

# Identities and experiences of Anatomists

Claire F. Smith<sup>1</sup>, Lydia Boyton<sup>2</sup>, Cecilia Brassett<sup>3</sup>, Darrell JR. Evans<sup>4</sup>, Ross Munro<sup>1</sup>, Gabrielle M. Finn<sup>5</sup>

<sup>1</sup> Department of Medical Education, Brighton and Sussex Medical School, University of Sussex, Brighton, United Kingdom

<sup>2</sup> Faculty of Medicine, Imperial College London, London, United Kingdom

<sup>3</sup> Human Anatomy Centre, Department of Physiology, Development and Neuroscience, University of Cambridge, United Kingdom

<sup>4</sup> School of Medicine and Public Health, University of Newcastle, Australia and Faculty of Medicine, Nursing and Health Sciences, Monash University, Australia

<sup>5</sup> School of Medical Sciences, Faculty of Biology, Medicine, and Health, University of Manchester, Manchester, United Kingdom

## SUMMARY

Across the world anatomists are responsible for delivering anatomical education designed to help prepare students in becoming safe and competent medical and allied healthcare practitioners. Despite the critical role that anatomists play in the early stages of student learning, little is known about the identity of anatomists, and how their journeys and experiences have shaped the ways they perceive and embody their role. The aim of this study was to provide anatomists with a reference to take comfort in the shared experiences of other anatomists, to provide individuals and managers with real-life situations that anatomists may come across in their career, and to generate a sense of belonging within the anatomy community. Through a survey data collected from 161 anatomists, it includes demographic characteristics, access to training and support provision, and availability of network and career opportunities. In addition, information was collected that focussed on aspects of wellbeing and lived personal experience in the workplace. The results of this study provide significant evidence for the need to develop a more inclusive, diverse, and supportive environment for anatomists in both the

work place as well as within professional societies and at conferences. Self-identifying female anatomists experience more discrimination overall ( $p < 0.01$ ), with specific elements such as barriers to career progression ( $p = 0.004$ ) and work-related mental health issues ( $p = 0.02$ ). Individuals, teams and managers have a distinct role to play in ensuring that everyone can work and thrive in a culturally safe work environment.

**Key words:** Gross anatomy education – Medical educators – Anatomists – Professional identity

## INTRODUCTION

An anatomist has been defined as someone who studies, researches, or teaches in the anatomical sciences (Anatomy.org, 2021). Anatomists as a group have been surveyed in the past to gain their understanding and viewpoints on a wide range of issues, including attitudes towards different aspects of teaching (Waterston and Stewart, 2005; Moxham et al., 2018), body donation (Anyanwu and Obikili, 2012), sexism in anatomy (Morgan et al., 2016), race in anatomy (Strkalj et al., 2004), use of ultrasound in teaching (Jurjus et al., 2013),

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### Corresponding author:

Prof. Claire F. Smith. Brighton and Sussex Medical School, University of Sussex, Medical School Building, Falmer, BN1 9PX, United Kingdom. E-mail: c.smith@bsms.ac.uk

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Submitted: September 16, 2022. Accepted: October 17, 2022

<https://doi.org/10.52083/QLMI1353>

body painting (Cookson et al., 2017), and twitter (Marsland and Lazarus, 2017). Anatomists have also been investigated as a group to test skills such as spatial ability (Fernandez et al., 2011). Yet surprisingly few studies have focused on the background and workplace experiences of anatomists, and how these shape the delivery of anatomical education. There is also little understanding of anatomists as individuals and how their own unique journeys determine who they are as educators and researchers and their sense of belonging in the anatomy community. This leads to the question: What do we know about anatomists' experiences?

### **Anatomists in History**

An internet search on the term 'anatomist' results in articles outlining the past association of anatomists with the scandals of grave robbing. Historically, it was a requirement that all medical students would dissect and it was the anatomist's responsibility to source bodies (Kaufman, 2005), which resulted in the practice of grave robbing and the Anatomy Act of 1832 (Ellis, 1993). As highlighted in books, such as 'Death, Dissection and the Destitute' (Richardson, 2001), anatomists are associated with cutting up bodies. The negative associations towards anatomists continued in 1933, where German anatomists during the Third Reich were known to have dissected bodies of victims of the National Socialist regime (Hildebrandt, 2009). More recently in the United Kingdom (UK) in the 1980 and 1990s, reports emerged that at Alder Hey Children's Hospital, Liverpool (Hall, 2001), there had been unauthorized removal, retention and disposal of human tissue by pathologists. Although anatomists were not implicated, this malpractice affected public opinion of donation and led to the creation of the Human Tissue Act 2004 (HTA, 2005) in England and Wales. More recently, Gunther von Hagens' 'Body Worlds™' was described by Stone (2011) as 'Dark tourism and the Cadaveric Carnival', bringing Anatomy and Anatomists back into the public domain. Anatomists' connections to body snatching and ethically challenging activities appear to be an association that has been difficult to dispel, and may shape the current role and perception

of anatomists, through both the lens of the public and the self-lens of the anatomist.

### **Career journey of Anatomists**

An individual's journey into anatomy rarely follows the same prescribed path. Different individuals may have backgrounds in an arrange of related topics such as gross anatomy, clinical medicine, surgery, biomedical science, histology, archeology and sports science. The Anatomical Society (UK) have highlighted this with examples where career anatomists have backgrounds in Cardiology, Biochemistry, Physiology, Medicine and Neurology (Anatomical Society, 2021). As one anatomist will be quite different from the next, it is important for us to understand this diverse and heterogenous community in order to identify their needs at an individual and community level.

### **Role**

It is not only the career background for anatomists that is varied, but there are also differences in focus within the job role of an anatomist. Three components are commonly described: teacher, researcher, and clinician/surgeon. The different components are played out in an individual's job descriptions, with anatomists employed on a 100% teaching and scholarship pathway, a mixed pathway such as 60% research, 40% teaching, or a 100% research pathway, as well as those who combine anatomy with a clinically focused post. Despite the natural interrelationship between anatomy, clinical practice, research and teaching, different perspectives might result in an unwanted hierarchy, and it is likely that all these factors underpin the complexity of the role of the modern anatomist.

### **Teacher**

The relationship between anatomy and teaching is highly entwined in history. The discovery of anatomical structures and understanding anatomical concepts by anatomists was historically often taught to audiences. One of the most notable anatomy teachers, Andreas Vesalius (1514-1564), advocated the importance of using human cadavers to teach anatomy (Markatos et al., 2020). Anatomy teaching, traditionally, was synonymous

with dissecting and therefore an ‘anatomist’ was assumed to be and defined as a dissector of dead bodies (Jones, 1997). However, with the advent of electron microscopy in the 1930s, the focus moved away from gross anatomy, and this helped change the antiquated definition of an anatomist. However, the teaching of gross anatomy remained prominent in higher education, particularly focused on medical programmes. Anatomy education continued to develop, and teaching with prosected specimens became seen as an alternative to dissection for some educators (Skidmore, 1995). Meanwhile in the 1990s, the number of hours allocated to anatomy was curtailed to make time in the curriculum for newer subjects such as molecular genetics and a focus on communication skills (McBride and Drake, 2017; Smith et al., 2021). Computer Assisted Learning (CAL) developed around the millennium, and the digital revolution, in addition to further technologies such as Ultrasound (Jurjus et al., 2013) and 3D printing (McMenamin et al., 2014; Smith et al., 17), provided different techniques for the teaching and learning of anatomy. Anatomists, especially those on a teaching-focused pathway, had to adapt and develop new skills and acquire different ways of understanding the human body and incorporate these methods in teaching. Anatomists also had to deliver teaching to ever-increasing numbers of students, along with an expanding breadth of programs that required human anatomy teaching and understanding pedagogical research and practice.

### **Researcher**

Anatomical research encompasses a range of scientific disciplines including neurology, developmental biology, anthropology, evolutionary biology, gross anatomy, histology of both human and animal species, and increasingly anatomical education research. The range of case studies provided by Jones et al. (2002) highlights the diversity of anatomical research as applied to sciences and clinical practice. As in other disciplines, the availability of funding can be a driver in determining what research is carried out in the field of anatomy (Jones et al., 2002). Research also underpins teaching, anatomists are perhaps seen as ‘discov-

erers’ and as Jones et al. (2002) suggest, staff may be required to undertake both in what is commonly known as a ‘mixed’ pathway.

### **Clinician / Surgeon**

Similar to the relationship between anatomy and teaching, the association between surgery and anatomy is historical, dating back to the Greek anatomist and surgeon Herophilus in 335BC (Howard and Hess, 2002). The identity of a ‘surgeon-anatomist’ continues and is highlighted in the plight of anatomists (Mall, 1907) in the journal *Science*. The President of the Journal explains “that an individual has safely passed the pioneer stage in the development of a scientific profession in America”. Mall (1907) continues to explain that anatomy then over time fell into disrepute, and that the conception of anatomy as a “mere maid-servant of surgery is still entertained by some”. It is not clear if this opinion still exists, but Phitayakorn and Lachman (2015) explain that there is a need for both to work together, especially in the development of procedural skills training, innovation and advancing surgical techniques and assessment. In the United Kingdom, it was reflected that a Chair in Anatomy was always a stepping stone to that of surgery, and that under these conditions the quality of teaching was rarely good, with many surgeons focusing on private practice in London (Ellis, 1993).

### **Skill set of Anatomists**

Like academics in other disciplines, the skill set of anatomists is of course broader than the three identities described above. As anatomists progress through their career as academics, they are required to have developed a broad range of transferable skills in addition to some very precise ones, such as the art of prosecting. As for most academics, anatomists are required to have an up-to-date appreciation of new knowledge, the ability to apply technological advances, the aptitude to adapt to changing teaching and learning requirements, e.g., during Covid-19 (Brassett et al., 2020; Evans et al., 2020; Longhurst et al., 2020; Pather et al., 2020). Anatomists may deliver education within a range of courses and therefore also have skills in curriculum planning, manage-

ment and leadership, and contribute towards specific activities of the institution, e.g., assessment. In addition, anatomists need to have a good understanding of the clinical or scientific implications of their teaching, which often intersect with other disciplines such as pathology or radiology. Anatomists need to know and abide by the laws that govern body donation and dissection in their country, they need to manage Health and Safety requirements, and they need to have an understanding of engineering and laboratory design (Trelease, 2006). Anatomists have also been described as being entrepreneurial by nature. In the 1700s, there were advertisements in newspapers offering courses in anatomy for anyone who was willing to pay (Guerrini, 2004). This is not that dissimilar to today when, due to ever increasing budget restrictions, income generation is important and the increasing number of laboratories supplementing their income with surgical courses and training. Therefore, it can be said that due to the nature of the discipline, anatomists are a highly adaptable and a highly trained group of people who operate within the higher education setting, with niche skills and attributes unique to this group of people.

### **Requirement for Anatomists**

Perhaps the most cited research to date centers around the necessity for them in higher education and the concern over the decreasing number of qualified and experienced anatomists and the need for more anatomists in many institutions throughout the world (Eldred and Eldred, 1961, Blevins and Cahill; 1973; Bird, 1979; Santana, 2003, Schaefer et al., 2019; Wilson et al., 2019). In 2002, it was projected that there would be a shortage of anatomy educators, with 65% of Anatomy Heads of Departments indicating that they would have moderate to great difficulty in hiring anatomy educators over the next five years. Wilson et al. (2019) reported that 21% of posts between 2017 and 2018 were not being filled. The reasons postulated for this shortage include the rise in molecular-based PhDs creating a shift in the training paradigm. Another cause cited was the economic downturn in the 2000s (Wilson et al., 2019) and the reduction in contact teaching hours (McBride and

Drake, 2017). It was also suggested that as medical schools moved to interdisciplinary and applied learning approaches, this led to a severe shortage in anatomists (Pathiraja, 2014). To address the shortage, some institutions have called for sessional teachers to fill the gaps (Caruth and Caruth, 2013; Lachman et al., 2013; Rhodes et al., 2018). Evidence from the United Kingdom (UK) suggests that the shortage in anatomists is being compensated for by increasing the number of posts known as Demonstrators' (Smith et al., 2021).

In summary, it is clear that there is a need to better understand the role and experiences of anatomists as a community. This study started as a symposium for the International Federation of Anatomy Associations World Congress meeting in August 2019, where Prof. Smith and Prof. Finn led a symposium entitled '#mylifeinatomy'-authors (except RM, LB) presented at the symposium. The aim was to provide a candid discussion to celebrate, and critique, the opportunities and barriers facing career anatomists today. During the discussion it became clear that little research had been conducted into this specific group of people and their experiences. Therefore, this study continued over 12 months to reach anatomists at differing career stages across the globe to gain a better understanding of their day-to-day experiences within their roles and of their career in anatomy so far.

### **Research Aims**

This project aims to understand a range of facets that make up what it means to be an anatomist today. These include demographic characteristics, access to training and support provision, and availability of networking and career opportunities.

### **Research Questions**

1. What is the range of demographics that make up the population of anatomists?
2. How do anatomists access and receive training and mentorship?
3. What support is available to anatomists?
4. How do anatomists feel about their workplace culture?

5. Have anatomists experienced any issues relating to harassment or bullying, especially related to any protected characteristics?
6. Are there issues specific to mental and physical health that are related to being an anatomist?

## MATERIALS AND METHODS

### Study Design

This quantitative study used a survey design. The questionnaire employed by Brighton and Sussex Medical School (BSMS) as its annual staff survey was used as the starting point for the survey and further questions were then developed based on trends in the literature about medical educators and educators in higher education. A draft survey was pilot tested by Resident Medical Officers at BSMS and refinements were made in light of its responses. The final survey (Appendix A) comprised 51 questions. The survey was hosted on the University of Sussex Qualtrics XM survey software platform (Qualtrics Labs Inc., Provo, UT). Ethical approval for this study was granted by Hull York Medical School in 2019.

### Participants

There is no international database of anatomists, so this research study utilised both convenience sampling and purposeful sampling to recruit anatomists through the following strategy.

1. International Federation of Associations of Anatomists (IFAA) World Congress 9-11<sup>th</sup> August London Excel Docklands. A paper survey was distributed to participants in their conference bags and during the '#mylifeinatomy' workshop and associated symposia. Secure return boxes (one for consent and one for the survey to ensure anonymity) were located at the reception desk.
2. Invitation to participate through the membership lists of anatomy societies via email with link to Qualtrics Survey (where gatekeeper permission was given).
3. Invitation to participate through professional social media platforms e.g. Twitter with link to Qualtrics Survey.

Data were extracted from Qualtrics into Microsoft Excel® (Microsoft Corp., Redmond, WA) in November 2020 and were analyzed using IBM SPSS statistical software, Version 26.0 (IBM Corp., Armonk, NY). Free text comments were analyzed using thematic analysis (Braun and Clarke, 2012), which was undertaken by one researcher (CS) who coded each response and then grouped the codes to provide key themes. The themes were then checked by another researcher (GF). The number of initial exported data lines was 237. Data cleaning removed lines where no responses had been provided to generate n=161 final responses. Chi Square tests were used to explore relationships between certain factors, such as gender.

## RESULTS

### Demographics of participants

The demographics of the participants are presented in Table 1. A number of key factors are highlighted that make this sample representative. The professional level of participants that responded might reflect the constitution of an anatomy department, with Assistants (40%), Associates (25%) and Professors (26%). There was an even spread of career level with 32% reporting early career, 36% mid-career, and 32% established. There was a higher percentage in continuous employment (66%), with 87% being employed full time. There was no significant difference in relation to gender and mode of working, e.g., Full time or Part time. When asked if participants had a flexible working agreement in place, 84 anatomists (54%) replied that they did. A Chi Square test showed a statistically significant relationship between gender and having flexible working ( $p < 0.00$ ), with more males having this (56%). Under half of the participants (42%) reported having any caring responsibilities – there was a statistically significant relationship between this and gender ( $p < 0.00$ ), with again more males (59%) reporting they had caring responsibilities. Within the respondents, there was a strong focus (60%) on education pathways, as defined by spending more than 60% of their time teaching.

## APPENDIX A. Original Survey.

About You	Circle/Tick Appropriate Option		
<b>1. Please select which grade you are</b>	Support/Technician		
	Lecturer/Teaching Fellow/Assistant Professor		
	Senior Lecturer/Senior Teaching Fellow/Associate Professor		
	Professor		
	Prefer not to say		
	Other: please state		
<b>2. Are you clinically qualified?</b>	Yes	No	
<b>3. What sort of contract do you have?</b>	Permanent		
	Fixed Term		
	Prefer not to say		
<b>4. Please select your age range</b>	Under 20		
	21-30		
	31-40		
	41-50		
	51-60		
	61-70		
	70 and over		
<b>5. Please select at what level you consider to be in your career</b>	Early-Career		
	Mid-Career		
	Established-Career		
<b>6. Is your role Full Time or Part Time?</b>	Full Time	Part Time	
If Part Time what percentage?			
<b>7. What percentage of your role is teaching/research? Mark where you are</b>			
0% Teaching 100% Research-----50% Teaching 50% Research-----100% Teaching 0% Research			
<b>8. Do you have a flexible working agreement in place?</b>	Yes	No	
<b>9. Are you currently studying for a qualification?</b>	Yes	No	
If Yes please provide details of the qualification.			
<b>10. What gender do you identify as?</b>	Male		
	Female		
	Neither		
<b>11. Does your gender identity match your sex?</b>	Yes	No	Prefer not to say
<b>12. Do you have caring responsibilities for dependents</b>	Yes: Under 18		
	Yes: Adult dependants		
	Yes: both of the above		
	No		
	Prefer not to say		
<b>13. To which ethnicity to do identify as? (You are welcome to mark more than one) (There is no international standard classification, the UK classification has been adopted and includes the FDA, USA 2016 guidelines- we recognise this may appear different to one you are used to and apologise if there is a group not included- please add this in for us under 'Other')</b>			
Arab	Asian or Asian British- Bangladeshi	Asian or Asian British- Indian	
Asian or Asian British- Pakistani	Other Asian Background	Chinese	
Black or Black British- African	Black or Black British Caribbean	Other Black background	
Mixed- White and Black African	Mixed- White and Asian	Mixed: White and Black Caribbean	
Other Mixed background	White	Aboriginal and/or Torres Strait Islander	
American Indian or Alaska Native	Gypsy or Traveller	Hispanic or Latino	
Native Hawaiian or other Pacific Islander	Other	Prefer not to say	
<b>14. What national societies do you belong to? (please tick all those that apply)</b>			

Anatomical Society	American Association of Clinical Anatomists
American Association for Anatomists	Argentine Association of Anatomy
Anatomical Society of India	Australia and New Zealand Association of Clinical Anatomy
Anatomical Society of Nigeria	Anatomische Gesellschaft
Anatomical Society of Southern Africa	Brazilian Society of Anatomy
British Association of Clinical Anatomists	Chinese Society of Anatomical Sciences
Czech Anatomical Society	Dutch Anatomical Society
Hungary Anatomical Society	Institute of Anatomists
Indonesian Anatomists Association	Korean Association of Anatomists
Portuguese Society of Anatomy	Pan-American Association of Anatomists
Polish Society of Anatomy	Russian Scientific Medical Society of Anatomists, Histologists and Embryologists
Serbian Anatomical Society	Società Italiana di Anatomia e Istologica
Other Please State:	
<b>Training and career progression 1=Strongly Disagree, 2= Disagree, 3=Neither, 4=Agree, 5=Strongly Agree</b>	
<b>15. Do you feel you have received adequate training to be able to undertake your role effectively?</b>	
At current institution	1 2 3 4 5
At previous institutions 1	1 2 3 4 5
At previous institutions 2	1 2 3 4 5
At previous institutions 3	1 2 3 4 5
Please detail the training that you feel has been most valuable	
<b>16. Do you feel career opportunities are available to you?</b>	
At current institution	1 2 3 4 5
At previous institutions 1	1 2 3 4 5
At previous institutions 2	1 2 3 4 5
At previous institutions 3	1 2 3 4 5
Please detail the career progression opportunities that you feel have been most valuable	
<b>17. Do you feel your career progression has been actively blocked at any point?</b>	Yes No
If Yes is/was this by	
A Manager	
A Head of School/Faculty	
Another individual	
Institutional based issues	
<b>18. I am actively encouraged to take up career development opportunities</b>	1 2 3 4 5
<b>19. Staff who work part-time or flexibly in my current institution are offered the same career development opportunities as those who work full-time.</b>	1 2 3 4 5
<b>20. My institution provides me with (Select all that apply)</b>	A helpful annual appraisal/review
	Time to undertake development opportunities
	Useful mentoring opportunities
	Useful networking opportunities
	Funding to undertake development opportunities
	Other opportunities please state:
<b>21. My professional society provides me with (Select all that apply)</b>	Useful mentoring opportunities
	Useful networking opportunities
	Funding to undertake development opportunities
	Other opportunities please state:
<b>22. I understand the promotion process and criteria at my institution</b>	Yes No
<b>23. When were you last promoted? Please provide Year and Month</b>	

<b>24. In the past, I have moved institution to gain promotion that would not be possible if I had remained at the institution</b>	Yes	No			
<b>25. My institution values the full range of an individual's skills and experience (e.g., research, pastoral work, outreach work, teaching, administration and technical support) in the following:</b>					
When carrying out performance appraisals/reviews	Yes	No			
When considering promotions	Yes	No			
<b>26. Please add any further comments about training or career progression.</b>					
<b>Support</b>					
<b>27. I am supported in my teaching role by: Select All that apply</b>					
Head of Department/School	Line manager				
Director of teaching	Teaching office				
Your named mentor	A critical friend				
PA/Admin assistant	Other, please state:				
<b>28. I am supported in my research role by Select All that apply</b>					
Head of Department/School	Line manager				
Director of Research	Research office				
Your named mentor	A critical friend				
PA/Admin assistant	Other, please state:				
<b>29. What other sources of support would you like to see at an institutional level?</b>					
<b>30. What other sources of support would you like to see at a national or international level?</b>					
<b>Activities 1=Strongly Disagree, 2= Disagree, 3=Neither, 4=Agree, 5=Strongly Agree</b>					
<b>31. I am encouraged to represent my institution externally (e.g., on committees/boards, panels, as chair or speaker at conferences).</b>	1	2	3	4	5
<b>32. I participate in external committees</b>	Yes	No			
<b>33. If yes, please provide details on the type of committee(s) you are involved with</b>		Research	Teaching	Clinical	Other
	Local				
	Regional				
	National				
	International				
Other					
<b>34. I supervise PhD students</b>	Yes	No			
<b>Workplace Culture 1=Strongly Disagree, 2= Disagree, 3=Neither, 4=Agree, 5=Strongly Agree</b>					
<b>35. I feel well-integrated with other colleagues in my department.</b>	1	2	3	4	5
<b>36. I feel well-integrated with other colleagues across my institution.</b>	1	2	3	4	5
<b>37. I feel well-integrated with other colleagues across the national anatomy sector.</b>	1	2	3	4	5
<b>38. I feel well-integrated with other colleagues across the international anatomy sector.</b>	1	2	3	4	5
<b>39. Work-related social activities at my institution, such as networking events, are likely to be welcoming to all staff, regardless of ethnicity or gender (e.g., consider whether venues, activities and times are appropriate).</b>	1	2	3	4	5
<b>40. Work-related social activities within the anatomy sector, such as networking events, are likely to be welcoming to all staff, regardless of ethnicity or gender (e.g., consider whether venues, activities and times are appropriate).</b>	1	2	3	4	5
<b>41. My institution makes it clear that inappropriate images that stereotype people in relation to ethnicity or gender are not acceptable (e.g., in calendars, newspapers and magazines, on computers and mobiles).</b>	1	2	3	4	5



42. The anatomy community makes it clear that inappropriate images that stereotype people in relation to ethnicity or gender are not acceptable (e.g., in calendars, newspapers and magazines, on computers and mobiles).	1	2	3	4	5	
43. My institution uses a range of staff regardless of ethnicity or gender as visible role models (e.g., in staff inductions, as speakers at conferences, at recruitment events).	1	2	3	4	5	
44. The anatomy community uses a range of staff regardless of ethnicity or gender as visible role models (e.g., in staff inductions, as speakers at conferences, at recruitment events).	1	2	3	4	5	
45. Please add further comments about workplace culture here if you would like to.						
<b>Equality and Diversity 1=Strongly Disagree, 2= Disagree, 3=Neither, 4=Agree, 5=Strongly Agree</b>						
46. Within in my institution I have undertaken training in equality and diversity.	Yes: Online					
	Yes: Course or Workshop					
	No					
	Don't Know					
47. Within my institution I have undertaken training in understanding unconscious bias.	Yes- Online					
	Yes- Course or Workshop					
	No					
	Don't Know					
48. My institution has made it clear to me what its policies are in relation to gender equity (e.g. on discrimination, parental leave, career leave, flexible working).	1	2	3	4	5	
49. Please add further comments about equality, diversity and inclusion here if you would like to.						
<b>Harassment and Bullying 1=Strongly Disagree, 2= Disagree, 3=Neither, 4=Agree, 5=Strongly Agree</b>						
50. I am aware of, or have knowledge of my institution's policy on the Prevention of Bullying and Harassment.	Yes	No				
51. I would know who to go to if I wanted to report an incident of bullying or harassment at my institution	Yes	No				
PTO						
52. I am confident that my line manager/supervisor would deal effectively with any complaints about harassment, bullying or offensive behavior.	1	2	3	4	5	
53. I have experienced a situation(s) where I have felt uncomfortable because of my ethnicity or gender. Note: the next question asks about specific discrimination					Yes	No
54. I have experienced discrimination because of my ethnicity	Yes	No: Go to next Question				
If yes, was this at your institution, at a national anatomy event or at an international anatomy event or other location?						
Would you consider the perpetrator to be more senior or junior to you?						
If this has occurred more than once, please provide a rough estimate						
Please expand if you wish						
55. I have experienced discrimination because of my gender	Yes	No: Go to next Question				
If yes, was this at your institution, at a national anatomy event or at an international anatomy event or other location?						
Would you consider the perpetrator to be more senior or junior to you?						
If this has occurred more than once, please provide a rough estimate						
Please expand if you wish						
56. I have experienced discrimination because of my sexual orientation	Yes	No: Go to next Question				
If yes, was this at your institution, at a national anatomy event or at an international anatomy event or other location?						
Would you consider the perpetrator to be more senior or junior to you?						
If this has occurred more than once, please provide a rough estimate						
Please expand if you wish						

<b>57. I have experienced discrimination because of my age</b>	Yes	No- Go to next Question			
If yes, was this at your institution, at a national anatomy event or at an international anatomy event or other location?					
Would you consider the perpetrator to be more senior or junior to you?					
If this has occurred more than once, please provide a rough estimate					
Please expand if you wish					
<b>58. I have experienced discrimination because of another 'protected characteristic' or 'protected class or group' (As classed by the UK Equality Act 2010: age, disability, gender reassignment, marriage and civil partnership, pregnancy and maternity, race, religion or belief, sex, sexual orientation)</b>	Yes	No			
If yes, was this at your institution, at a national anatomy event or at an international anatomy event or other location?					
Would you consider the perpetrator to be more senior or junior to you?					
If this has occurred more than once, please provide a rough estimate					
Please expand if you wish					
<b>Flexibility and Working Hours 1=Strongly Disagree, 2= Disagree, 3=Neither, 4=Agree, 5=Strongly Agree</b>					
<b>59. Meetings in my institution are completed in core hours to enable those with caring responsibilities to attend.</b>	1	2	3	4	5
<b>60. Meetings that I participate in for external bodies/societies are completed in core hours to enable those with caring responsibilities to attend.</b>	1	2	3	4	5
<b>61. My line manager/supervisor is supportive of requests for flexible working (e.g., requests for part-time working, job share, compressed hours).</b>	1	2	3	4	5
<b>62. Please add further comments about flexible working</b>					
<b>Wellbeing 1=Strongly Disagree, 2= Disagree, 3=Neither, 4=Agree, 5=Strongly Agree</b>					
<b>63. I feel that my institution cares about my well-being at work.</b>	1	2	3	4	5
<b>64. I feel my institution is a great place to work for:</b>					
Women	1	2	3	4	5
Men	1	2	3	4	5
<b>65. I feel the anatomy community at a national level is a great place to work for:</b>					
Women	1	2	3	4	5
Men	1	2	3	4	5
<b>66. I feel the anatomy community at an international level is a great place to work for:</b>					
Women	1	2	3	4	5
Men	1	2	3	4	5
<b>67. I have experienced mental health issues that I can attribute to my work.</b>	Yes	No			
If yes, was this related your institution, at a national anatomy event or at an international anatomy event or other location?					
Please expand if you wish					
<b>68. I have experienced physical health issues that I can attribute to my work</b>	Yes	No			
If yes, was this related to your institution, at a national anatomy event or at an international anatomy event or other location?					
Please expand if you wish					
<b>69. Please add further comments about well-being here if you would like to.</b>					
<b>Future</b>					
<b>70. I would like to see active progress made by the anatomy sector in relation to ensuring balance. Please explain in what area and any suggestions of how this might be achieved.</b>					
<b>71. There are no further survey questions. If you have any further comments on the topics covered, please add them here:</b>					

**Table 1.** Demographic information of participants.

<b>Grade</b>	
Professor	41(26%)
Associate Professor/Senior Lecturer	40 (25%)
Assistant Professor/Lecturer	65 (40%)
Technical/Support	7 (4%)
Other	6 (4%)
Prefer not to say	2 (1%)
<b>Clinically Qualified</b>	
Yes	53 (33%)
No	108 (67%)
<b>Contract</b>	
Fixed Term	48 (30%)
Permanent	106 (66%)
Prefer not to say	6 (4%)
<b>Age</b>	
21-30	26 (16%)
31-40	50 (31%)
41-50	34 (21%)
51-60	23 (14%)
61-70	16 (10%)
70 and over	12 (8%)
<b>Level of career</b>	
Early	51 (32%)
Mid	58 (36%)
Established	51 (32%)
<b>Full Time/Part Time</b>	
Full Time	139 (87%)
Part Time	20 (13%)
<b>Gender</b>	
Female	87 (54%)
Male	70 (44%)
Neither	3 (2%)
<b>Ethnicity</b>	
Arab	1 (0.5%)
White	115 (67%)
Hispanic and Latino	8 (5%)
White Hispanic and Latino	1 (0.5%)
Asian or Asian British	2 (1%)
Other Asian	11 (7%)
White American Indian or Alaska Native	1 (0.5%)
Chinese	6 (4%)
White Other	3 (2%)
Asian or Asian British Bangladeshi	2 (1%)
Asian or Asian British Indian	5 (3%)
Other Asian Background	5 (3%)
White Aboriginal and or Torres Strait Islander	1 (0.5%)
Black or Black British	2 (1%)
Mixed White and Asian	1 (0.5%)
Prefer not to say	4 (2%)
Other	4 (2%)

## Training, Support and Career Progression

Exploring the membership of professional societies, the majority of respondents were members of the Anatomical Society UK (n=57), followed by the American Association for Anatomists (n=51). A total number of 217 memberships were reported, with 28 different societies represented, reflecting the fact that many anatomists belong to more than one society (Table 2). In response to feeling that anatomists have received adequate training at their current institution to undertake their role efficiently, 67% (88) strongly agreed or agreed. This number decreased when asked about previous institutions, with 58% (53), 60% (30) and 42% (12) for their first, second and third institutions respectively, indicating that training has improved slightly over time or that individuals have moved to an institution with better training. A similar trend was observed when asked about the career progression opportunities that were available with 54% (71) at their current institution, then 40% (32), 41% (17), 34% (8) for their first, second and third institutions respectively. When anatomists were asked if they felt they had had their career progression blocked, 52% (69) said yes and 48% (65) (n=134) said no. In exploring if this had a correlation to gender, a Chi Square test revealed a positive relationship (p=0.00), with females (66%) being more affected. On the question of career opportunities, 59% (78) reported they were encouraged to take up career opportunities, but only 39% (49) said that part-time staff were offered the same opportunities. When asked about understanding of the promotion process, 82% (11) said they did. However, 39% (49) revealed they had moved institution to gain promotion. Sadly, only 64% (79) of anatomists felt that their institution valued their full set of skills when considering promotion.

## Inclusivity

Anatomists were asked at departmental, institutional, national and international levels as to how integrated they felt with other colleagues. The full details are in Figure 1, however overall integration was reported to be higher 68% (78) at departmental level, dipped at institutional level 44% (54) and national level 30% (35) but rose at

**Table 2.** Learned Society Membership.

Society	Number *
Anatomical Society UK	57
American Association for Anatomists	51
American Association for Clinical Anatomists	20
Dutch Anatomical Society	13
British Association of Clinical Anatomists	11
Societa Italiana di Anatomic e Istologica	9
Australia and New Zealand Association of Clinical Anatomy	8
Institute Anatomical Sciences	8
Sociedad Anatómica Española	6
Anatomische Gesellschaft	5
Russian Scientific Medical Society of Anatomists, Histologists and Embryologists	3
Human Anatomy and Physiology Society	2
Mexican Society of Anatomy	2
Anatomical Society of Nigeria	2
Anatomical Society of Southern Africa	2
Anatomical Society of Argentine	2
Turkish Anatomical Society	2
Sociedad ecuatoriana de ciencias Morfo funcionales	1
Korean Association of Anatomists	1
Chinese Society of Anatomical Sciences	1
Polish Anatomical Society	1
Czech Anatomical Society	1
Society of Clinical and Experimental Anatomy Nigeria	1
American Society of Andrology	1
Anatomical Society of India	1
Specific Clinical Societies	4
Medical Education Societies	1
American Physical Therapy Association	1
Total Membership of Societies	217
*Many individuals belong to more than one society	

international level 46% (52). When asked about work-related social activities at institutional and sector level, such as networking events, to ascertain if they were likely to be welcoming to all staff regardless of ethnicity or gender (e.g. whether venues, activities and times are appropriate) there was very strong disagreement. At institutional level only 14% (16) agreed, and 65% (78) disagreed. At a sector level this was lower, with 6% (8) agreeing and 66% (76) disagreeing. In asking “My institution makes it clear that inappropriate images that stereotype people in relation to ethnicity or gender are not acceptable (e.g., in calendars, newspapers and magazines, on com-

puters and mobiles)”, 70% (82) disagreed. Similar trends were seen when referring to the anatomy sector with 65% (76) disagreeing. In exploring if their institution uses a range of staff regardless of ethnicity or gender as visible role models (e.g., in staff inductions, as speakers at conferences, at recruitment events), 56% (66) disagreed. At a national level the trend was the same, with 53% (63) disagreeing. In exploring training, 39% (46) had not completed any training on unconscious bias. Eighty percent (97) were aware of their institutional policy on bullying and harassment, and 85% (102) knew to whom they could go to report any such incidents. However, only 61% (72) were confident that their line manager/supervisor would deal effectively with any complaints about harassment, bullying or offensive behavior.

### Protected Characteristics

Sixty seven percent of participants identified as ‘white’. Due to the small percentages of other groups, it was not possible to perform any statistics aligned to ethnicity (Table 1). Thirty five percent (41) of anatomists reported that they had felt uncomfortable because of their ethnicity or gender, with 11% (13) reporting that they had experienced discrimination because of their ethnicity. Of these individuals, 50% (6) reported that the perpetrator/s was senior to them, and 42% (5) reported that the perpetrator/s included those who were senior and junior. When asked if anatomists had experienced discrimination because of their gender, 36% (43) had done so. There was a statistically significant difference between experiencing discrimination because of gender ( $p < 0.00$ ). Females were more affected, with the perpetrator frequently being more senior to them (82% of those who experienced discrimination because of gender were female). In response to whether anatomists had experienced discrimination because of their sexual orientation, only 2% (3) reported this to be the case. Discrimination because of age was reported by 25% (30) anatomists. In response to “I have experienced discrimination because of another ‘protected characteristic’ or ‘protected class or group’ (as classed by the UK Equality Act 2010: age, disability, gender reassignment, marriage and civil partnership, pregnancy and mater-

nity, race, religion or belief, sex, sexual orientation), 7% (9) had done so.

In exploring how institutions support those with caring opportunities, 62% (74) felt that meetings occurred within core hours to enable those with caring responsibilities to attend. Similarly, 51% (56) felt the same when working with external bodies/societies. When asked about flexible working, 67% (79) felt their line manager/supervisor was supportive of requests for flexible working (e.g., requests for part-time working, job share, compressed hours).

In response to “ I feel my institution is a great place to work for women”, 52% (58) agreed compared to 81% (75) in response to the same question answered by men. At a national level, 70% (73) felt anatomy was a great place for women, compared to 81% (86) for men. Internationally as an anatomy sector, the trend continues with 65% (69) for women and 80% (84) for men.

**Physical and Mental Health**

Exploring if anatomists have experienced issues related to their physical and mental health, 41% (49) had experienced mental health issues

that were attributable to work. A statistically significant relationship ( $P < 0.02$ ) was identified between mental health and gender, with females more likely to experience this (68% of participants who experienced mental health issues related to work were female). Thirty percent of participants (36) had experienced physical health issues that were attributable to work.

**DISCUSSION**

The findings of this study suggest that anatomists have experienced a number of issues common to the sector. These include discrimination, health and wellbeing issues as a result of work, and a lack of defined training and progression.

**Identity and professional registration**

Literature from around the mid-1600s describes the granting of Royal Charters to Anatomy Schools in the United Kingdom, indicating that there were lots of ‘unofficial’ anatomy schools as well as those who had been deemed to meet a defined level (Michell, 2016). Anatomists as individuals were referred to as being ‘incorporated’, and these were the only anatomists who could legally

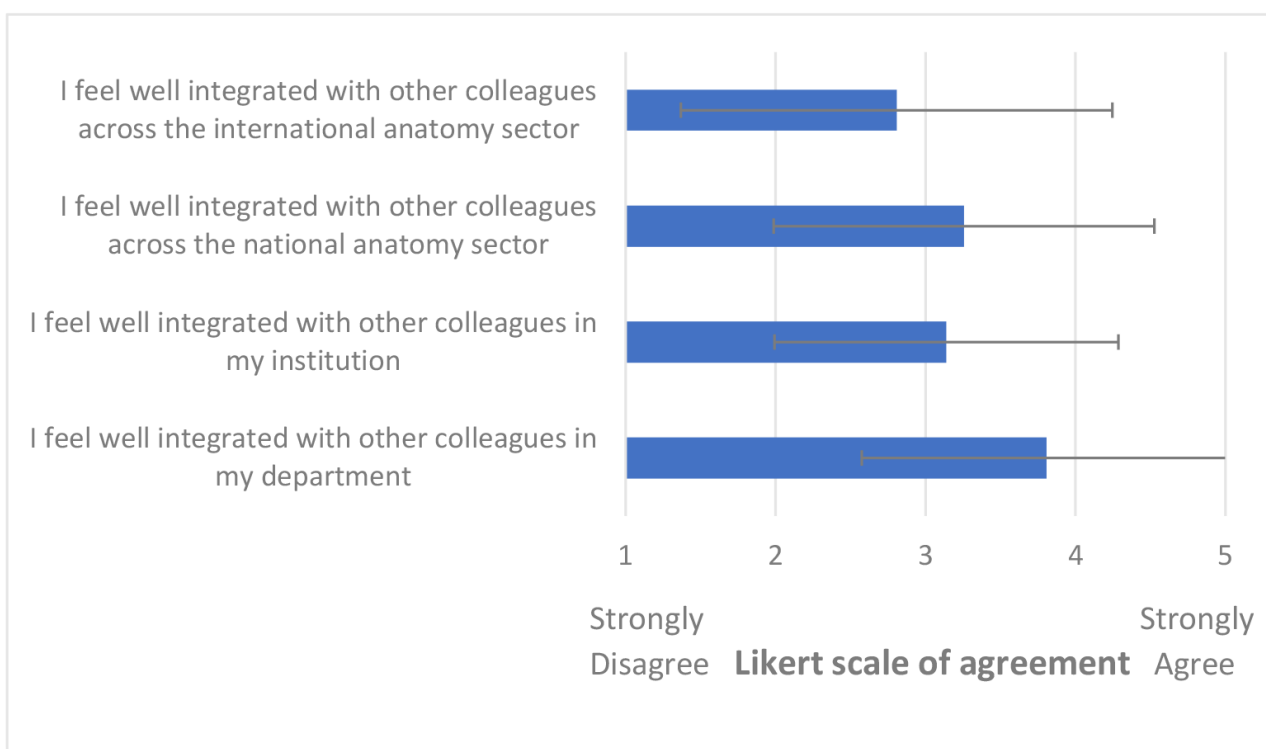


Fig. 1.- Integration at department, institutional, national, and international level.

receive bodies. However, in the 18<sup>th</sup> Century there was an increase in private hospitals and thus the number of ‘unincorporated’ anatomists increased (Ward, 2015). In the 18<sup>th</sup> and 19<sup>th</sup> centuries, the definition of a qualified anatomist became more straightforward as it was linked to legislation around the use of human bodies. This connection with legislation remained until 2004. In the United Kingdom prior to the Human Tissue Act (HTA), an anatomist could be ‘licensed’ as an individual by Her Majesty Inspector of Anatomy, but with the establishment of the Human Tissue Authority, an Institution is licensed with named individuals on the license. A component that has changed is that the term ‘anatomist’ can now encompass a variety of professional activities, including research, teaching and technical work. Only some of these may use specimens from human bodies and therefore have a need to work under regulations. The individuals in the study were predominantly involved in teaching anatomy and therefore were likely to be or have been involved in dissection. Dissection echoes back to the historical identity of anatomists, previously seen as taboo and condemned by society (Dangerfield, 2002). However, there is little information available today on the perception of anatomists by the general public. In recent years, one anatomist (Gunther von Hagens), creator of the controversial Body Worlds exhibition, has influenced the public’s perception of anatomy, and has been cited as an anatomist in the old-fashioned sense, motivated by the beauty of anatomy, rather than the science (Jones and Whitaker, 2009). There are also intricate ties to the past in the link between anatomy and art and the beauty of anatomy, as, for example, the anatomist Emily Evans (Emily Evans, 2022) who, as an anatomist, has also developed a successful arts collection. The identity of anatomists today appears to be as broad as ever.

The issue of identity of anatomists is probably compounded by the lack of a clear definition of an anatomist. It may also be attributable to the heterogeneity within the anatomy community, possibly also linked to a lack of sense of belonging and therefore perceived support worldwide. This issue is also probably exacerbated by there being only one or two anatomists per institution, with the

overall numbers who work in the discipline being relatively small compared to other biomedical sciences. With the emergence of new disciplines and a shift in focus towards communication skills within medical education, anatomy as a discipline has experienced a severe reduction in the allocation of teaching hours (Smith et al., 2021). This has doubtless affected the number of anatomists, with retired faculty members not being replaced, even while there were not enough anatomists to fill advertised posts (Topp, 2004; Fraher and Evans, 2009; Wilson et al., 2020). It could be argued that within the discipline, the historical perception that anatomists are not needed continues to pervade the sector.

Although anatomists frequently work in a laboratory-based environment and contribute towards key preclinical training, they are also key players in assisting medical students to develop the ‘professional knowledge’ domain of the Outcomes for Graduates (General Medical Council, 2018). Despite this, they are not considered to be part of the same professional bodies to which their colleagues who are doctors and allied health professionals belong, such as the General Medical Council. While such organizations are primarily focused on protecting patients, it can be also argued that the knowledge imparted by anatomists informs future patient care, which raises the question of professional registration for anatomists. The various learned societies that exist to support anatomists and other biomedical scientists have no legal jurisdiction. The study highlighted that anatomists mostly felt integration at the department level, but this was not so at the national or societal level, albeit this perception did increase again at the international level. The reasons for these differences are unclear, but may relate to whether anatomists feel welcomed and included.

### Qualification

The number of qualified anatomists has been raised as a concern (Sugand et al., 2010), but interestingly the literature does not specify what constitutes a ‘qualified anatomist’. There have been a number of improvements that provide a qualification for anatomists in the past 10 years. These include the Anatomical Society Anato-

my Training Programme in collaboration with the American Association for Anatomy (Fraher and Evans, 2009), a graduate model of training with the Anatomy Education Research Institute (O'Loughlin and Husmann, 2019), and an apprenticeship-style model at the University of Kentucky (Richardson-Hatcher et al., 2018). In the UK, there are dedicated Master's degrees in human anatomy and education, such as those offered by the University of Sheffield and Hull York Medical School.

There has been in recent years an emphasis on 'teaching-focused' anatomists, and it is therefore unsurprising that the majority of anatomists in this survey were 'teaching-focused'. There has been previous debate over the value of a teaching credential (Rizzolo and Drake, 2008). In the UK and Australia, the Advance HE fellowship (Advance HE, 2020) structure is promoted and recognized in the Teaching Excellence Framework (TEF) (TEF, 2020), so that it is likely that most anatomists in these countries who have a significant teaching role have accredited fellowship status, as this is a common requirement for employment and promotion.

### **Training and professional development**

The identification of Early Career Anatomists (ECA) has occurred. However, ECAs may find navigation of the higher education landscape a complex task, especially in anatomy with novel pedagogies. Kramer et al. (2020) explains that it is an international challenge to create anatomists of the future and initiatives such as Early Career Networks are an important tool in supporting junior anatomists. With new generations of students entering anatomy as a discipline there must be support in place to help ECAs progress into established careers while training new ECAs. Schaefer et al. (2019) suggests weaknesses in education-focused postdoctoral training due to the undervaluing of teaching and to the fact that other forms of postgraduate training may be more suitable, and this reflects the level of an ECA. It is also worrying to see that there is less focused support for mid and late career anatomists, with this study reporting that individuals (39%) have had to move institution to gain promotion. Just over half of participants (52%) felt they had their career pro-

gression blocked, which may be due to prejudice or unconscious bias.

### **Discrimination**

It is clear that discrimination exists in anatomy, especially in relation to gender, ethnicity, and age. It is perhaps surprising, in this study, that males report having a higher amount of flexible work and caring responsibilities. It is not surprising that the study indicates a detrimental effect to individuals based on their ethnicity and on their identification as female. This echoes patterns in the literature on clinical academic careers (Finn et al., 2022). Gender inequality is also highlighted by the marked difference in whether individuals feel "their place of work is great", with 52% for women compared to 81% for men. This trend continues across the international anatomy community, with 65% for women and 80% for men. These may reflect issues of power imbalance and hierarchy, which both affect the sense of belonging and the ability to speak out and have your voice heard.

### **Health and Wellbeing**

Historically, one of the risks of being an anatomist was disease transmission. In the winter of 1848-49 in Scotland, records showed that 33 out of 38 bodies had died from cholera, a known infectious disease. The risk to anatomists of catching cholera or tuberculosis was mainly during the period between death to arrival in the medical school (Kaufman, 2005). However, this occupational hazard was reduced with the advent of embalming, although the chemicals used in embalming are still harmful to human health, especially formaldehyde (Skisak, 1983; Pabst, 1987; Mirabellor et al., 2011; Waschke et al., 2019). From the survey it would appear that the modern anatomist is less at risk of physical health problems and more so impacts on one's mental health. From the survey it was reported that anatomists who identify as female are more likely to experience poor mental health related to work than those who identify as male. This could be related to the rate and incidence of discrimination against female anatomists in the workplace that was observed in the survey results.

## CONCLUSION

Anatomists are fulfilling vital roles in the education of medical, allied health and science-focused individuals. Collectively educational institutions, the learned societies, and anatomists themselves need to take collective action to ensure that individuals are treated with dignity and respect. Anatomists should be offered appropriate training and development opportunities. A career in anatomy should be rewarding, prosperous and embedded within a positive culture of inclusion and equality. It is hoped that the results from this study provide anatomists at all stages of their career with a sense of belonging within their discipline. It is also hoped that the issues identified within this study encourage anatomists to speak out against adversity within their institution and societies, in a hope to drive progressive changes towards creating a more forward-thinking culture within the discipline of anatomy.

## RECOMMENDATIONS

1. This study acts as a call to arms to explore further the experiences of anatomists and to develop better support systems for colleagues.
2. National Societies should continue to work collaboratively to develop training opportunities for anatomists at all stages of their career (early, middle, late).
3. International and National Societies should develop and implement policies to promote inclusion in the anatomy community.
4. Everyone should work to develop a culture of change to provide allyship to all members of the anatomy community and to challenge inappropriate behavior.
5. Establish an attitude and policy of zero tolerance on any aspect where a protected characteristic of an anatomist is treated with discrimination.

## ACKNOWLEDGEMENTS

The authors wish to express their gratitude to those who provided the data for this study. The authors also thank Jenny Holmes for her help in the design of the study as the equality and diversity officer at Brighton and Sussex Medical School.

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