

# STEP 1: The Scottish Trauma & Orthopaedics Equality Project

## Demographics and working patterns of a national workforce

From South-East Scotland Orthopaedics, Edinburgh Royal Infirmary, and Fife National Treatment Centre, UK

M. Jabbal,<sup>1</sup> J. Cherry,<sup>1,2</sup> D. Eastwood,<sup>3</sup> C. E. H. Scott,<sup>1</sup> P. Walmsley,<sup>2</sup> E. Baird<sup>1,4</sup>

<sup>1</sup>Orthopaedics Department, Edinburgh Royal Infirmary, Edinburgh, UK

<sup>2</sup>Fife National Treatment Centre, Kirkcaldy, UK

<sup>3</sup>Great Ormond Street Hospital, London, UK

<sup>4</sup>South East Scotland Orthopaedics, Edinburgh, UK

Correspondence should be sent to E. Baird [emily.baird@nhs.scot](mailto:emily.baird@nhs.scot)

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### Aims

Trauma & Orthopaedic (T&O) surgery has come under scrutiny for lagging behind other medical specialties in promoting gender and cultural equity and diversity within their workforce. The proportions of female, ethnic minority, and sexual and gender minority individuals within orthopaedic membership bodies are disproportionate to the populations they serve. The aim of this study is to report the findings of a national workforce survey of demographics and working patterns within T&O in Scotland.

### Methods

A questionnaire devised by a working group was delivered by the Client Analyst and Relationship Development (CARD) group. Utilizing a secure third party ensured anonymity for all respondents. Data were recorded and analyzed by the CARD group.

### Results

A total of 353 responses were recorded, representing 71% of the known workforce. Overall, 261 respondents (74%) identified as male, 85 (24%) female, and seven (2%) preferred not to say. For specialist trainee (ST)3 to ST6, 148 (42%) were female, and for ST7 to ST8, 131 (37%) were female. In total, 226 of all respondents (64%) were white-British, 35 (10%) were white-European, and 92 (26%) were of an ethnic minority background. A total of 321 of respondents (91%) identified as heterosexual, 14 (4%) preferred not to say, and 18 (5%) identified as LGBTQ+ or preferred to self-describe.

### Conclusion

This is the largest national workforce survey in contemporary surgical literature. The findings demonstrate a greater proportion of female surgeons overall compared to other studies in T&O. This proportion of females was highest among more junior trainees. The Scottish T&O workforce is more ethnically diverse than the demographics of the population it serves. This study suggests that T&O in Scotland is an evolving speciality in terms of equality and diversity, and is making positive progress.

### Take home message

- This study represents the most complete national workforce survey in the orthopaedic literature.
- It highlights an increasing proportion of female trainees; however, consultants are still predominantly male.

- The study suggests Trauma & Orthopaedics in Scotland is showing positive progress in equality and diversity.

### Introduction

Diversity, equity, and inclusion (DEI) within the medical workforce is an important area of focus, especially for specialities such as

Trauma & Orthopaedic (T&O) surgery, where workforce diversity has traditionally been lowest.<sup>1</sup> DEI has evolved from being a morally and socially just endeavour to an evidence-based strategy that brings value to an organization. A diverse healthcare workforce enables culturally sensitive care, promotes health equity, and enhances the understanding of various needs and patient viewpoints, resulting in more effective patient treatment.<sup>2</sup> Diverse teams demonstrate improved communication through appreciation of different perspectives rather than the needs of one group. This can lead to increased organizational and process innovation with the potential for improved financial performance.<sup>3</sup> Furthermore, having access to a larger pool of talent can lead to better productivity and problem-solving ability compared to more homogeneous teams and organizations.<sup>4,5</sup> Prioritizing diversity and inclusion improves employee retention and engagement.<sup>5</sup> Patient outcomes may improve through shared decision-making, adherence to management plans, and improved recruitment to research studies.<sup>6</sup> Within healthcare specifically, workforce diversity has been demonstrated to reduce healthcare disparities.<sup>4</sup> Learners at any stage benefit from a broadened perspective of race, religion, ethnic, and cultural backgrounds, making them better equipped to work comfortably and effectively in diverse environments.

The British Orthopaedic Association (BOA) launched its DEI strategy in 2020 with the aim: "To lead the profession to challenge the status quo, stimulate cultural change, and improve diversity and inclusion across T&O. To create an inclusive culture that values diversity and for each member to feel respected and included."<sup>7</sup> They reported a total membership of 12% being female, with 7% at consultant level, and 21% at trainee level; however, further information on protected characteristics are not yet known.<sup>8</sup> The first priority of their DEI action plan is to understand and define the groups that are currently under-represented across T&O, and to demonstrate a commitment to addressing that under-representation.

The Scottish Committee for Orthopaedics and Trauma (SCOT) benefits from regular nationwide communication and collaborative meetings, which foster a close and supportive community. The deanery is sub-divided into four smaller geographical regions – North, East, South-East, and West – each with an individual training programme director. Recruitment for trainees is predominantly through run-through specialist trainee (ST)1 selection, with a small proportion of uncoupled core training and ST3 entry positions. In recent years, there has been an observed increase in the proportion of female and ethnic minority background trainees, perceived to be more than the previously stated national figures.

The aim of this study was to report the findings of a survey investigating demographics and working patterns of the Scottish T&O workforce.

## Methods

A working group was set up to decide which aspects of the Scottish T&O workforce should be investigated. The group was composed of the British Orthopaedic Trainees Association (BOTA) national representative (MJ), BOA culture and diversity champion (JC), persons involved in undergraduate and postgraduate training (PW, EB, DE), and research

organizations (CEHS). All of these individuals are authors of this report. Taking into account the experience of a previous study in this field undertaken by the British Hip Society (BHS) and BOTA census data,<sup>9</sup> the working group formulated a questionnaire with three main sections: demographics of the Scottish workforce, training journey/barriers, and workforce culture. The full questionnaire is available in Supplementary Material 1.

The Client Analyst and Relationship Development (CARD) group,<sup>10</sup> specialist informational analysts, were used for further development of the questionnaire and subsequent delivery. Utilizing a secure third party ensured anonymity for all respondents. Data were recorded and analyzed by the CARD group. The questionnaire was launched at the annual scientific meeting for consultants and trainees, and was promoted through social media, local and national email chains, regional clinical and educational leads, and word of mouth.

## Statistical analysis

The survey results were analyzed independently by the CARD group. Frequencies and descriptive statistics were calculated to summarize anonymously the answers of the respondents. Chi-squared test was used to analyze categorical variables, with a p-value < 0.05 deemed significant. Raw data from survey responses were not able to be accessed for further predictive models to be performed, as due to the relatively small geographical region it may be possible to identify individuals based on their demographics, and their response anonymity may be compromised.

## Results

Responses were received from 353 individuals, representing 71% of the known workforce. The full results table is available in Supplementary Material 2.

### Demographics

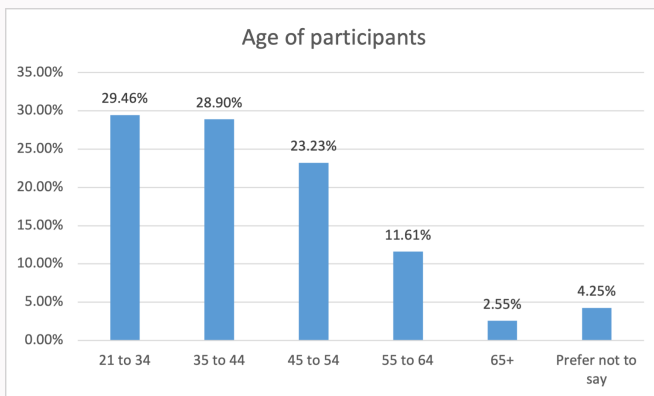
The highest proportion of respondents were aged 21 to 34 years (104; 29.5%), followed by 35 to 44 years (102; 28.9%), 45 to 54 years (82; 23.3%), 55 to 64 years (41; 11.6%), and over 65 years (9; 2.6%); 15 (4.3%) preferred not to say (Figure 1).

Sex assigned at birth was 254 (72%) male, 88 (25%) female, and 11 (3%) preferred not to say. Currently defined sex was 254 (72%) male, 85 (24%) female, 11 (3%) preferred not to say, one (< 1%) prefer to self-describe, and one (< 1%) non-binary.

For consultants, 146 (81%) were male and 32 (18%) female. The highest proportion of females were in the ST3 to 6 group (21; 42%), followed by ST7 to 8 (9; 37%), speciality and specialist (SAS) group (5; 29%), and ST1 to 2 (6; 22%) (Figure 2).

The majority of respondents identified as heterosexual (321; 90.9%), with ten (2.9%) identifying as bisexual, seven (1.9%) as lesbian/gay, one (0.3%) preferring to self-describe, and 14 (4%) preferring not to say. A disability was present in 39 (11%) responders while 314 (89%) did not have a disability. Three-quarters were British graduates (263; 74.5%), 81 (23.0%) were international medical graduates, and nine (2.3%) preferred not to say.

The overall breakdown of race varied by career stage, and is summarized in Table 1 and Figure 3. Individuals identifying as white-British predominated among training



**Fig. 1**  
Responses by age.

grades and consultants, but other racial groups predominated among SAS, locally employed doctors (LEDs), and post-certificate of completion of training (CCT) groups.

Relationship status was married in 251 (71%), civil partnerships in seven (2%); 85 (24%) had never been married or in civil partnership; seven (2%) were divorced; and three (1%) were separated. A significantly greater proportion of female respondents had never been married compared to males (40% (35) vs 19% (48) ( $p = 0.048$ ). A significantly higher proportion of consultants were married (151; 84%) compared to trainees (38; 37%) ( $p = 0.009$ ).

### Working patterns

Of those who responded, 180 (50.9%) were consultants, 101 (28.3%) were trainees, 28 (7.6%) ST1 to 2, 49 (13.8%) ST3 to 6, 24 (6.8%) ST7 to 8, 20 (5.6%) LED, 17 (4.8%) SAS, 11 (3.1%) post-CCT fellow, 11 (3.1%) other, seven (2.2%) preferred not to say, and six (1.7%) retired.

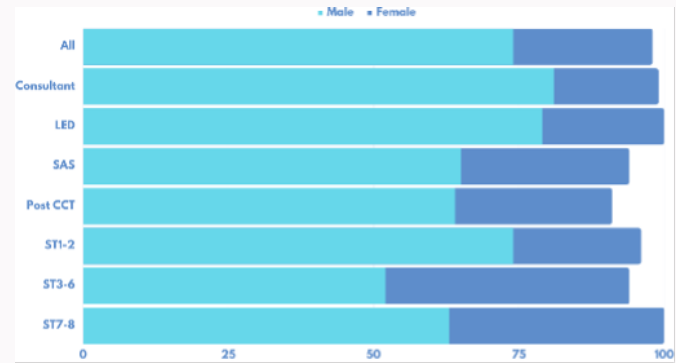
A subspecialty interest was declared by 307 (83%), while 60 (17%) were either still undecided or preferred not to say. There was no significant difference in subspecialty interest by gender ( $p = 0.852$ ). In the trainee group, the development of a subspecialty interest increased with seniority, 21 (74%) ST1 to 2, 39 (80%) ST3 to 6, and 21 (88%) ST7 to 8.

The majority of consultants (157; 87%) worked full-time with ten PAs or more. A PA is a unit of work in the UK which equates to four hours. Of the 15 (6%) who worked less than full-time, the majority were male (12; 67%). Similarly, 93 (92%) trainees worked 40 to 48 hours per week, with eight (8%) working less, but in contrast to consultants, the majority working less than full-time were female (6; 86%).

One-third of respondents (124; 35%) had taken a period of time away from work: 51 (58%) females compared to 71 (28%) males ( $p = 0.007$ ).

Reported caring responsibilities did not vary between genders. Overall, 166 (47%) had caring responsibilities for children (127 (50%) males, 37 (42%) females, with the remainder not responding or preferring not to say),  $p = 0.675$ ; 35 (10%) had other caring responsibilities (25 (10%) of males and seven (8%) of females)  $p = 0.716$ .

Professional activities in addition to their NHS contracted duties were undertaken by 85 respondents (24%). There was no significant difference between male and female



**Fig. 2**  
Sex by grade. The numbers on the x-axis represent percentages.

**Table I.** Overall race breakdown.

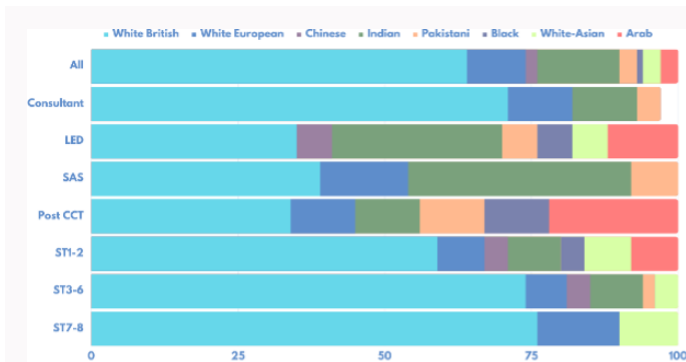
Race of respondents	N (%)
White-British	226 (64)
Indian	49 (14)
White-European	35 (10)
Pakistani	10 (3)
Arab	10 (3)
White-Asian	10 (3)
Chinese	7 (2)

surgeons in terms of who was involved in training or academic roles, or working for professional bodies. There was a significantly higher proportion of males participating in non-NHS private work ( $p < 0.001$ ) and management roles ( $p = 0.005$ ) (Figure 4).

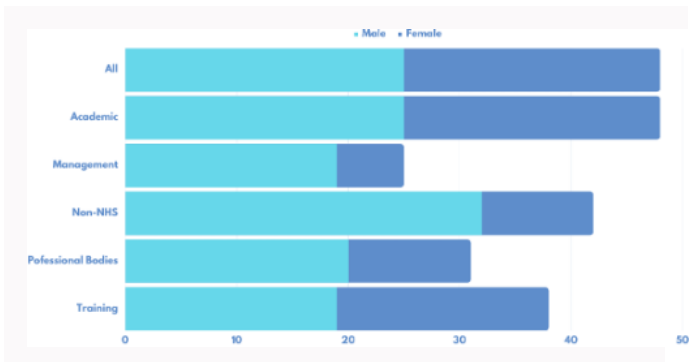
### Discussion

The current study reports the results of a national workforce survey of the Scottish T&O workforce with a high response rate of 71% (353). Overall, the sex assigned at birth was male in 254 respondents (72.8%). The highest proportion of females was among trainees where 21 (42%) of year three to six (ST 3 to 6) and 37% of year seven to eight (ST 7 to 8) trainees were female. Racial diversity was greatest among LED, SAS, and post-CCT surgeons. The majority of responders identified as heterosexual (90.9%).

The current study reports higher female representation in T&O in Scotland than the reported BOA female membership of 12% total: 7% at consultant level and 21% at trainee level. It should be noted that many individuals may be counted in both groups, and some individuals in Scotland may not be members of the BOA.<sup>8</sup> The European Federation of National Associations of Orthopaedics and Traumatology (EFORT)<sup>11</sup> and International Orthopaedic Diversity Alliance (IODA)<sup>12</sup> showed that the proportion of female consultants was highest in Estonia (26.4%), Sweden (16.8%), Brunei (13.3%), and Canada (12%). Other notable countries were the USA (6.1%), Australia (4.3%), and India (0.5%).<sup>13</sup> The UK was reported at 4.8% by



**Fig. 3**  
Race by grade.



**Fig. 4**  
Gender proportion by activity. The numbers on the x-axis represent percentages.

these organizations, which is lower than the BOA figure, so this must be taken into account when considering the other percentages. The current study reports a percentage of female consultants of 18%, which is second only to Estonia in the literature. There may be an element of respondent bias whereby members of the workforce who are from more diverse backgrounds are more likely to respond to a questionnaire on diversity. A worst-case scenario, where all non-respondents to the survey were male, gives a lower estimate of 13% of the T&O consultant workforce being female. The proportion of female trainees reported in the current study is higher than reported in previous studies of trainee/resident female representation from other regions: 14.9% in the USA,<sup>14</sup> 22% in Australia;<sup>15</sup> and 26% in the Canadian orthopaedic associations.<sup>16</sup>

The demographics of the UK medical workforce have evolved significantly over time. Females now represent 48% of doctors and 64% of the current 2021/2022 medical school intake, according to the General Medical Council workforce survey.<sup>17</sup> Furthermore, 42% of all current licensed doctors are international medical graduates (IMGs) and 46% of all trainee doctors identify as an ethnic minority. Despite these advances, T&O is often perceived as a white-heterosexual-male-dominated speciality by medical students, which may dissuade them from pursuing it as a career.<sup>18</sup> This perception may reflect reality in many areas, with previous UK reports demonstrating that only 19% of T&O trainees and 7% of T&O consultants are female, with the proportion reducing with seniority described as the “leaky pipeline” phenomenon.<sup>19</sup> This is not limited to the UK: in a systematic review of DEI across surgical specialties from 1990 to 2020 in the USA, Reghunathan et al<sup>1</sup> found T&O to have the smallest proportion of females (approximately 15%) and minority ethnic groups (approximately 7%). Despite this, T&O had published the most articles about DEI over the time period (63 from a total of 199), and had the largest increase in publications on DEI each year, highlighting an appetite for change.

According to Public Health Scotland, 89% of the population of Scotland identify as white-Scottish.<sup>20</sup> In contrast, this orthopaedic workforce survey found that only 226 (64%) identified as white-British. Of the remaining 127 members (36%) of the workforce, 59 (50%) identified as British-Asian. Only three (1%) of the population and three (1%) of the workforce identified as black. This demonstrates the orthopaedic workforce is more ethnically diverse than the population

it serves. Similar reporting of ethnicity within orthopaedic communities is limited. The most complete study is from the USA, where Singleton et al<sup>21</sup> reported 74.5% white-American and 25.5% ethnic minorities compared to the population estimate of 60.1% and 39.9%, respectively, and more specifically, 12.5% Asian-Americans, 4.2% African-Americans, 4.5% Hispanic, 0.36% American Indians, 0.19% Native Hawaiians/Pacific Islanders, and 8.3% other/unknown. The authors also commented that these proportions are the lowest of all the surgical specialties. Though racial diversity in the current study appears to be higher than that of the general population, it should be noted that this is not equally distributed across grades, with high proportions of non-white individuals in LED, SAS, and post-CCT roles.

While promotion of race and gender diversity has been established for some time, allyship towards and visibility of LGBTQ+ doctors and surgeons are a more recent focus. Studies have demonstrated that 41% of practising LGBTQ+ doctors choose not to disclose their sexual orientation due to fear of rejection or reprisal,<sup>22</sup> with self-censorship highest in surgery programmes stemming from concerns regarding career advancement.<sup>23</sup> This self-censorship makes it difficult to assess the proportion of LGBTQ+ surgeons within surgery in general and T&O specifically. Bullying and sexual harassment are higher among LGBTQ+ surgical residents,<sup>24</sup> with up to half reporting having experienced homophobic remarks during surgical residence programmes.<sup>25</sup> Subsequently, a recent survey of LGBTQ+ medical students demonstrated T&O to be the least popular speciality as a career choice in the USA.<sup>26</sup> To help address and remove these barriers, both real and perceived, organizations such as Pride Ortho and the Pride in Surgery Forum (PRISM) of the Royal College of Surgeons of England aim to empower and support future LGBTQ+ surgeons, providing LGBTQ+ surgeons with visibility, mentorship, and a voice among national surgical societies. Increasing LGBTQ+ representation in surgery and in surgical society leadership may help to address health inequality among the LGBTQ+ patient population.<sup>27</sup> In 2019, the Scottish government reported that 98% of the population surveyed identified as heterosexual, while 2% identified as LGBTQ+.<sup>20</sup> The current study of the Scottish orthopaedic workforce demonstrated that ten (2.83%) identified as bisexual, seven (1.98%) as lesbian/gay, and one (0.28%) preferred to self-describe. These findings demonstrate that in Scotland, the orthopaedic workforce is, at least, as diverse as the population



it serves. In the current study, the use of a secure and impartial third party for complete anonymity of the results and analysis was highlighted during the promotion of the survey, with the aim of encouraging participants to report their characteristics accurately without fear of repercussion.

The majority of respondents worked full-time (157 (87%) as consultants and 93 (92%) as trainees) and had a specialist interest. Trainees displayed an increasing preference for subspecialization as they became more senior. Consultants who worked less than full-time were predominantly male (15; 67%); however, trainees who worked less than full-time were predominantly female (6; 86%). Overall, 124 (35%) had had a period off work for reasons such as maternity leave or research, of whom 71 (58%) were female. The specific breakdown of reasons for these periods, or for less than full-time (LTFT) working, was not part of the survey. It was not possible to perform a predictive analysis due to data confidentiality purposes on gender, caring responsibilities, or other professional activities (i.e. private work) and their relationship to LTFT working; however, this is a potential area for further investigation. Interestingly, there were no significant differences in caring responsibilities for children or any other family members according to gender; however, the proportion of time spent on said responsibilities was not investigated. There has been a recent change by NHS Education for Scotland (NES), which permits any trainee to apply to be LTFT without any set criteria.<sup>28</sup> These changes aspire to make training more flexible in acknowledgement of progressive family dynamics and caring responsibilities, and may lead to more men working LTFT or taking increased periods of parental leave in the future.<sup>28</sup>

One-quarter of respondents reported having professional activities in addition to their standard NHS contracted duties. There was no significant gender difference for training roles, professional societies, or academic roles, suggesting the opportunity for such may be open and inclusive. In contrast, the current study reports significantly more males in management roles and private practice. The Royal Australasian College of Physicians previously examined barriers to advancement to higher positions within medicine, noting that a lack of workplace flexibility and masculine bias in organizational culture can lead to lack of female role models and mentoring in these areas.<sup>18</sup> Potential solutions revolve around increased flexibility for these professional activities, such as hybrid meetings to accommodate less travel, and moving timings to be more practical around a working day or family responsibilities.

### Strengths and limitations

The strengths of this study include the high response rate, which is the largest in the recent literature for a national workforce survey. Furthermore, the level of detail in demographics allows many protected characteristics to be made visible. Limitations include the moderate sample size and responder bias; however, this must be taken in the context of the overall population and country size being small. Furthermore, the anonymous third party data collection and analysis did not allow the raw demographics to be used by authors for any predictive analysis, as this would have potentially identified the respondents. Further study includes investigation of the effects of these demographics, such as barriers and

culture, FRCS exam pass rates, fellowships, and consultant job acquisition.

In conclusion, this study reported the demographics and working patterns of the Scottish T&O workforce. Overall, the workforce is predominantly male; however, there is an increasing proportion of females, up to 42%, in training grades. Ethnic diversity is greater than the Scottish population served, but is not equal across all grades. The workforce is still predominantly white-British (64%). The proportion of LGBTQ+-identifying individuals slightly exceeds that of the Scottish population. This study demonstrates the Scottish T&O workforce is making progress in EDI, with more diversity than in other reported studies, and demonstrates that the recent focus on EDI is making a positive impact. While it would be desirable to make further recommendations, this was unfortunately not possible due to the study design. Areas for further work would include predictive models for success and survey design to ensure anonymity while allowing the use of raw response data.

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### Supplementary material

Full survey, and tables showing an overview of full results.

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### Author information

**M. Jabbal**, MBChB, Registrar

**C. E. H. Scott**, MBChB, Consultant

Orthopaedics Department, Edinburgh Royal Infirmary, Edinburgh, UK.

**J. Cherry**, MBChB, Consultant, Orthopaedics Department, Edinburgh Royal Infirmary, Edinburgh, UK; Fife National Treatment Centre, Kirkcaldy, UK.

**D. Eastwood**, MBChB, Consultant, Great Ormond Street Hospital, London, UK.

**P. Walmsley**, MBChB, Consultant, Fife National Treatment Centre, Kirkcaldy, UK.

**E. Baird**, MBChB, Training Program Director, Consultant, Orthopaedics Department, Edinburgh Royal Infirmary, Edinburgh, UK; South East Scotland Orthopaedics, Edinburgh, UK.

### Author contributions

M. Jabbal: Formal analysis, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing.

J. Cherry: Conceptualization, Methodology, Project administration.

D. Eastwood: Conceptualization, Data curation, Funding acquisition, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing.

C. E. H. Scott: Conceptualization, Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing.

P. Walmsley: Conceptualization, Formal analysis, Funding acquisition, Investigation, Methodology.

E. Baird: Conceptualization, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing.

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### Data sharing

The data that support the findings for this study are available to other researchers from the corresponding author upon reasonable request.

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