

# Differences in the occurrence and characteristics of injuries between full-time and part-time dancers

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**To cite:** Vassallo AJ, Pappas E, Stamatakis E, *et al.* Differences in the occurrence and characteristics of injuries between full-time and part-time dancers. *BMJ Open Sport & Exercise Medicine* 2018;**4**:e000324. doi:10.1136/bmjsem-2017-000324

► Additional material is published online only. To view please visit the journal online (<http://dx.doi.org/10.1136/bmjsem-2017-000324>).

Accepted 20 February 2018

## ABSTRACT

**Background** Professional dancers are at significant risk of injury due to the physical demands of their career. Despite their high numbers, the experience of injury in freelance or part-time dancers is not well understood. Therefore, the aim of this study was to examine the occurrence and characteristics of injury in part-time compared with full-time Australian professional dancers.

**Methods** Data were collected using a cross-sectional survey distributed to employees of small and large dance companies and freelance dancers in Australia. Statistical comparisons between full-time and part-time dancer demographics, dance training, injury prevalence and characteristics were made using  $\chi^2$ , two-tailed Fisher's exact tests, independent t-tests and Mann-Whitney U tests.

**Results** A total of 89 full-time and 57 part-time dancers were included for analysis. A higher proportion of full-time dancers (79.8%) than part-time dancers (63.2%) experienced an injury that impacted on their ability to dance in the past 12 months ( $p=0.035$ ). Injuries characteristics were similar between groups with fatigue being the most cited contributing factor. Part-time dancers took longer to seek treatment while a higher proportion of full-time dancers were unable to dance in any capacity following their injury.

**Conclusion** More full-time dancers sustained an injury in the past 12 months, and were unable to dance in any capacity following their injury. However injuries still commonly occurred in part-time dancers without necessarily a large volume of dance activity. Part-time dancers often access general community clinicians for treatment, who may need additional education to practically advise on appropriate return to dance.

## What are the new findings?

- A substantial proportion of part-time dancers experience injuries, despite a relatively low load of dance compared with full-time dancers.
- Fatigue is the most commonly cited contributor to injury by both full-time and part-time dancers.
- A typical week of dance activity (or dance exposure) was difficult for part-time and freelance dancers to report on, and this must be taken into consideration when designing future studies for the standardisation of reporting dance injury research.
- Over 50% of injured part-time dancers seek care from clinicians outside of their dance employment, who may require tailored education and support to practically advise on dance modifications while managing an injury.

Injuries sustained during one's dance career can have significant consequences, both on ability to maintain fulfilling dance employment, as well as other aspects of a dancer's daily life and identity.<sup>6</sup> Therefore, there is an increasing focus within the dance community on developing a better understanding of dance-related injuries, their causes, prevention and management.

Comprehensive and regular collection of descriptive epidemiological data is an essential part of the injury prevention process.<sup>7</sup> The majority of epidemiological studies within the dance literature investigate injuries in full-time dancers, who work within the support structures of large and well-resourced companies, and predominantly practise ballet or contemporary dance.<sup>8</sup> Only a small percentage of dancers, however, are employed by large companies. In Australia, for example, of the approximate 1135 professional dancers and choreographers,<sup>9</sup> it is estimated that less than 200 are employed with full-time (or near to full-time) contracts with a major company.<sup>10</sup> Another study from 2009 found that only one Australian non-major performing company was able to offer year-round or full-time employment to dancers.<sup>10 11</sup> This is not an issue exclusive to

## INTRODUCTION

Professional dance can be a rewarding, yet physically challenging career path. Dancers place enormous physical demands on their bodies as they take class, rehearse, perform, tour and compete for a limited number of paid positions within the professional dance industry.<sup>1</sup> The incorporation of strong artistic,<sup>2</sup> aesthetic<sup>3</sup> and perfectionistic<sup>4 5</sup> components in dance performance is also proposed to contribute to a unique risk, distribution and experience of injury.



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Australia, as a 2001 English study also identified only approximately 10% of paid dance positions were year-long contracts.<sup>10 12</sup>

Since the time of these studies there have been further changes to the professional dance landscape in Australia, as the nature of dance employment and performance has continued to diversify.<sup>13 14</sup> Now there is a greater variety in dance styles performed professionally, a greater number of very small or temporary companies and increasing flexibility in funding options for individual freelance dance artists.<sup>15</sup> This increased diversity also relates to the environments dancers train, rehearse and perform in, which would potentially influence dance injury rates,<sup>1 16</sup> as well as the injury prevention and rehabilitation support available to part-time dancers compared with their full-time colleagues.

Despite their high numbers, freelance or part-time dancers are an understudied population and their experience of injury is not well understood. Additionally there have been no previous national Australian studies that incorporate freelance dancers.<sup>17 18</sup> Developing a better understanding of injuries in part-time dancers, in comparison to full-time dancers, will address this gap. Therefore, the aim of this study was to examine the occurrence and characteristics of musculoskeletal injury in full-time compared with part-time Australian professional dancers.

## METHODS

This study utilised data collected from Safe Dance IV,<sup>19</sup> a cross-sectional survey of professional dancers in Australia undertaken in 2016–2017.

### Questionnaire development, dissemination and variable definitions

The Safe Dance IV questionnaire was developed based on previous studies from 1989<sup>17</sup> to 1999,<sup>18</sup> the Fit to Dance 2 survey<sup>20</sup> from the UK, a literature review and advice from key stakeholders, including current and recently retired professional dancers, dance physiotherapists and peak bodies. The questionnaire included components on dancer demographics, early dance training and current dance working environments, occurrence of injury in the past 12 months, injury sites and types, possible contributing factors, injury management and healthcare access and return dance practices. The questionnaire predominantly contained closed questions with limited options, though there were some open-ended questions allowing for expansion or personal opinion to be documented.

The questionnaire was available in both electronic and hard copy format. It was distributed to all known large, medium and small dance companies within Australia, as well as via social media (Facebook and Twitter), dance advocacy and support groups and independent dance networks. Data were collected between February 2016 and February 2017 using REDCap electronic data capture tools.<sup>21</sup>

The study inclusion criteria were any professional dancer of any dance style working in Australia. A

professional dancer was defined as a person aged over 18 years, who was paid to work, rehearse or perform as a dancer in Australia for a combined period of 3 months or more over the past 12 months, and who personally identified primarily as a professional dancer. A dance-related injury was defined as a physical problem deriving from stress or other causes to do with performance, rehearsal, training, touring or other circumstances of dance life, which affects ability to participate fully in normal dance training, performance or physical activity.<sup>20</sup> A strain was an injury to a tendon or muscle and a sprain was defined as a stretch or tear to a ligament.<sup>22</sup> Full-time dancers were defined as those who were employed or contracted to work, rehearse or perform as a dancer for at least 48 weeks out of the past 12 months. Dancers meeting the overall study inclusion criteria but were employed for less than 48 weeks of the past 12 months were considered part-time dancers. When answering the injury-related parts of the questionnaire, dancers were instructed to focus on the one injury sustained in the past 12 months that was most significant to them.

### Statistical analysis

All data analysis was conducted in IBM SPSS Statistics for Windows (V.22). Statistical significance was set a priori  $p < 0.05$ .

$\chi^2$  or two-tailed Fisher's exact tests were used to test for statistical differences between dance employment status (full time or part time) and demographic characteristics, dance experience, injury characteristics and injury contributors. Independent t-tests were used to determine statistical differences between dance employment status and normally distributed continuous variables, including age, body mass index and years of dance employment. Mann-Whitney U tests were used to determine differences between dance employment status and continuous ordinal data that were not normally distributed, including number of dance hours, number of injuries sustained, number of days taken to seek clinical care and days to return to dance.

## RESULTS

A total of 146 surveys were included that met the professional dancer inclusion criteria and completed all relevant injury-related questions for this study objective. There were 57 part-time and 89 full-time dancers, [table 1](#) outlines the demographic, health and dance characteristics of the sample by dance employment status.

Part-time dancers were, on average, older and more likely to have more than one active role within the dance industry. This most often included choreography and dance administration/management in addition to dance performance. Other demographic, health and dance training characteristics did not differ between groups. Regarding their dance performance style, 76.4% of full-time dancers worked in ballet, 50.6% in contemporary and 18% other styles. The types of dance styles practised by part-time dancers were ballet (24.6%), contemporary

**Table 1** Demographic, health and dance employment characteristics of study participants

Characteristic	Part-time dancers (n=57)	Full-time dancers (n=89)	P values
Female (n (%))	42 (73.7)	52 (58.4)	0.06
Average age (mean (SD))	31 (10.7)	26 (5.5)	<0.01
BMI (mean (SD))	21.3 (2.8)	20.7 (2.6)	0.7
Hours sleep per night (mean (SD))	7.3 (1.2)	7.5 (0.9)	0.16
Non-smokers (n (%))	46 (80.7)	64 (71.9)	0.23
Consumes alcohol at least weekly (n (%))	29 (50.9)	46 (51.7)	0.92
Age started dancing (mean (SD))	7.1 (5.2)	6.5 (3.0)	0.44
Completed full-time dance training (n (%))	51 (89.5)	84 (94.4)	0.27
Years of dance employment (mean (SD))	9.9 (8.7)	7.5 (5.4)	0.07
Greater than one role of dance employment (n (%))	30 (53)	15 (17)	<0.01

BMI, body mass index.

(77.2%) and other styles (35.1%). Part-time dancers were employed for an average of 19 weeks (SD 10.6) in the last 12 months, and full-time dancers were all employed for 52 weeks.

Table 2 outlines typical dance and exercise participation during the study period. Part-time dancers generally spent less time in dance training than full-time dancers during non-performance weeks (13 hours vs 32.5 hours, =0.001). Full-time dancers also spend approximately

**Table 2** Dance participation in part-time and full-time dancers during study period

Dance training characteristic	Part-time dancers (n=57)	Full-time dancers (n=89)	P values
Typical weekly time spent in class and rehearsal (mean (SD)/median (IQR), hours)	17.4 (15.1)	26 (17.2)	0.001
Typical weekly time spent in supplemental exercise (mean (SD)/median (IQR), hours)	5 (5.2)	4 (4.3)	0.326
Typical weekly performance time (mean (SD)/median (IQR), hours)	3.5 (8)	3 (6)	0.171
Weeks spent performing per year (mean (SD)/median (IQR))	14.4 (14.6)	16.2 (14.3)	0.171
Weeks spent performing per year (mean (SD)/median (IQR))	8 (18.5)	16 (13.0)	0.171
Weeks spent performing per year (mean (SD)/median (IQR))	8.8 (8.9)	17.4 (9.5)	<0.001
Weeks spent performing per year (mean (SD)/median (IQR))	6.0 (7)	15 (10)	<0.001
Number of different productions per year (mean (SD)/median (IQR), hours)	4.5 (2.9)	7.5 (6.6)	<0.001
Number of different productions per year (mean (SD)/median (IQR), hours)	4 (3)	7 (3)	<0.001
Weeks spent touring per year (mean (SD)/median (IQR), hours)	3.7 (6)	6.8 (7.5)	<0.001
Weeks spent touring per year (mean (SD)/median (IQR), hours)	1 (4)	4 (5)	<0.001

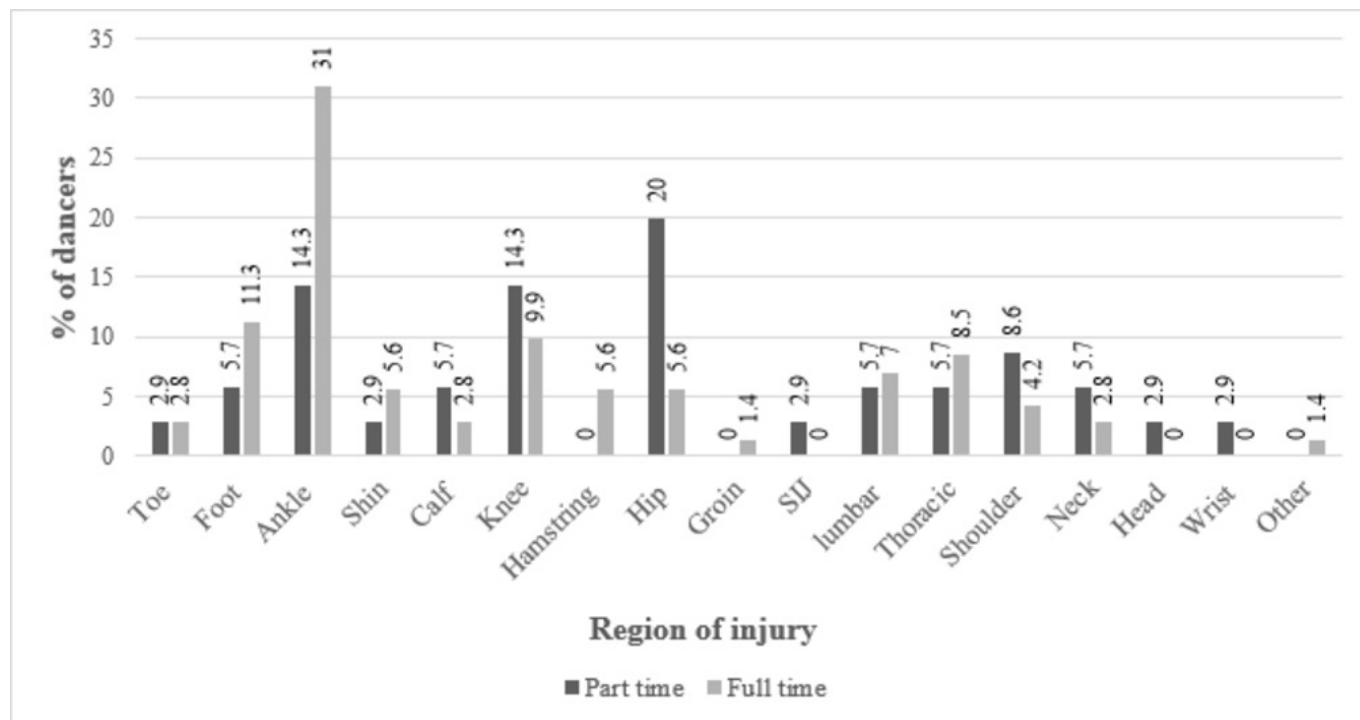
**Table 3** Type of most significant dance-related injury of the past 12 months in full-time and part-time dancers

Injury type or site	Per cent injured part-time dancers (n=36)	Per cent injured full-time dancers (n=71)
Chronic inflammation	22.9	17.1
Sprain	20	27.1
Strain	17.1	18.6
Fracture (chronic and stress)	14.3	10
Pinched nerve and/or disc issue	8.6	10
Dislocation	5.7	2.9
Other	11.4	14.3

twice as many weeks per year performing and perform in a greater number of different productions per year. Both full-time and part-time dancers regularly participated in supplemental exercise, most commonly Pilates, swimming, cycling and gym work.

A total of 107 (73%) dancers sustained at least one dance-related injury in the past 12 months. More full-time dancers were injured than part-time dancers (79.8% vs 63.2%,  $p=0.035$ ). The types and sites of each dancers' most significant injury of the past 12 months are summarised in table 3 and figure 1. Chronic inflammation was the most common injury type in part-time dancers (22.9% of all injuries), followed by sprain (20%) and strain (17.1%). In full-time dancers a sprain was the most common (20%) followed by strain (18.6%) and chronic inflammation (17.1%). The most common injury site in part-time dancers was the hip (20% of all injuries) followed by the ankle and knee (14.3% each), and shoulder (8.6%). In full-time dancers the most common injury site was the ankle (31% of all injuries), followed by the foot (11.3%), the knee (9.9%) and the thoracic spine (8.5%).

Over half (55.6%) of part-time and 58.6% of full-time dancers reported that this was a new injury for them. Just over a quarter (27.8%) of injuries in part-time dancers were traumatic injuries and 55.6% were overuse. A similar pattern was observed in full-time dancers with 28.2% of injuries being traumatic and 59.2% overuse. Fatigue was the most cited contributing factor for injury identified by both part-time (52.8%) and full-time dancers (43.7%). There was a higher prevalence of full-time dancers accessing employer-provided health services for injury management compared with part-time dancers (83.1% vs 36.1%,  $p<0.001$ ). Full-time dancers were also more likely to visit practitioners specialised in dance (74.6% vs 50%,  $p=0.001$ ). Part-time dancers took longer to see a clinician postinjury (median of 2 days,  $IQR=13$ ) than full-time dancers (median of 1 day,  $IQR=4$ ) ( $p=0.016$ ). More part-time dancers were required to pay for treatment of their injury (63.9% vs 23.9%,  $p=0.005$ ), whereas more full-time dancers had their treatment costs covered by their employer or workers' compensation (88.7% vs 36.1%,  $p<0.001$ ).



**Figure 1** Region of most significant dance related injury in the past 12 months in full-time and part-time dancers.

There was a higher prevalence of full-time dancers unable to dance in any capacity following their injury (21.4% vs 5.7%,  $p=0.014$ ). No dancer experienced an injury that they considered career ending in the past 12 months. A total of 15 dancers (14.0%) reported that they did not expect their injury to completely resolve, but they all reported that they had modified their dance participation in order to continue professional dance.

All data for analysed injury characteristics, contributors and implications are summarised in online supplementary appendix table 1.

## DISCUSSION

### Injury occurrence and characteristics

A total of 73% of all dancers included in this study reported experiencing a significant dance-related injury in the past 12 months, indicating a high period prevalence of injuries in both types of professional dancers in Australia. This finding aligns with previous research using similar methodology in company-based professional dancers from a range of styles including ballet,<sup>23 24</sup> modern,<sup>23</sup> musical theatre<sup>25</sup> and Irish dance<sup>26</sup> and studies combining company-based and freelance modern dancers.<sup>27</sup> These injury period prevalence findings are also similar to other national dance injury investigations from the UK.<sup>20</sup>

Part-time Australian dancers in this study were employed for an average of 19 weeks over the past 12 months. However 63.2% of them reported experiencing a dance-related injury over this time, compared with 79.8% of full-time dancers, suggesting that many injuries may not be due to a high dance load,<sup>28</sup> and thus may be preventable with appropriate training and dance-knowledgeable

healthcare personnel. There is growing evidence in sport that undertraining may increase injury risk,<sup>28–30</sup> and this is a substantial consideration for part-time dancers who have unpredictable and variable dance employment contracts. Another aspect to this may be fatigue, as despite significantly different workloads, fatigue was the most commonly cited contributing factor to injury by both groups of dancers. Full-time dancers reported an intense dance training, performance and touring load, which could result in fatigue or overtraining syndrome if these were not offset by adequate rest periods.<sup>5</sup> On the other hand, part-time dancers commonly reported multiple roles within the dance industry, and therefore a need to juggle multiple jobs. Other Australian-based research has also found that the lack of financial and job security in the sector requires artists to maintain other forms of employment.<sup>31</sup> The ad hoc nature of part-time work also makes periodisation difficult.<sup>32</sup> Finally, other research has proposed that athletes and dancers may experience injuries due to psychological factors as well as physical causes.<sup>33 34</sup> This includes stress and a lack of social support,<sup>35</sup> coping skills<sup>34</sup> and other occupational stressors such as low work control,<sup>36</sup> which may all be relevant issues for professional dancers. Further research is required to better understand the epidemiology of injury in freelance dance artists, however it is essential that future research and interventions also consider these non-physical contributors to injury.

The ankle and the knee were among the three most commonly injured regions in both part-time and full-time dancers, consistently with other literature on dance injuries.<sup>16</sup> However, differences were observed in prevalence of hip injuries, which represented the greatest proportion of significant injuries in part-time dancers (20%) but



only 5.6% of injuries in full-time dancers, despite ballet being their most common dance style. This finding could be explained by the successful implementation of a hip strength and stability programme by major Australian dance companies, which has resulted in a reduction in time loss injuries and workers' compensation claims relating to hip pain.<sup>37</sup> It is most likely that other differences in region of injury observed in this study are explained by dance genre, for example, the higher proportions of shoulder injuries in part-time dancers who most commonly practise contemporary dance and ankle injuries in full-time dancers who commonly practise ballet.

### Treatment and management of dance-related injuries

Early diagnosis through prompt and quality healthcare is essential for injury recovery.<sup>36</sup> However, this can come at a price and more part-time dancers were required to pay for their own injury treatment compared with full-time dancers (63.9% compared with 23.9%,  $p=0.005$ ). Yet despite this cost and inconvenience healthcare appears to be prioritised, as it only took approximately 1 day longer for injured part-time dancers to see a clinician (2 days compared with 1 day). On the other hand, there was still a large range in time taken for all part-time dancers to see someone for their injury (1–60 days, IQR=13) and previous research has highlighted some psychological and practical barriers to seeking care for dance-related injuries.<sup>38 39</sup> Therefore, an in-depth qualitative rather than quantitative approach may be best placed to further investigate why it took so long for some dancers to seek care, and to ensure that future clinical services are accessible for all Australian dancers.

A greater proportion of injured full-time dancers in this study were unable to dance in any capacity following their injury, 21.4% compared with 5.7% of part timers ( $p=0.014$ ). This could be explained by a variety of factors, besides the theory that injuries sustained by full-time dancers are more severe, and thus require full rest from dancing. Clinicians accessed by part-time dancers were less likely to be specialised in dance or associated with dance employment, therefore part timers may be dancing on injuries where dance-specialised clinicians would have provided more tailored advice not to. On the other hand, there are more practical barriers for the part-time dancer to stop dancing, such as being unable to audition for a follow-up job, not having access to paid sick leave and smaller companies not resourcing multiple casts or understudies. Therefore, a complete rest from dance may result in shuffling of other dancers' roles or cancelled performances, which an injured dancer may be reluctant to impose.<sup>40</sup>

### Study strengths and limitations

This is the first national study in Australia to incorporate freelance dancers, which is a growing and understudied group. It is also the first known study to compare injuries in part-time dancers with full-time dancers, and presents a first step towards understanding the injury experience

of a broader scope of professional dance practise. There are also limitations, including the retrospective, self-report study design. However previous research in professional athletes found an adequate level of accuracy of retrospective self-report for the number, site and type of sports injuries sustained in the preceding 12 months.<sup>41</sup> Due to this decision to focus on a significant injury of the past 12 months, data on previous injuries and/or employment conditions were not incorporated into this study. All possible attempts were made to distribute this questionnaire as widely as possible, however it may not be a representative sample of Australian dancers. It is likely that the most independent and/or disconnected members of the dance community did not participate in this project. Additionally, there were small numbers of injured dancers, particularly part-time dancers. Therefore some injury characteristics, even when statistically non-significant, may be real with a large enough sample size to detect them. This sample size also precluded additional sub-analysis by gender or dance style, both of which influence injury rates and characteristics. Finally, although researchers attempted to collect detailed dance exposure data, the recorded responses were not complete, and therefore we were unable to report injury rates in the best practice format of injuries per 1000 dance exposure hours.<sup>42 43</sup> Dancers were asked a series of questions regarding their number of hours spent in class, rehearsal and performance during a performance and non-performance weeks, however these questions were not always fully completed. In particular a typical week of dance activity was difficult for part-time and freelance dancers to report on, and this needs to be considered in the design of future studies in this group for the standardisation of reporting dance injury epidemiology research.

### Clinical implications

In order to prevent and manage injuries in professional dance, it is vital for clinicians to understand the dance specific stressors that lead to different injuries.<sup>8</sup> Part-time dancers often access general community clinicians, who may need additional education and support to practically advise on appropriate modification and/or return to dance, while also balancing the psychosocial implications of injury and practical demands of maintaining and thriving in a dance career. Other countries have established specialised clinics, such as the London NHS Dance Injury Clinic in the UK,<sup>44</sup> specifically designed for part-time and freelance dancers. This study provides evidence that such a service would meet a need in Australia and potential funding models should be further investigated.

### CONCLUSIONS

This study demonstrates that injuries commonly occur in professional dance without necessarily a large volume of dance activity, and that part-time dancers may be susceptible to injuries due to undertraining or fatigue from maintaining multiple careers. Clinicians working with dancers should be aware not only of their unique

technique and load requirements, but also how these can be realistically accommodated when preventing or rehabilitating from injuries.

**Acknowledgements** We wish to acknowledge Australian Dance Council-Ausdance Inc for their support for this study and assistance with data collection.

**Contributors** AJV designed the study, collected the data, analysed and interpreted the data, drafted the manuscript and approved the final article. EP and ES provided advice throughout the study design and data collection, critically revised the manuscript drafts and approved the final article. CH conceived the study, provided advice throughout the study design and data collection, critically revised the manuscript drafts and approved the final article.

**Funding** This research did not receive any specific grant from funding agencies in the public, commercial or not-for-profit sectors. However, AJV is supported by an Australian Government Research Training Program stipend. ES is funded by the National Health and Medical Research Council through a Senior Research Fellowship.

**Competing interests** None declared.

**Patient consent** Not required.

**Ethics approval** Ethics committee approval was granted from the University of Sydney Human Research Ethics Committee.

**Provenance and peer review** Not commissioned; externally peer reviewed.

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