



Original research

# The Australian high performance and sport science workforce: A national profile



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## ABSTRACT

**Objectives:** The purpose of this study was to provide a profile of the demographics and employment characteristics of the Australian high performance and sport science workforce.

**Design:** This study used a cross-sectional, quantitative survey methodology to collect data about the Australian high performance and sport science workforce.

**Method:** 175 Australian high performance and sport science employees completed an online survey which captured demographic information and work-related characteristics such as role, industry sector, income, permanence of employment and hours worked. Descriptive statistics were used to summarise information and some comparisons were made between position titles, industry sectors and sexes.

**Results:** The Australian high performance and sport science workforce is predominantly male (76.0%),  $\leq 35$  years of age (50.3%), located on the eastern seaboard of Australia (69%) and have been in their current position for 2–5 years (37.4%). They are mostly employed on a fixed term contract of 2.4 years, by an institute of sport. Income varied, with those working in professional sporting clubs and/or employed as high performance managers earning the highest wage. On average, participants worked well over their contracted hours, with a considerable proportion of these hours outside the standard 9–5 working week.

**Conclusions:** Employees in the high performance and sport science workforce in Australia face significant professional issues that relate to long and unusual work hours, job insecurity and income disparity. Policy makers and the managers of this workforce should consider the impact of these issues on work-life balance, staff retention rates and the risk of burnout.

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## 1. Introduction

High performance sport is predominantly focused on improving athletic performance, thus winning. It is characterised by practitioners consistently seeking ways to achieve higher performance, over a sustained period, relative to other sport organisations.<sup>1</sup> Effective governance and management of high performance sport is now considered to provide a competitive advantage.<sup>2,3</sup> High performance managers and the sport scientists they work with, seek to assist athletes in attaining sustained peak performance. Australia has provided leadership in the field of sport science for several decades, with Australian sport scientists distributed amongst the profession around the world.<sup>4</sup> However, the profession is relatively young and there is no widely accepted definition of the role of a sport scientist or a high performance manager. In moving

towards an agreed definition of both roles, a greater understanding is required of the characteristics and employment practices of the workforce.

The role of a high performance manager (those who manage sports scientists and high performance programmes), is closely related to the role of a sport scientist, however the role has only evolved more recently. Although there is recognition that those in management roles may play a significant role in athlete performance,<sup>5</sup> there is scant published information about high performance management and the scope of practice of high performance managers. In broad terms, a high performance manager might drive organisational change to establish and sustain winning performances, monitor trends and improvements,<sup>1</sup> and manage the increasing number of stakeholders involved in high performance sport.<sup>5,6</sup> In practice, the precise role of high performance managers is as ill-defined as those of a sport scientist.

Sport science is a multidisciplinary field and consequently, professional sport scientists probably inhabit a diverse range of roles, such as a strength and conditioning coach or a performance analyst.

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The Australian Bureau of Statistics (ABS) classifies sport scientists in the category of “Natural and Physical Science Professionals Not Elsewhere Classified” along with exercise physiologists, ceramic scientists, mineral processing engineers, and polymer scientists.<sup>7</sup> The ABS (2006) provides no definition of a sport scientist, rather, an indicative skill level is given that equates to a bachelor or higher qualification, with possible requirements for registration or licensing. Exercise and Sports Science Australia (ESSA), the current governing body of accredited sport scientists in Australia, defines a sport scientist as “3 or 4 year university trained exercise and sport science/human movement studies graduates [that] specialise in helping an individual athlete or team to improve their sporting performance through the use of scientific knowledge, methods and applications in the area of physiology, biomechanics, psychology, motor control and motor development”.<sup>8</sup>

In 2013, a high profile Australian legal case regarding the professional ethics of a biochemist, who was referred to in the media as a ‘sport scientist’, focused public attention on the sport science profession.<sup>9,10</sup> Consequently, an Australian government Senate enquiry was established to review the practices of the Australian sport science profession.<sup>11</sup> The findings of the enquiry highlighted the lack of clarity in defining ‘sport science’ and the scope of practice of sport scientists.<sup>11</sup> In addition, the enquiry concluded that there was an insufficient level of engagement between the profession and ESSA and under-regulation and development of the profession.

If existing employers and governing bodies are to adequately support and effectively regulate this profession, a thorough understanding of the high performance and sport science workforce is required. Although a number of workforce studies have been conducted in Australia in the allied health professions,<sup>12,13</sup> some of which may be considered sub-disciplines of sport science (e.g. sport and exercise psychology),<sup>14</sup> as well as in sports coaching,<sup>15</sup> there has yet to be a large-scale investigation in Australia, or internationally, of the high performance and sport science workforce. Exploratory research investigating the policy and management of Australian coach career development,<sup>16</sup> the career experiences of Australian sport scientists<sup>17</sup> and strength and conditioning coaches<sup>18</sup> has shed some light on components of the sport workforce in Australia. These studies have identified poor management practices and a lack of organised career development policy, highlighting that more needs to be done to better support the employment and career development of those who work in the sport industry. In addition, an understanding of the demographics of the workforce may assist in the development of industry plans and policies that are designed to assist and regulate sport scientists and high performance managers.

Therefore, the purpose of the present study was to report on the Australian high performance and sport science workforce. Specifically, to identify the demographics of the profession, the roles and industry sectors in which they work and their employment conditions. Additionally, comparisons were made in order to determine whether there were differences between position titles, industry sectors and sexes.

## 2. Methods

This survey was commissioned and funded by ESSA. Neither ESSA nor any representative of ESSA had any involvement in data collection, analysis and interpretation nor the preparation or approval of this manuscript. Ethical approval for this study was obtained from the University, Faculty of Health, Human Ethics Advisory Group (HEAG-H 95.2013). Data was collected via an online survey, using Qualtrics survey software (Qualtrics Labs, Inc., Provo, USA). Development of a comprehensive survey was undertaken by

the research team, with numerous survey items adapted from other Australian workforce surveys.<sup>15,19,20</sup>

Pilot testing of the survey revealed good face validity, with no issues with survey question comprehension, time taken to complete the survey, or the online delivery method. Based on feedback from pilot testing, five survey questions were added (number of positions held, additional hours worked, collaboration and formal qualifications) with the final survey containing 74 items. This paper reports on results of one section of this survey that assessed the demographics and employment characteristics of the profession.

A multi-strategy recruitment approach was utilised to capture as much of the workforce as possible, including those working outside large sport organisations. Information about the survey was disseminated to members of sport organisations and associations via email address lists, recruitment messages via relevant websites, social media, and online newsletters; and distribution of information to personal contacts of the research team.<sup>21</sup> Recruited participants were also encouraged to forward information about the survey onto colleagues and associates that were eligible to participate. These multi-pronged approaches are effective ways to recruit participants for web-based surveys.<sup>21</sup>

The survey participants were Australian high performance and sport science employees, aged 18 years or older. At the time of data collection the Australian sport science population was estimated to be between 400 and 500.<sup>22</sup> There were no existing estimates for the number of high performance managers in Australia, but a realistic estimate was 100.<sup>22</sup>

Data collection was completed over a three-month period between August and November 2013. Results are presented as frequencies (%). All data are presented using descriptive statistics and some comparisons were made between position titles, industry sectors and sexes, using Chi square test and effect size is reported as the Phi coefficient. Significance was accepted at  $p < 0.05$ . All analyses were performed using SPSS 21.0 (IBM Corp., Armonk NY).

## 3. Results

A total of 175 high performance and sport science participants completed the survey. Based on the estimated workforce ( $n = 450$ ) at the time of data collection, the estimated response rate was 39%. The participant group consisted of 133 males (76%) and 42 females (24%, [Table 1](#)). About half (50.3%) of participants were  $\leq 35$  years of age, with only a small proportion of participants over the age of 55 years ( $n = 12$ ; 6.9%). The age of high performance managers was higher than for those in sport science roles (Phi coefficient = 0.266,  $p = 0.003$ ). The majority of participants were from the eastern seaboard of Australia (Queensland, New South Wales and Victoria), together accounting for 67.2% ( $n = 87$ ) of participants in the sample. There was also sizeable representation from the Australian Capital Territory ( $n = 26$ ; 14.9%), which reflects the large number of sport scientists working at the Australian Institute of Sport. Of the total number of participants, 5 reported that they were of Aboriginal or Torres Strait Islander descent (2.8%), which is consistent with the larger Australian population.<sup>23</sup>

The most common sport science position titles were “strength & conditioning coach” (20.6%), “sport scientist” (20.0%) and “sport physiologist” (13.7%). High performance managers alone comprised 17.7% of the total number of participants. There was a large range of income levels amongst participants, with over half earning between \$50,000 and \$99,999 per annum ( $n = 60$ ; 52.2%, [Table 1](#)). Males earned more than females (Phi coefficient = 0.259,  $p = 0.038$ ) and high performance managers earned more (Phi coefficient = 0.396,  $p < 0.001$ ) than those in sport science roles. Of those participants who were working for an hourly or casual rate ( $n = 17$ ; 11.9%), most participants earned between \$20 and \$59 per hour

**Table 1**

The demographics and employment characteristics of the high-performance and sport science profession by position title. The results are from a self-report survey and represent proportions (%) of the total number of respondents working in each position title.

Characteristics	Strength and conditioning coach (n = 36)	Sport scientist (n = 35)	High-performance manager (n = 31)	Sport physiologist (n = 24)	Academic sport science (n = 23)	Sport biomechanist (n = 16)	Performance analyst (n = 6)	Skill acquisition specialist (n = 4)	All positions (n = 175)
Gender (%)									
Male	91.7	62.9	80.6	79.2	82.6	62.5	50.0	50.0	76.0
Female	8.3	37.1	19.4	20.8	17.4	37.5	50.0	50.0	24.0
Age group (%)									
≤35 years	69.4	48.6	16.1	54.2	47.8	56.3	100.0	50.0	50.3
36–55	27.8	48.6	77.4	37.5	39.1	31.2	–	25.0	42.9
≥56 years	2.8	2.8	6.5	8.3	13.1	12.5	–	25.0	6.8
Employment status (% n = 167) <sup>a</sup>									
Ongoing/permanent	47.1	31.3	36.7	26.1	63.6	43.8	50.0	25.0	40.7
Fixed-term/contract	38.2	56.2	53.3	43.5	36.4	50.0	50.0	50.0	46.7
Self-employed	14.7	12.5	10.0	30.4	–	6.2	–	25.0	12.6
Income (% n = 138)									
≤\$49,999	13.8	3.6	4.2	–	11.8	14.3	16.7	–	8.0
\$50,000–\$99,999	41.4	53.6	20.8	53.0	41.2	50.0	66.6	33.3	43.5
\$100,000–\$149,999	17.2	17.8	41.7	23.5	11.8	21.4	–	–	21.0
≥\$150,000	–	–	33.3	–	17.6	–	–	–	8.0
No response given	27.6	25.0	–	23.5	17.6	14.3	16.7	66.7	19.6
Total (%)	20.6	20.0	17.7	13.7	13.1	9.1	3.4	2.3	100

<sup>a</sup> A small number of participants (n = 3) indicated there was no formal arrangement or contract with their employer.

(n = 10; 58.8%), with the rate ranging from \$20 to over \$120 per hour.

Institutes of sport and professional sporting clubs employed 60% of the total number of survey participants (Table 2). The remaining 40% were distributed between universities, sporting associations, private consultants and non-professional sporting clubs. Professional sporting clubs had the widest income range, with the second highest proportion of employees earning less than \$50,000 (16.1%) and the highest proportion earning more than \$150,000 (25.8%). Mean income was lowest for those employed by non-professional sporting clubs (\$36,717) and highest for those employed by professional sporting clubs (\$94,598). Collectively, the universities, sporting associations and non-professional sport clubs offered above average (>40% of positions) proportions of permanent employment. In contrast, the professional sporting clubs and institutes offered the highest proportion of fixed term employment contracts.

The most frequently reported duration that a participant was employed in their current position was 2–5 years (37.4%, Table 3) and this was not different between high performance managers and those in sport science roles (Phi coefficient = 0.074, p = 0.789). Participants were predominantly employed either on a contract/fixed-term (n = 73; 41.7%) or in an ongoing/permanent position (n = 68; 38.9%). The mean contract length for participants employed on a fixed-term contract was 2.4 years (range ≤6 months–10 years). For those who were employed on a fixed term contract, the median duration of these contracts was 2.5 years (Table 3). The median number of hours that participants were contracted to work in their main job was 38 per week. Participants typically worked 10 h more per week than their contracted hours and spent over half of their typical week (58.6%) working during the standard hours of 9–5pm on week days. The remaining hours were spent working in the early mornings or late evenings (25.2%), and weekends (16.2%).

#### 4. Discussion

Despite the fundamental role that high performance managers and sport scientists play in high performance sport, there is no widely accepted definition of either role. The purpose of this study was to determine the demographics of the Australian high

performance and sport science workforce and to determine fundamentally important characteristics regarding the nature of their employment. Key findings that emerged from this study were a workforce that was typically male, half were under 35 years of age, they were employed on a fixed-term contract by an academy and/or institute of sport, with highly variable incomes and workloads well above contracted hours.

The complexity of the various roles of this workforce presents many challenges particularly when defining the profession and classifying the knowledge, skills and competencies required for employment in the profession. Our results illustrate the range of demographic and employment characteristics amongst high performance managers and the variety of sport science roles, such as strength and conditioning coaches and performance analysts. Adding further complexity was the diversity of industry sectors, which presents a challenge for policy makers regarding plans for industry regulation. While there is much in common amongst the profession, there are also differences in roles and employment characteristics.

The results of this survey indicate that there may be systemic problems with the typical employment conditions found in the profession. Females are underrepresented in the high performance management and sport science workforce, which is similar to the Australian coaching workforce<sup>15</sup> reflecting the current climate for employment in the sports industry.<sup>24</sup> A recent qualitative study by York et al.<sup>17</sup> on the career experiences of Australian sport scientists revealed that the working hours for female employees was not considered ‘family friendly’, due to insufficient flexibility within the workplace to manage work/life balance. The results of the present survey indicate that a large amount of work outside of contracted hours, which supports the conclusions of York et al.,<sup>17</sup> that employment conditions are not “family friendly”. Human resource (HR) practices and limited resources for HR managers in sport organisations<sup>25</sup> may assist in retaining women within the sport science field. Practices associated with equity-HRM and perceived organisational support (such as employee accomplishments and appreciation of employee effort) have been found to influence women’s intentions to stay at a sport organisation.<sup>26</sup>

The majority of the profession inhabit sport science roles and they tend to be younger than those in high performance management roles, which is understandable given the requirements for

**Table 2**  
The demographics and employment characteristics of the high-performance and sport science profession by industry sector. The results are from a self-report survey and represent proportions (%) of the total number of respondents working in each industry sector. Note that the totals in the right hand column do not exactly match those in Table 1, because not all respondents indicated which industry sector they worked in.

Characteristics	Institute or academy of sport (n = 64)	Professional sporting club (n = 37)	University/ research institution (n = 25)	Sport association/ organisation (n = 18)	Private consultation (n = 11)	Non-professional sporting club (n = 9)	Total industry sector (n = 175)
Gender (% n = 164)							
Male	62.5	83.8	92.0	77.8	100.0	55.6	75.6
Female	37.5	16.2	8.0	22.2	–	44.4	24.4
Age group (% n = 164)							
≤35 years	59.4	43.2	48.0	27.8	54.5	66.7	50.6
36–55	35.9	51.4	44.0	55.5	45.5	33.3	43.3
≥56 years	4.7	5.4	8.0	16.7	–	–	6.1
Employment status (% n = 156) <sup>a</sup>							
Ongoing/permanent	39.1	20.0	58.3	47.1	10.0	50.0	37.2
Fixed-term/contract	57.8	68.6	33.3	35.3	–	33.3	49.4
Self-employed	3.1	11.4	8.4	17.6	90.0	16.7	13.5
Income (% n = 134)							
≤\$49,999	3.4	16.1	8.7	14.3	–	40.0	9.7
\$50,000–\$99,999	56.9	16.1	34.8	50.0	33.3	20.0	41.0
\$100,000–\$149,999	24.1	19.4	26.1	28.6	66.7	20.0	24.6
≥\$150,000	–	25.8	13.0	–	–	–	8.2
No response given	–	22.6	17.4	7.1	–	20.0	16.4
Total (%)	38.1	22.0	14.9	10.7	6.5	5.4	100.0

<sup>a</sup> A small number of participants (n = 3) indicated there was no formal arrangement or contract with their employer.

**Table 3**  
Employment characteristics by position title and industry sector. The results are from a self-report survey and represent proportions (%) in the ranges listed.

	Employed in current position (years)				Contract length of current position (years)				Hours contracted to work per week (hours)				Difference between contracted and actual time worked (hours)			
	≤1	2–5	6–10	≥11	≤1	2	3	≥4	≤10	11–30	31–40	≥40	≤5	6–10	11–20	>20
<b>Position Title</b>																
Strength and conditioning coach	33.3%	44.4%	13.9%	8.3%	38.5%	38.5%	7.7%	15.4%	14.3%	17.9%	60.7%	7.1%	33.3%	29.6%	25.9%	11.1%
Sport scientist	23.5%	35.3%	26.5%	14.7%	23.5%	17.6%	17.6%	41.2%	16.7%	10.0%	66.7%	6.7%	35.7%	21.4%	25.0%	17.9%
High-performance manager	27.6%	41.4%	20.7%	10.3%	12.5%	18.8%	62.5%	6.3%	3.8%	–	73.1%	23.1%	11.5%	15.4%	46.2%	26.9%
Sports physiologist	17.4%	39.1%	21.7%	21.7%	44.4%	11.1%	–	44.4%	15.8%	10.5%	73.7%	–	30.0%	15.0%	25.0%	30.0%
Academic sport science	15.0%	45.0%	25.0%	15.0%	20.0%	20.0%	60.0%	–	–	–	100%	–	0.0%	27.8%	44.4%	27.8%
Sports biomechanist	33.3%	26.7%	13.3%	26.7%	62.5%	37.5%	–	–	7.1%	–	92.9%	–	35.7%	28.6%	14.3%	21.4%
Performance analyst	16.7%	50.0%	16.7%	16.7%	66.7%	0.0%	33.3%	–	–	20.0%	80.0%	–	–	100%	–	–
Skill acquisition specialist	25.0%	50.0%	–	25.0%	50.0%	50.0%	–	–	–	33.3%	66.7%	–	–	66.7%	33.3%	–
<b>Industry sector</b>																
Institute or academy of sport	23.9%	25.4%	26.8%	23.9%	28.2%	20.5%	7.7%	43.6%	3.1%	4.7%	84.4%	7.8%	30.6%	32.3%	22.6%	14.5%
Professional sporting club	25.0%	52.5%	17.5%	5.0%	42.3%	26.9%	30.8%	0.0%	20.0%	11.4%	51.4%	17.1%	17.1%	25.7%	37.1%	20.0%
University/research institution	23.1%	46.2%	15.4%	15.4%	28.6%	14.3%	57.1%	0.0%	9.5%	0.0%	90.5%	0.0%	4.8%	23.8%	47.6%	23.8%
Sport association/organisation	39.1%	21.7%	21.7%	17.4%	22.2%	22.2%	44.4%	11.1%	5.0%	10.0%	75.0%	10.0%	26.3%	21.1%	31.6%	21.1%
Private consultation <sup>a</sup>	21.4%	64.3%	0.0%	14.3%	–	–	100%	–	22.2%	33.3%	44.4%	–	10.0%	20.0%	40.0%	30.0%
Non-professional sporting club <sup>a</sup>	33.3%	33.3%	22.2%	11.1%	–	100%	–	–	33.3%	–	50.0%	16.7%	40.0%	40.0%	20.0%	–

<sup>a</sup> A small number of participants (n = 3) indicated there was no formal arrangement or contract with their employer.

management expertise and experience.<sup>5,22</sup> Nevertheless, longevity in the profession appears to be poor based on the relatively low average age of the survey participants and the low number of years in their current position. Less than 7% of the profession are 56 years of age or older, which is considerably lower than allied health professions such as physiotherapy.<sup>13</sup> It is possible that the small proportion of older workers in the profession is in part due to the newness of the profession and its small size. However, it may also be due to the employment conditions that are typical of the profession.

The present survey found that a high amount of work over and above contracted hours is common and this should be a major concern for sport organisations where employee burnout and high turnover<sup>27</sup> can have a significant impact on overall organisation performance. In addition, overall job security appeared to be low, when considering that only four in ten positions in the profession are permanent positions. High performance managers and sport scientists employed in professional sporting clubs appear to be particularly vulnerable to low job security. This is in direct contrast to academic sport scientists and allied health professions such as psy-

chology and nursing were only a small percentage are employed on a fixed-term contract or casual basis.<sup>14,28</sup> It may be difficult to make significant improvements in the proportion of permanent positions available to the workforce, due to the uncertain nature of funding in elite sport and the unpredictable nature of the recruitment process in professional sporting clubs.<sup>29</sup> Nevertheless, a high rate of turnover presents a risk for the profession overall and for individual sporting organisations. A loss of highly skilled professionals with deep domain knowledge and long-term experience disadvantages sporting organisations that operate in competitive environments. Furthermore, the loss of these workers from the field would reduce the capacity of the entire profession to fulfil its primary objective of enhancing the performance of elite athletes.

Poor job security may be further compounded by the varied salary ranges of the workforce, with participants employed within institutes or academies of sport particularly disadvantaged compared to their professional sport counterparts. The Australian high performance and sport science industry has never been comprehensively regulated by government stipulated award rates and

conditions, although institute-based employers use state or federal government award categories depending on their funding source. Nevertheless, much of the workforce are simply offered pay rates determined independently by their employer based on available funding, organisational resources and perceptions of value.

The main limitation of this study was the inability to precisely quantify the size of the Australian high performance and sport science workforce. Nevertheless, based on our best estimate of the Australian ( $n=450$ ) workforce we have confidence that our sample is sufficiently representative to generalise findings about the important characteristics and issues to the entire workforce. Furthermore, although a multi-strategy approach was undertaken for recruitment of participants, members of the workforce may not have been aware of the survey, with the use of a web-based survey potentially prohibiting access. Other limitations include the inclusion of unvalidated items in the survey and the survey data only representing one point in time. The main strength of this study is that it is the first study in Australia (and possibly worldwide) to attempt to characterise the high performance and sport science workforce. This has provided the current governing body with valuable information on the workforce which was difficult to discern otherwise given the lack of regulation and accreditation of the workforce, particularly high performance managers.

## 5. Conclusions

The results of this study represent the first large-scale survey of the demographics and employment characteristics of the high performance and sport science profession in Australia. Our findings raise a number of issues regarding the underrepresentation of females, poor job security and the relatively high working hours. Of additional concern is the disparity of income between industry sectors. These issues need to be addressed to ensure the long-term success of the profession and the welfare of the workforce itself. The relevant professional representative organisation has an opportunity to consult with the profession and work with employers to achieve more consistent and attractive employment conditions. Further investigations should examine the practice, training and professional development of the Australian high performance and sport science workforce, to provide a more comprehensive picture of the workforce for ongoing development and future planning of the profession.

## Practical implications

The policy makers and managers responsible for the development of the Australian high performance and sport science workforce face several challenges to ensure the profession matures and remains attractive as a career:

- There is an underrepresentation of women in the profession, which may be due to employment conditions that are not family friendly. Employers should review their HR policies and explore opportunities to attract and retain more female employees.
- The income of the profession is highly varied, especially between professional and non-professional sporting clubs. The disparity may contribute to elevated turnover rates and employers should consider adopting an existing state or federal award for income and employment conditions.
- High amounts of work above contracted hours probably contribute to stress and burnout and the low proportion of permanent positions are probably negatively affecting retention rates in organisations and the entire profession. Employers should evaluate this issues in their own organisations and identify

strategies to reduce long working hours and improve retention rates.

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