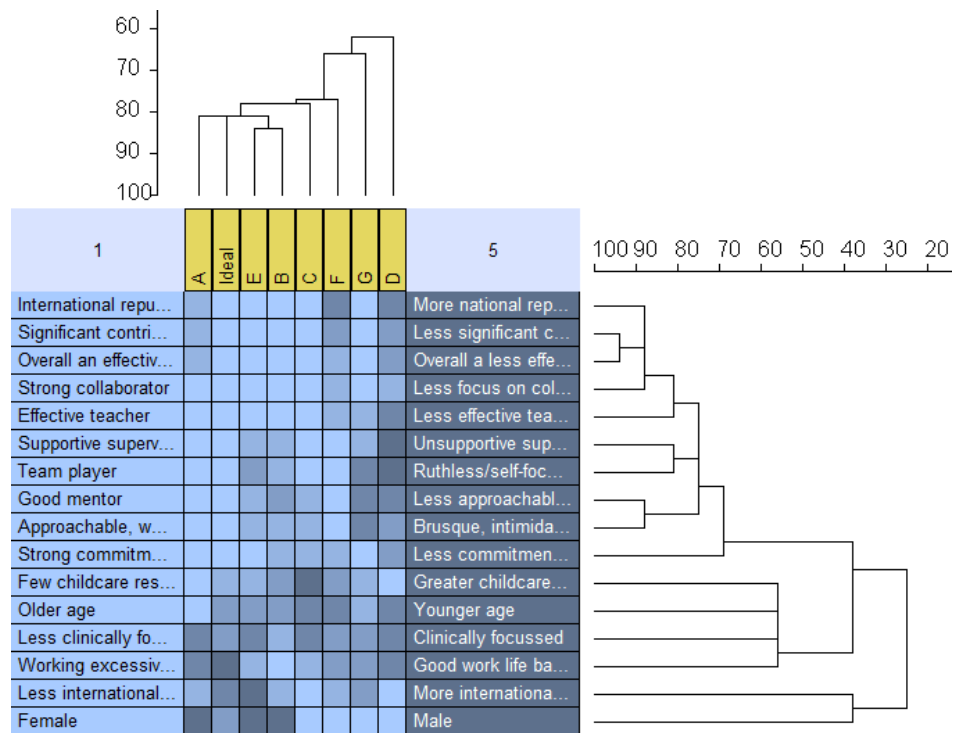
Dendrogram Grid: Clinical academics' constructs of successful clinical academic practice

Grid E2 (Established, Male)



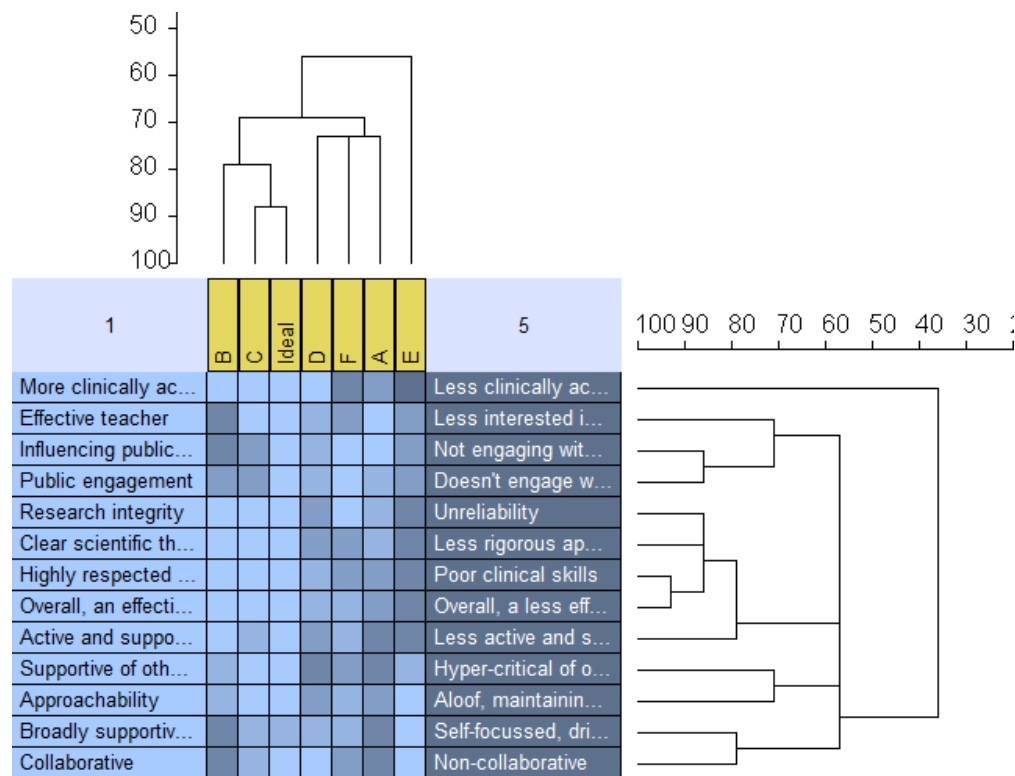
Dendrogram Grid: Clinical academics' constructs of successful clinical practice - Client:Parti

Grid E3 (Established, Female)



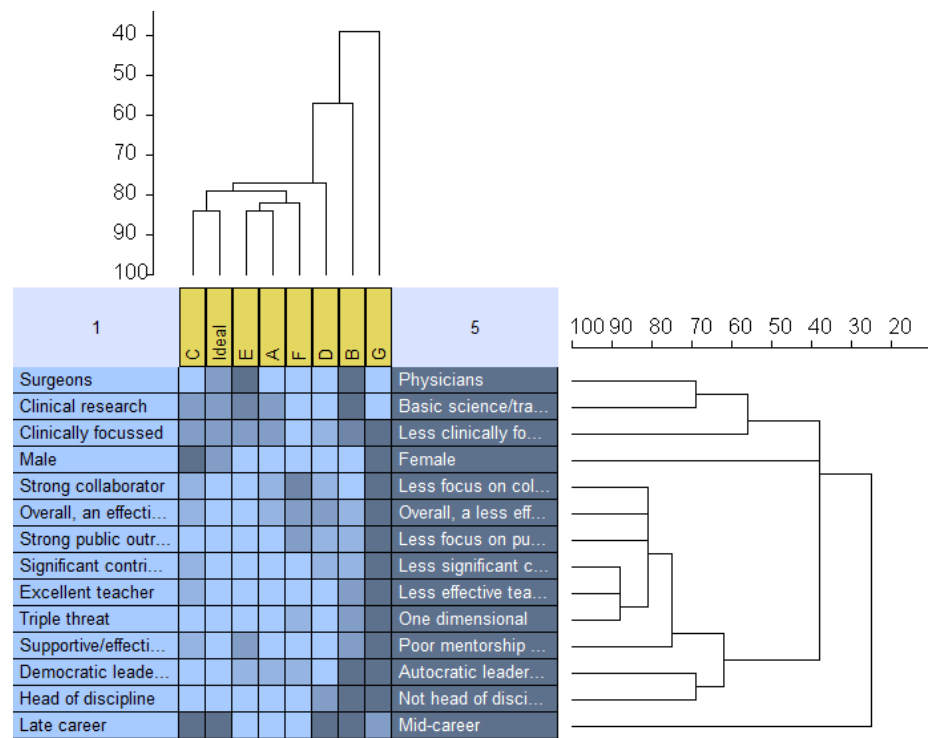
Dendrogram Grid: Clinical academics constructs - Client:P3

Grid E4 (Established, Female)



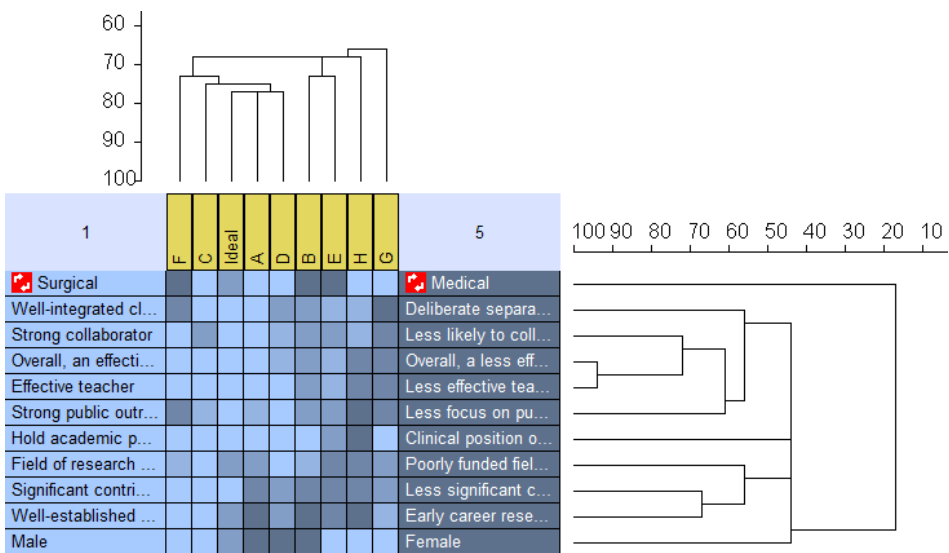
Dendrogram Grid: Clinical academics' constructs of successful clinical academic practice - C

Grid E5 (Established, Female)



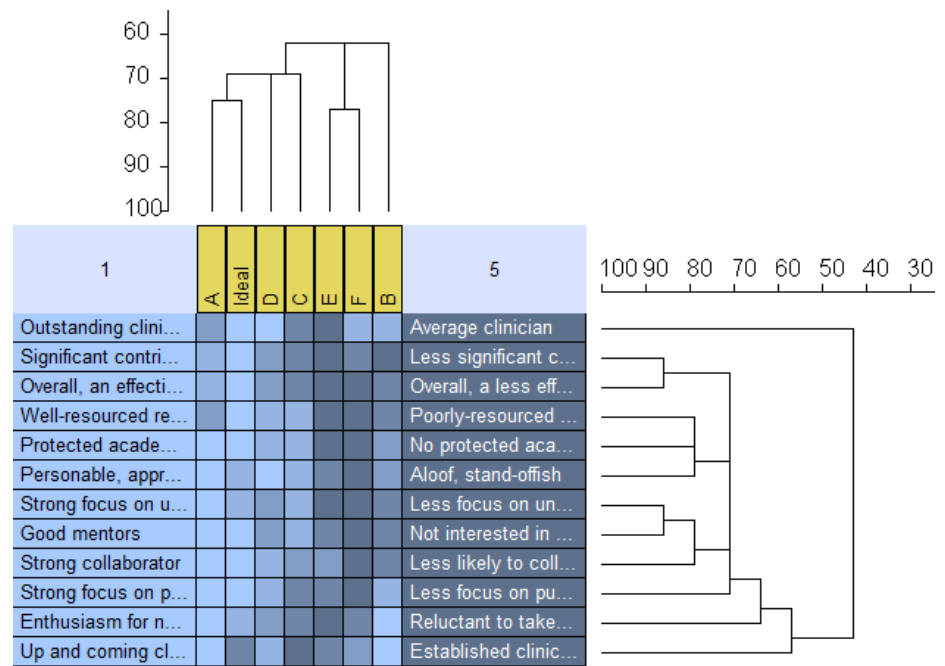
Dendrogram Grid: Clinical academics' constructs of successful clinical academic practice - Client P:

Grid T1 (Trainee, Female)



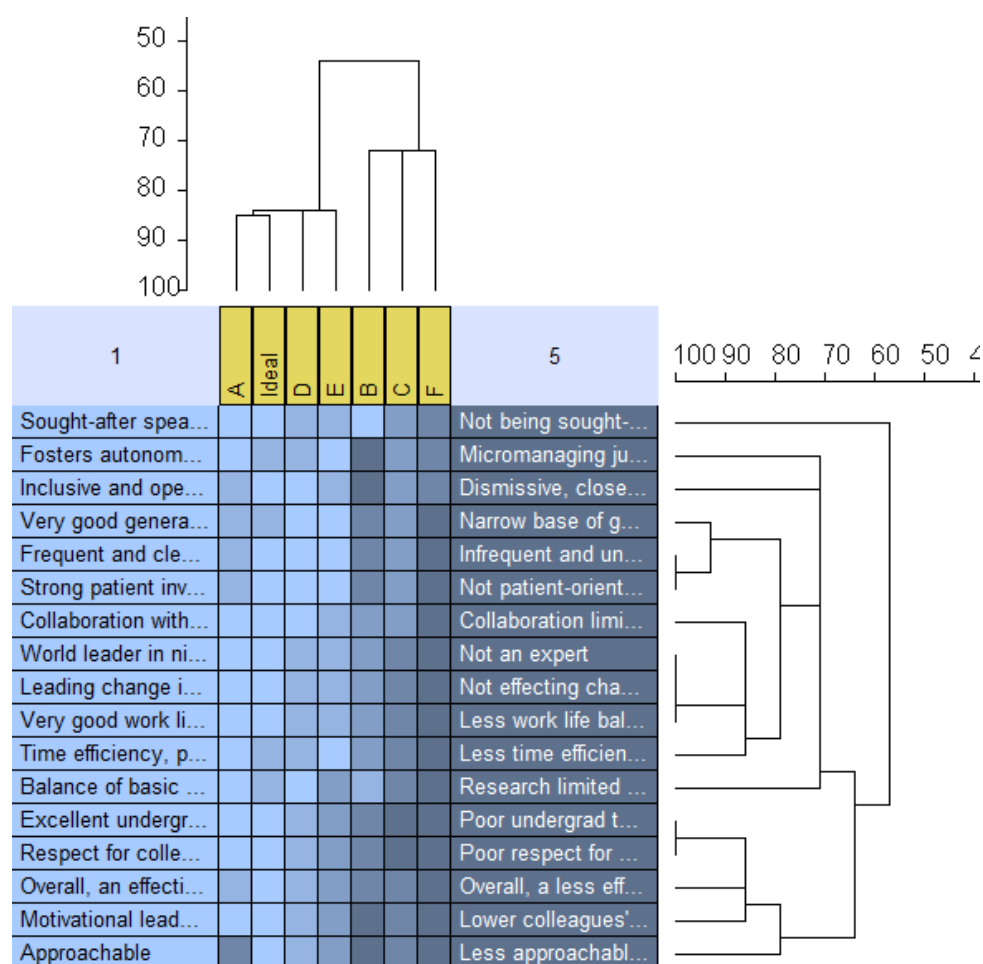
Dendrogram Grid: Clinical academics' constructs of successful clinical academic practice - Client: P6

Grid T2 (Trainee, Male)



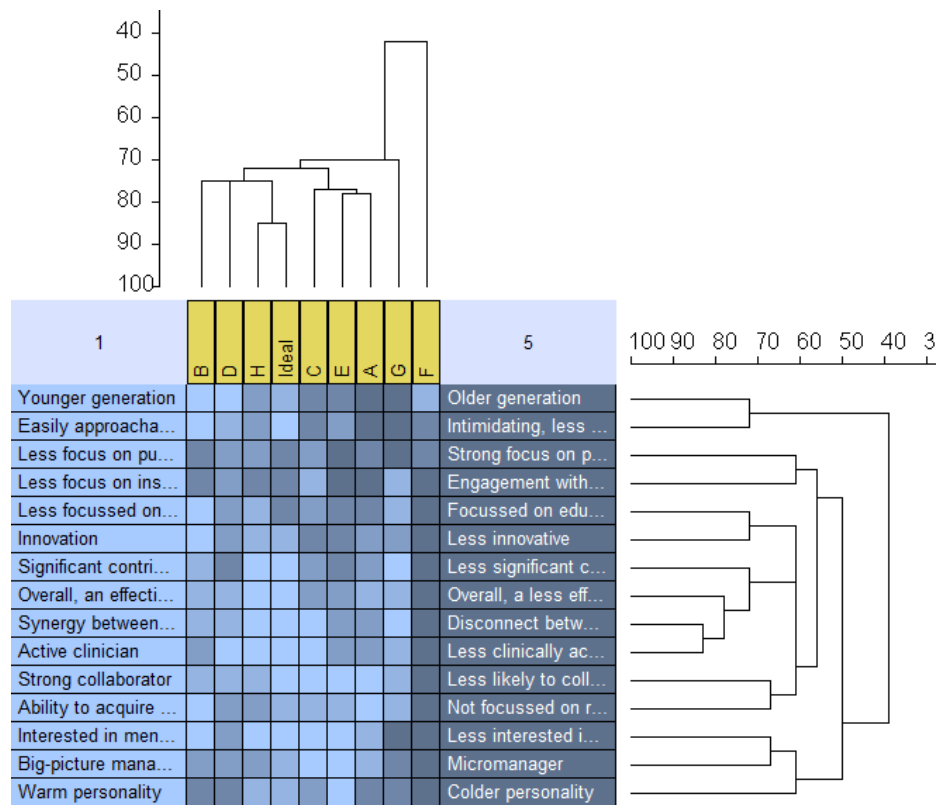
Dendrogram Grid: Clinical academics' constructs of successful clinical academic practice -

Grid T3 (Trainee, Male)

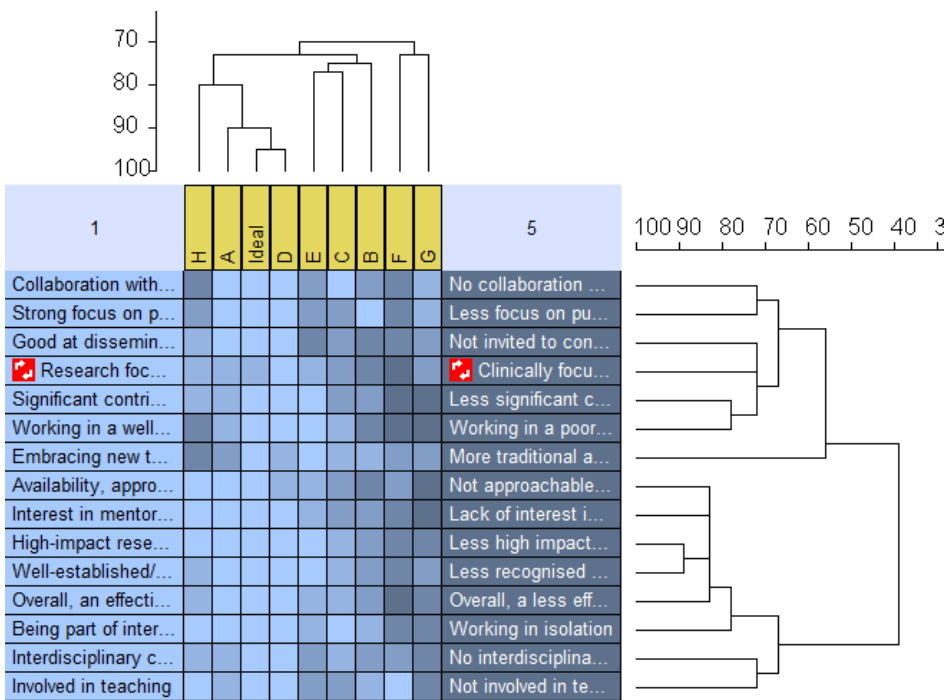


Dendrogram Grid: Clinical academics' constructs of successful clinical academic practice

Grid T4 (Trainee, Female)



Grid T5 (Trainee, Male)



Appendix 4: Core categorisation procedure

Overarching construct	Codes	Frequency	Total frequency
Willing to help others, altruistic vs focussed on own goals	Good mentor, interested in mentorship vs poor mentor, not interested in mentorship	7	20
	Committed to teaching vs not committed to teaching	6	
	Willing to help others vs focussed on own goals	3	
	Helps develop research infrastructure for all vs focussed on own research infrastructure	2	
	Engages with own institutional admin vs doesn't engage with own institutional admin	2	
Research outputs have significant impact vs outputs have lower impact	Significant contribution to discipline vs less significant contribution to discipline	8	13
	Research with international significance vs research without international significance	2	
	Leading change in practice through research vs not effecting change	1	
	Influencing public policy vs not engaging with public policy	1	
	Collaboration with industry, develops own IP vs no collaboration with industry	1	
Agreeable, approachable	Approachable vs intimidating, brusque	8	12

vs antagonistic, intimidating	Supports colleagues' work vs excessively critical	1	
	Younger, more relatable vs older, less relatable	1	
	Supportive supervisor vs not a supportive supervisor	1	
	Respects work-life boundaries of colleagues vs doesn't respect work-life boundaries	1	
Works to build a network of collaborators vs prefers to work alone	Good at collaborating vs not good at collaborating	5	11
	Interested in collaborating vs inward-looking, not collaborative	5	
	International work experience vs no international work experience	1	
Access to resources vs less access to resources	Poorly resourced research environment vs well-resourced research environment	3	9
	Head of discipline/well-established, more access to resources vs does not head discipline/not well established, less access to resources	2	
	Has protected academic time vs no protected academic time	2	
	Small research team vs large research team	1	
	Ability to acquire research funding vs not focussed on research funding	1	
Focus on clinical work vs focus on research	Focus on patient care vs focus on research	5	9
	Active clinician, excellent clinical skills vs less active clinically, average clinical skills	4	

Committed to public outreach vs not committed to public outreach			7
Established researcher, well-recognised in scientific community vs not well recognised as a researcher	International expert, niche area vs national expert, broad area	3	7
	Sought-after speaker vs not sought-after	2	
	Well-established vs less well recognised	1	
	Engage with organisations in their field vs doesn't engage with organisations in their field	1	
Innovative, embracing new ideas vs closed-minded, lacking imagination	Innovative vs not innovative	3	6
	Inclusive and open-minded vs dismissive and closed-minded	1	
	Open to new technology vs traditional approach	1	
	Interdisciplinary collaborations, exchange of ideas vs no interdisciplinary collaborations	1	
Honesty and integrity vs self-serving	Scientific rigor vs less rigorous approach	1	5
	Research integrity vs unreliability as a researcher	1	
	Provides accurate information to the public vs provides inaccurate information to the public	1	
	Integrity vs self-serving	1	
	Can acquire peer-reviewed funding vs reliance on soft funding	1	
Excellent, inspiring teacher vs	Good at teaching vs not good at teaching	4	5
	Inspirational teacher vs boring teacher	1	

poor, boring teacher			
Experienced researcher vs early career, less experienced	Older age, more experience vs younger, less experience	2	5
	Late career, less interest in new projects vs mid-career, more interest in new projects	3	
Greater demands on time outside work vs fewer demands on time outside work	Female vs male	3	4
	Greater childcare responsibilities vs fewer childcare responsibilities	1	
Democratic leader, fosters autonomy vs autocratic, micromanager	Leadership which fosters autonomy vs micromanager	2	4
	Democratic leadership style vs autocratic leadership style	1	
	Motivational leadership vs lowers morale	1	
Dedicated and hardworking vs lazy, inefficient	Hardworking vs lazy	1	4
	Dedicated vs not dedicated	1	
	Time efficient vs not time efficient	1	
	Excels in clinical, research and teaching vs one-dimensional	1	
Pure clinical research vs basic scientific research			3
Synergy between clinical and research work vs disconnect between clinical and research work			3

Good at communicating vs not good at communicating			2
Working excessive hours vs good work-life balance			2
Surgeon vs physician			2

Appendix 5: Representative quotes for each overarching construct

*Quotes from interviewees are in italics, quotes from the interviewer are in bold.

Willing to help other, altruistic vs focussed on own goals

"...the person F will do work and works hard, but it's very focussed on their needs, whereas the person B will do stuff that doesn't... that is good for the system, it's good perhaps for the school or for the university or for colleagues but not for them....So the types of thing is taking on a leadership role, taking on organisation roles, being the front runner in the development of a national programme, that type of thing."

Interview E1, established clinical academic

Research outputs have significant impact vs research outputs have lower impact

"...making a significant contribution or, and... practice-changing and that kind of concept, so leading change in practice through research..."

Interview T3, trainee clinical academic

Agreeable, approachable vs antagonistic, intimidating

"...They're definitely not – not that they're not approachable, but I would think long and hard before I approached one of these people with a problem!

.....

Versus.... Approachable?

Easily approachable and maybe, like my Ideal would be relatable, is that kind of the opposite of intimidating..."

Interview T4, trainee clinical
academic

Works to build a network of collaborators vs prefers to work alone

"... you can't really succeed these days without collaborating!"

Interview E3, established clinical academic

Access to resources vs less access to resources

"I guess just like having the support and having the designated time to get research done allows you to get research done.

...

... so, I think it makes it, it's much more challenging if you don't have that."

Interview T1, trainee clinical
academic

Focus on clinical work vs focus on research

"...but I also think it's like, people who have a good clinical skills, it's because of the thought process and their logical approach and like ok, I know what I'm dealing with and like, and they've read up on the element, you know, they know more about their topic maybe ... but also have to be like you said it's all about the patient like, they're doing the research because it's going to improve outcomes, not just because they're going to get another paper..."

Interview E4, established clinical academic

"...I suppose specifically in my field where you're kind of technically oriented, I don't think a clinical academic is going to be the best clinician because you're trying to balance other things and I don't think it's your role to be the best clinician; I think it's your role to be a good clinician but you don't want to be fully focussed on being a clinician because your role is

more towards research really, that's the particular, you know, advantage that you have, that's the particular selling point..."

Interview T5, trainee clinical
academic

Committed to public outreach vs not committed to public outreach

"...what I speak about with the commitment to public outreach is a commitment to deliver accurate information that reassures the public and that informs them adequately according to their level of knowledge. And what I would put with less interest in public outreach is not somebody that doesn't outreach to the public, but those that provide inaccurate information..."

Interview E2, established clinical academic

Established researcher, well-recognised in scientific community vs not well recognised as a researcher

"Yeah, I think being a sought after speaker is more of a thing that's – that I think that, you know, cos like I suppose disseminating research is more for like PhD, you know, at that stage and things like that, whereas once you're ... an academic clinician, you'd be maybe asked to talk about a topic, you'd include your research and you'd be asked to talk because you've published a lot of research and you know the area so it's actually – dissemination is more at maybe PhD or early consultancy level. So, it's probably more like being a sought-after speaker or presenter."

Interview T3, trainee clinical academic

Innovative, embracing new ideas vs closed-minded, lacking imagination

"...I mean we haven't really rated them in terms of... I'm not sure would you call it expertise, but intelligence I guess, you know... cutting edge, deep, you know, thinkers, ideas..."

Innovation?

Innovation. Good one. Strong innovators."

Interview E1, established clinical academic

"The spirit of enquiry for the ultimate betterment of society and for the ultimate betterment of patient care, rather than enquiry for enquiry's sake. I'm guilty of enquiry for enquiry's sake sometimes myself, but you know, it has to be enquiry, for me, with impact."

Interview E2, established clinical academic

Honesty and integrity vs self-serving

"I guess there are two different types of honesty and integrity, there's actual research honesty and research integrity in the way that you report your results which would be one construct, but there would be honesty, integrity as a personal trait of the researcher, and that would be related more so to the motivation of the researcher than the reporting of the results."

Interview E2, established clinical academic

Excellent, inspiring teacher vs poor, boring teacher

"I think it's an awareness of their audience that they're pitching their information to because for academic clinicians it's important, like they might have talked the previous week at the world congress on whatever their area is, and then the next week they have to readjust their teaching to a much lower level, so it's the concept of knowing the audience, knowing what the particular cohort needs to know, and adjusting the information as such, whereas what might not be as impressive would be to mismatch the level of knowledge that is being presented and the previous level of knowledge of the audience so, you know, I think a clinical academic who's bad at doing this might give the same talk at the world congress and to 4th year medical students, you know, so not matching their teaching to the audience"

Interview T3, trainee clinical
academic

Experienced researcher vs early career, less experienced

"I suppose being experienced, if you come up against a problem, you might have seen it before, might have... a more established network of people that you could call on for help if you needed it.... if you're up and coming, you might be more enthusiastic, more energetic, you might have more time to spend with a particular, you know, on a particular project or something."

Interview T2, trainee clinical
academic

Greater demands on time outside work vs fewer demands on time outside work

"So it certainly can have a detrimental effect because obviously, even if you take a period of maternity leave which is, you know, I suppose the shortest people would take would be three or four months typically, inevitably you're going to miss deadlines, in the year of your pregnancy you're going to miss deadlines or grant applications or just be, like somewhat less productive, and it does impact on your, and you know for females, if you decide to breastfeed, these things do impact on your freedom to work when and how you please, I suppose."

Interview E5, established clinical academic

Democratic leader, fosters autonomy vs autocratic, micromanager

"Yeah so, I think it's the democratic leadership versus autocratic, yeah this is it, exactly. So, the autocratic leader makes decisions without taking input from anyone, they just make the decisions and off they go, and they tell people this is what is happening, whereas a democratic leadership will, you know, bring people along and listen to their opinions."

Interview E5, established clinical academic

Dedicated and hardworking vs lazy, inefficient

"Let's come back to that hard work cos I think it is important.

Ok.

So, you know, dedication.

Yeah, ok. Versus?

Versus less dedication, I guess.

.....

I mean you don't get to where you're going on these without being dedicated to some extent..."

Interview E1, established clinical academic

Pure clinical research vs basic scientific research

"I think really if you're just saying, oh 10% of patients had this, 20% of patients had that, whereas if you're doing more basic science, you can understand the mechanistic, you know, underpinnings of clinical findings, so yeah, so basically they'd be a bit more independent because they're not just looking at their own patients but also looking at the underlying scientific processes."

Interview T3, trainee clinical
academic

Synergy between clinical and research work vs disconnect between clinical and research work

"so, H I would have to say off the top of my head is probably one of the most, I would think like is one of the best clinical academics or clinical researchers I know, and one of the reasons I would say he's so good is he's a really good clinician, and seems to align his clinical work and his academic practice really closely"

Interview T4, trainee clinical
academic

Good at communicating vs not good at communicating

“Good communicator, in other words, somebody who interacts very easily with, with their peers, with the public...”

Interview E1, established clinical academic

Working excessive hours vs good work-life balance

“...I suppose ideally you will obviously work hard but also have a good work life balance and you would be successful within normal working hours”

Interview E3, established clinical academic

Surgeon vs physician

“like your competing interests as a surgeon are more challenging I guess than as a physician, because you have to operate, and you have to do a lot of operating to keep up your skills, and that’s all the way through training”

Interview E5, established clinical academic

Appendix 6: Academic Internship Track Curriculum

	Outcomes	Competencies	Supporting Evidence
All streams	Collaborate within a multidisciplinary group on a specific research/education/leadership project	Identify key stakeholders/collaborators Organise meetings of stakeholders/collaborators Develop an action plan/proposal involving the MDT	Agenda/minutes from meetings Reflective report on multidisciplinary collaboration
	Continuing clinical development	Clinical judgement Communication skills Professional development	Satisfactory completion of each clinical rotation and sign-off by trainers Completion of components of standard intern training programme Certificate of experience
Clinical research	Identify specific research question and develop study protocol	Literature review Formulates appropriate research question Draft protocol describing appropriate methodology	Systematic review Proposed research question Study protocol
	Application for ethical approval	Knowledge of principles of research ethics	Completed ethics application form Letter of approval from ethics committee

		Knowledge of process for ethical approval Completion of application for ethical approval (local/national)	
	Conducts a lab-based study	Performance of relevant laboratory techniques Application of lab safety principles	Reflective report on experiment Evidence of training in lab techniques, safe practice etc. Experiment results
	Conducts a study using patients/human volunteers or a population-based study	Obtains valid research consent Effective communication with patients and/or carers Management of research documentation and data	Reflective report on experiment Evidence of training in relevant study techniques, e.g., obtaining consent Study results
	Writes a paper for publication in peer-reviewed journal	Use of appropriate techniques for data analysis Use of appropriate structure and writing style for peer-reviewed journal Can describe limitations of study	Completed manuscript Letter of acceptance from a journal
	Presentation at local/national/international meeting	Submits abstract to a scientific meeting Produces and presents a poster/oral presentation	Acceptance letter at scientific meeting PowerPoint slides/poster Abstract published in conference proceedings

			Certificate of attendance at meeting
Medical Education	Development of new module/course in undergraduate or postgraduate curriculum	Knowledge of principles underlying curriculum development Develops patient-centred learning outcomes Designs feedback tools Reflects on feedback and adjusts programme accordingly	Course curriculum Feedback from participants Feedback from supervisors
	Development of assessment programme	Critically appraises the different assessment tools currently in use Blueprints assessments to course curriculum/learning outcomes Use of technology to add value to medical assessment	Description of the assessment programme
	Completion of piece of medical research	As per clinical research section	Completed manuscript Accepted abstract at local/national/international meeting
Leadership/Management	Identifies opportunity for quality improvement project	Knowledge of the organisation and environment, existing policies, and challenges Collaborates within a multidisciplinary team	Literature review Reflective review on the process of identifying and opportunity and developing a project proposal

		Use of specific quality improvement tools (e.g., Needs Assessment) Develops study protocol	Certificate of attendance at any relevant course
	Produces project plan for quality improvement	Discusses plan with key stakeholders Works effectively within team and leads team where appropriate Tests feasibility of change with patients, colleagues, and staff	Meeting minutes Project plan Reflective report on achievements and challenges of working within MDT
	Implementation of quality improvement project	Leading and managing a specific element of the project Understands how teams and individuals function and the most effective way to work with them Use of appropriate tools and techniques to implement change Appropriate delegation	Reflective report on project implementation process
	Evaluation of project and development of recommendations for the future	Appraisal of the different evaluation and measurement tools available Engagement with appropriate individuals, teams, and networks to develop recommendations for the future	Relevant documents from the evaluation and measurement exercise Summary of actions taken Reflection on evaluation process and result

		Seeks feedback on the effectiveness of the project and future recommendations	
	Presents and disseminates learning from improvement project	Effectively disseminates results e.g., publication, presentation to appropriate audiences	Written report Oral or poster presentation Letters of acceptance from meetings, journals etc.

Appendix 7: Ethics approval for Resumé study

my.tcd.ie Blackboard Trinity Web Systems Trinity College Library Trinity College Dublin Other Bookmarks

Admin fields

Academic Supervisor / Lead Researcher (username):
mhenness

Application Number:
20210107

Final Comments:

21st January 2021

Re: Amendment Request – Gender Balance and Unconscious Bias in a Combined Clinical Academic Training Programme for Junior Doctors

Amendment Application No: 20210107

Original Approved Application No: 20200502

Dear Dr. Bourke

Your amendment request to the previously approved study (Application number 20200502 approved on 21/09/2020) has been reviewed by the School of Medicine Research Ethics Committee (REC).

Based on the information you have provided in the amendment request we are pleased to inform you that the amendment request has been approved.

Appendix 8: Email to shortlisting reviewers

Dear XXXX,

On behalf of the Intern Network Executive, I would like to thank you for making yourself available for the 2019 Academic Track shortlisting process. This is the third year of this exciting programme for the INE, Medical Schools and graduates, and we are very grateful that you have agreed to participate.

We hope that the shortlisting process will produce outstanding candidates nationally, to be invited for interview for the 24 academic internship places available. You are one of several representatives for your Medical School/Intern Training Network reviewing applications in this process.

These same applications will also be reviewed by representatives from 2 other Medical Schools/Intern Training Networks, therefore each candidate's application will be reviewed by three experts, each from a different Medical Schools/Intern Training Network. All scores from your process will be combined and collated with the entire national process and an average score generated for each of your candidates. The top applicants, when overall scores have been averaged, will be invited to interview.

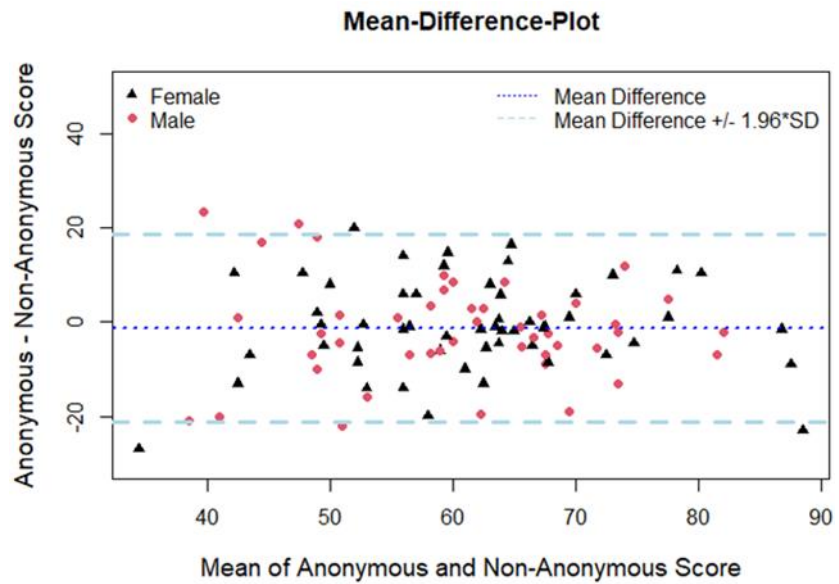
Reviewers should bear in mind that we anticipate that applicants scoring above 60 will be automatically invited for interview, while those between 50-59 will go on a reserve list, and those below 50 deemed not suitable for interview. It is important that all applicants have meaningful feedback, so please ensure you use the final comment box on each application feedback form to indicate elements that were lacking from the application.

In addition to the shortlisting guidelines, I am also sharing 6 applicant files with you. Each file contains a transcript and application review form. You will find that the guidelines have also been built into the application form so this should allow for an efficient and streamlined reviewing process. All

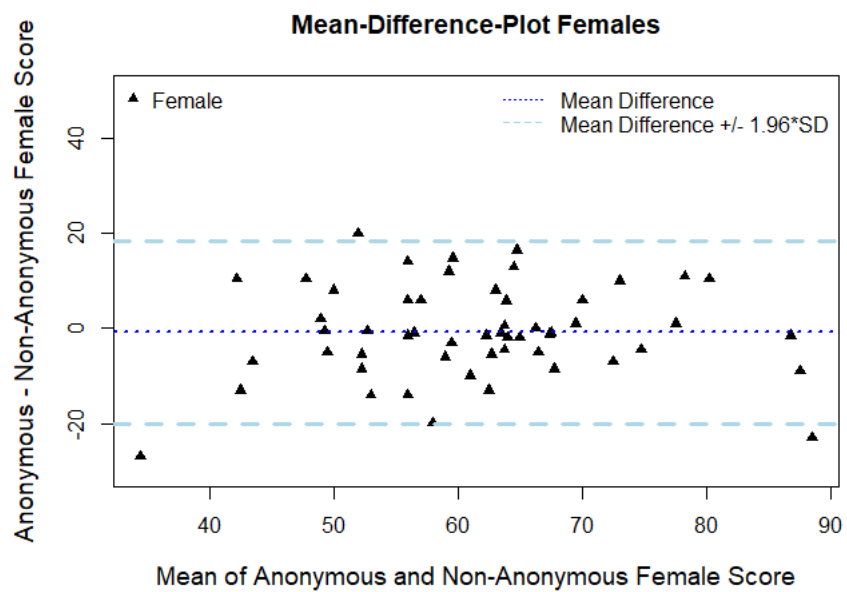
marks/comments should be entered electronically into the spaces provided within the documents, and returned directly to me at [XXXXX](#). Some applications have been anonymised in keeping with international guidelines on minimising implicit bias in academia (<https://www.leru.org/files/implicit-bias-in-academia-full-paper.pdf>). Monday, Feb 18th is the proposed date by which all shortlisting scores should be returned. This date allows the INE Academic Track Recruitment Team to collate all scores, create a ranked list and engage with the INE around outcomes, before communicating overall results to HBS Recruit on Wed, Feb 20th. It is expected that HBS Recruit will issue feedback directly to all applicants on Thursday, Feb 21st. If you have any questions at any stage, please do not hesitate to contact me.

Warm regards,
Evan Blake

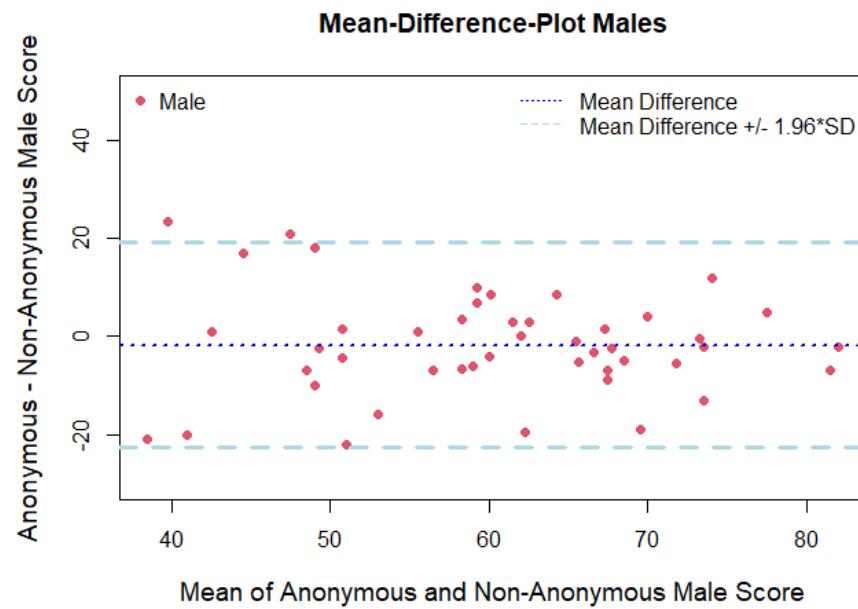
Appendix 9: Mean difference plots of Anonymous-Non anonymous (named) scores



Mean difference plot for anonymous scores, non-anonymous (named) scores



Mean difference plot for anonymous scores, non-anonymous (named)
scores for females



Mean difference plot for anonymous scores, non-anonymous (named)
scores for males