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Describing pre-professional identity in higher education: A case study of exercise science students

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Describing pre-professional identity in higher education: A case study of exercise science students

Abstract

Pre-professional identity (PPI) is an understanding of the skills, qualities, conduct, culture and ideology of a students' intended profession. Understanding PPI is valuable for students and higher-education providers to provide insight into motivation for- and to promote engagement in- learning. Describing PPI is challenging, particularly for evolving health professions. This paper describes a process undertaken to understand PPI, using exercise science (ES), a new and evolving health profession, as a case study. Mixed methods were used to describe three aspects of PPI: 1) student cohort characteristics; 2) personal factors influencing PPI; and 3) perceived career direction. Final year ES students participated in an online survey and a focus group (n=305; 59% male; 75% age range of 20-24 years). Factors contributing to the development of PPI included the desire to help others; interest and experience in sports/exercise. Students had the strongest understanding of the PI domains of affiliation, money and structure and limited understanding of the role of scientist and researcher. Two outcomes were derived from the study findings to advance the theoretical understanding of PPI: 1) a 3-item framework that describes factors specific to students' PPI; and 2) a worked case study demonstrating how this framework was applied to gain a nuanced understanding of PPI in ES. Our framework can be applied to increase student and higher education providers understanding of PPI and the motivations underpinning student decision-making in higher education.

Practitioner Notes

1. Understanding the factors that influence the development of pre-professional identity is important for student success, retention and employment outcomes. Higher education providers benefit from understanding the relationship between motivation and engagement in learning and confidence, academic achievement and attrition. These factors have increase prominence in emerging professions due to the evolving nature of the professional and variability in employment outcomes.
2. Three factors are perceived to influence pre-professional identity: 1) characteristics of the student cohort specifically previous paid or voluntary work experience in their field of interest; 2) personal factors including intrinsic values (personal attributes, ambitions and motivations) and extrinsic motivators (perception of the role of the profession and social and family influence); and 3) perceived career direction relating to earning potential of the profession, hours and routine, governing guidelines and career pathways.
3. Investigation of the above factors can allow for the development of a model of pre-professional identity that promotes familiarity, proximity and confidence relating to a students targeted employment area.

Keywords

Pre-professional identity; scientist; practitioner; researcher; exercise science

Introduction

Professional identity relates to how an individual defines themselves in their current professional life, comprising interpersonal factors including beliefs and attitudes, values, motives and experiences; social identity; and occupational and organisational factors (Schwartz et al., 2011). Theoretically, professional identity is related to, but distinct from an individual's self-concept (Johnson et al., 2012). Professional identity develops over a lifelong socialisation process through the integration of dynamic professional norms, values and behaviours with one's continuously evolving self-identity (Rosenblum et al., 2016). This produces behaviours which are consistent with being a professional in a specific field.

Professional identity formation is proposed to begin prior to students undertaking formal study and training and is influenced by factors including: previous experience working/ volunteering in the intended environments; understanding of team work; knowledge of the profession; and cognitive flexibility (Adams et al., 2006). Professional identity is proposed to assist students to develop an academic and scholarly identity to apply appropriate and effective academic behaviours during the transition into tertiary education, in turn improving student outcomes (Whannell & Whannell, 2015). Interestingly, it is proposed that there is variability in the strength of student's professional identity between intended professions, with potentially more established professions more established professions being associated with students with more well developed professional identities. (Adams et al., 2006). Therefore, for new or evolving professions, integration of curriculum elements relating to professional identity are important for student success and retention and the learners' employment potential. Recently professional identity has been identified as a key component of graduate employability, with stronger professional identity associated with a clearer understanding of the scope of employment opportunities following graduation (Jackson, 2019; Nadelson et al., 2017). Professional identity is identified as a means of bridging higher education and employment through increasing social and cultural capital, in particular familiarity, proximity, and confidence around targeted employment areas (Tomlinson & Jackson, 2019).

Pre-Professional Identity

Cruess et al. (2019) described professional identity formation as fundamental to health education as the development of professional identity and acculturation into a profession begins while studying. Professional identity development is facilitated by curricular, extra-curricular and professional development activities including wearing a uniform, role plays and debates, role modelling and guided reflection, mentorship, and immersion into authentic, work integrated learning experiences (Hodge et al., 2009; Jackson, 2019; Ronfeldt & Grossman, 2008; Rosenblum et al., 2016).

A range of theoretical frameworks have been used to describe professional identity development, including Social/Human Capital Theories, Social Identity Theory, Social Learning Theory, Intrinsic/Extrinsic Motivation Theories, Communities of Practice and Situational Learning and Self-Authorship Theory (Goltz & Smith, 2014; Nadelson et al., 2017). We employed the Self-Authorship Theory as a framework for understanding the process of becoming a professional (Baxter Magolda, 2008b). This theory contends that one's beliefs and values are internally generated and reconciled across three dimensions (cognitive, intrapersonal, and interpersonal), producing learning and growth, and has been used to define three professional identity stages through which student's transition as they advance towards graduation. Stage 1 relates to understanding the chosen profession, its norms, values and expectations, so that students can align their behaviour to their future profession. Stage 2 involves critical thinking and reflection, whereby students begin to question disciplinary knowledge and practice. Stage 3 encapsulates immersion into their chosen profession, collaborating with others and actively contributing to new ways of work (Jackson, 2019).

Collectively, these stages are termed pre-professional identity (PPI), 'an understanding of- and connection with- the skills, qualities, conduct, culture and ideology of a students' intended profession' (Jackson, 2016).

Developing PPI provides students with a sense of purpose and meaning as a student in a health profession program and their intended profession upon graduation (Jackson, 2016). It allows students to develop an in-depth insight into their decision-making processes and orientation towards their chosen career, particularly the connection and attraction to a profession (Schwartz et al., 2011). Understanding the driving force behind students' career decision making is of benefit to higher education providers, with evidence indicating a link between a student's perceived identity and motivation/engagement in learning, confidence, academic achievement, retention at university and employability (Good & Adams, 2008; Jackson, 2016; Jensen & Jetten, 2016; Nadelson et al., 2017; Tomlinson & Jackson, 2019; Whannell & Whannell, 2015). Limited evidence exists, however, on how to establish PPI or how to describe it, particularly in new/evolving health professions (Jackson, 2017).

To address this gap, we describe a process that was developed to gain an understanding of PPI in a higher education setting using student exercise scientists as a case study. Specifically, we investigate the PPI of two cohorts of student exercise scientists prior to graduation, and present an explanatory model, as an educational response, to develop students' PPI.

Exercise scientists and pre-professional identity

Exercise scientists have expertise in client assessment, and the design and delivery of exercise/physical activity programs to improve health, fitness, wellbeing or performance, and/or the prevention of chronic disease and disability across the lifespan (Exercise and Sports Science Australia, 2020). In Australia, the profession of exercise scientist is relatively new (<6,000 accredited exercise scientists) and is evolving as an allied health profession, despite 70% of Australian universities offering a total 61 exercise science degrees across 41 campuses. Thus it lacks the deep historical professional precedents such as those in medicine and nursing (Cruess et al., 2019). Despite its recent establishment, exercise science is one of Australia's 'top' employment growth areas (Australian Industry and Skills Committee, 2018). Internationally, the field of exercise science continues to expand with the recent (2020) establishment of the International Confederation of Sport and Exercise Science Practice, which comprises of representatives from Australia, New Zealand, UK, Canada and the USA. This confederation aims to advance the practice of sport and exercise sciences by developing and endorsing international professional standards and practice guidelines; influencing health policy to promote exercise science as a professional field; and facilitating global dissemination of information and fostering international research partnerships. This demonstrates that the exercise scientist profession is maturing and evolving, which therefore impacts on the professional identity of its current and future membership.

In Australia and in other countries internationally (e.g., New Zealand, UK, Canada, USA), exercise scientists hold a bachelor degree, which contain scholarly activities designed to meet the accreditation standards as prescribed by the relevant national professional body. Exercise and Sports Science Australia's National University Course Accreditation Program (Exercise and Sports Science Australia, 2013), prescribes the content and the standard of Australian exercise science degrees, which prepares students for a wide range of employment options in various settings and practice areas (e.g., exercise specialist in community or sports organisations; clinical scientist – cardiac, respiratory, sleep medicine; rehabilitation, sports or recreation manager; strength and conditioning coach; occupational health and safety manager). Based on these accreditation standards, PPI is not explicitly addressed in Australian exercise science curricula; rather it is contained in the hidden curriculum that exists in many health profession preparation progams (Cardell & Bialocerkowski,

2019). It has been assumed that students develop PPI across their years of study as they learn theoretical knowledge and practical skills, from a range of academic staff, researchers and practitioners, and participate in learning activitis that socialise them to the many, variable facets of exercise science (Kogan, 2000) Yet, it is not clear how students define or perceive what it means to be an exercise scientist, which is the first stage of becoming a professional (Baxter Magolda, 2008b). This issue (i.e., that PPI is part of the hidden curriculum) is not an issue that is limited to exercise science; but it requires addressing due to the evolving nature of the exercise science profession, the variable employment outcomes and the high attrition rates of student exercise scientists.

This study aimed to understand exercise science students' PPI, as this information forms the first stage of professional identity (Baxter Magolda, 2008b). Using theories and frameworks developed from other health professions, we sought to describe the:

(1) *Characteristics of the student cohort*, including variables such as age, gender, nationality and exposure to the health profession and their effect on identity formation (Nystrom, 2009).

(2) *Personal factors influencing PPI*, as identity is shaped by students' values and interactions with their environments (Jackson, 2016). It is proposed that 5 domains influence an individual's attraction to a particular career pathway: autonomy, structure, affiliation, science, and money. These domains contained in the Work-Values Scale (Brooks et al., 2003) were used as a framework to gain deep insight into students' values as they relate to becoming an exercise scientist.

(3) *Perceived career direction*, as the formation of PPI requires an understanding of the health profession, which in turn provides students with a sense of purpose and meaning with respect to their career direction (Billett & Somerville, 2004). Professional identity requires the integration of science/ research and practice, where the relationship between the two variables is carefully considered. The science-practitioner professional identity model (Jones & Mehr, 2007) was used to unpack students' understanding of the roles of a practitioner, scientist and researcher, and the relationship of these professional roles to their perceived career direction.

Materials and Methods

Study design and data collection methods

Due to the paucity of evidence on this topic, a cross-sectional, mixed methods (concurrent, partially mixed, equal status, sequential) design was used to describe aspects of PPI: 1) student characteristics; 2) personal factors influencing PPI; 3) perceived career direction. A pragmatist paradigm was used to address the study aim, which facilitated a strong student voice. Both qualitative and quantitative data were collected sequentially (online survey then in-person focus groups) from the same sample, which were integrated at the interpretation/analysis stage of the study. Ethical approval was gained from Griffith University Human Research Ethics Committee (GU Ref No: 2016/205). Student consent was gained twice; prior to participating in the survey and the focus group.

The online survey comprised of 6 sections: 1) personal information; 2) present, immediate and long-term perceived professional identity; 3) learning preferences specific to experimental work; reading current literature; and practical experience; 4) work values via the Work Values Survey (Brooks et al., 2003); 5) employability including an abbreviated version of the Work Readiness Scale (Office for Learning and Teaching Australian Government, 2014) and Measure of Guidance Impact Scale

(National Foundation for Educational Research, 1992); and 6) contribution to the healthcare profession. Information regarding the outcomes of the learning preferences, Work Values Scale, Work Readiness Scale and Measure of Guidance Impact Scale is not included in this manuscript. The survey can be accessed from the contact author.

Focus groups gathered information on three aspects of PPI: 1) definition of PPI; 2) students' understanding of the five key domains of professional identity and their application to professional roles associated with exercise science; and 3) factors that affect the individual's development of professional identity. Focus group trigger questions can be accessed from the contact author.

Characteristics of the student cohort

Information describing the characteristics of the student cohort (demographics and engagement in the field of exercise science) was gained from the personal information section of the survey. This section included closed and open-ended questions relating to: age; gender; nationality; previous tertiary study; previous work experience in the field of exercise science or a related area (paid/voluntary); current work in the field of exercise science or a related area (paid/voluntary); and research experience.

Personal factors influencing pre-professional identity

Focus group questions relating to the students' perceptions of personal factors that influenced the formation of their PPI or influenced career decision-making processes were used to determine factors that influenced the PPI of student exercise scientists. Students were asked to provide a definition of the 5 domains of professional identity (affiliation, autonomy, money, science and structure), as outlined in the Work-Values Scale (Brooks et al., 2003).

Perceived career direction

Multiple components of the online survey and focus groups collected data on the students' understanding of the roles of an exercise scientist and their perceived career direction. First, focus group questions facilitated discussion regarding the students' perception of the roles of an exercise scientist by asking students to define the terms practitioner, researcher and scientist. These terms were selected based on the professional categories identified in the science-practitioner model (Jones & Mehr, 2007) which was modified by adding an additional category 'scientist'. This was considered important as Bachelor of Exercise Science graduates are 'exercise scientists'.

Second, students were asked to apply the 5 domains of professional identity to each of these professional categories by identifying which of the roles had the highest perceived application of each domain. These definitions were applied to the three professional categories associated with exercise science to provide a deep understanding of the students' values as they relate to exercise science.

Third, students were asked to identify their present, immediate and long-term perceived professional identity to explore current PPI and perceived future professional identity with respect to their anticipated career direction (practitioner, scientist, researcher).

Finally, perceived career direction was evaluated through an open-ended survey question asking

students to identify their perceived ability to contribute to the healthcare profession.

Participants

Participants were Bachelor of Exercise Science students who were enrolled at one Australian University. Specifically, they were final year students in 2016 (n=177) and 2017 (n=187), who were enrolled in one core subject on exercise prescription and programming during their last semester of their degree. Data were collected at the same point in time in the 2016 and 2017 cohorts. All enrolled students were invited to participate in this study. All 329 students completed the online survey, with 93% consenting to participate in the focus groups.

Procedure

Students were informed of the research via an introductory email.

The survey was administered first, using SurveyMonkey. The survey data were entered into Microsoft Excel in a manner that was anonymous, which did not allow for data to be re-identified. Then, audio- and video-recorded focus groups were conducted in scheduled practical classes over a one-week period. It was expected that all students would attend their practical class during the data collection week and participate in the discussion. Data were analysed from students who consented to participate in this study.

Focus groups were 2 hours in duration, with 10-12 students in each group. Twenty-eight focus groups were conducted across the two cohorts. All focus groups were facilitated by the same researcher (KC) to ensure consistency. The facilitator (KC) was an accredited exercise scientist who worked in academia and in practice. The back of each chair in the room was labelled with a unique identifier. Students were prompted to complete a consent form prior to participating in the focus group where they indicated their consent aligned to their chair position. This information was not available to the focus group facilitator at the time of administering the focus group. The back of each chair was filmed throughout the duration of the focus group. This allowed researchers to identify when students who had not provided consent contributed to the conversation to allow their comments to be removed from the focus group transcripts. Participants were able to withdraw their consent to allow researchers to use their data up to the generation of the de-identified focus group transcripts.

Data Analyses

Data from the two cohorts of students were stacked and analysed as a whole. Descriptive statistics (mean, standard deviation, frequency, percentage) were used to summarise the survey data, and contributed to the understanding of characteristics of the cohort and students' perceived career direction.

Each focus group was audio- and video-recorded and transcribed verbatim. Comments from the non-consenting students were removed from the transcripts by a research assistant who was independent to the data analyses. Focus group transcripts were imported into NVivo (Version 11) and analysed using descriptive content analysis. This approach was also used analyse the open-ended survey questions. Themes were identified using open to selective coding to provide an overview of each response, with a secondary hierarchical analysis applied to group responses under key themes (Braun & Clarke, 2006). Themes were identified on: 1) personal factors influencing PPI; 2) perceived career direction, including the definition of the three exercise scientist roles; and 3) the students' perceived contribution to healthcare. Two researchers independently conducted the analyses. Differences of opinions on the deconstruction, interpretation and reconstruction of data were resolved through discussion until consensus from all researchers was gained regarding the key theme that the datum represented. The process undertaken was selected based on evidence that

indicates the use of two primary coders reduces flexibility in the iterative process of coding analysis, particularly interpretive and pattern coding (Berends & Johnston, 2005).

Themes derived from the focus groups were presented as a percentage of the number of focus groups in which the theme was discussed and as a percentage of the total coded responses for each research question. Primary themes were identified by applying arbitrary criteria: 1) > 30% representation in the 28 focus groups; and 2) > 10% of the total coded responses relating to the construct of interest. These criteria ensured that the distribution of responses was reflected in the analyses, while allowing for consensus conclusions to be drawn. When both criteria were not met, themes were classified as secondary. Themes from the open-ended survey question were presented as a percentage of the total coded responses for each question. Quotes were further used to illustrate the primary themes.

Results

Characteristics of the student cohort

Characteristics of the participants who consented to participate in the focus groups are presented in Table 1. Most participants were fulltime domestic students (85%), aged between 20-24 years (75%). The male to female ratio was 3:2. Eighty-three percent of participants identified as an Australian nationality. Most students (70%) had not undertaken pervious tertiary study; 67% had no previous professional or paid work experience; 86% were not undertaking work in their field of interest; 68% had not undertaken voluntary work experience; and 83% had not engaged in research activities. There were no differences between the demographic characteristics of participants who consented to participate in the focus group and survey.

Table 1.

Characteristics of the focus group participants (n=305)

Variable	n (%)
Gender (n = 305)	
Male	180 (59)
Female	125 (41)
Age, years (n = 305)	
< 20	23 (7.5)
20-24	228 (75)
25-29	34 (11)
30-34	5 (2)
35-39	10 (3)
> 39	5 (2)
Nationality (n = 305)	
Australian	244 (80)
Other	61 (20)
Previous Tertiary Study (n = 305)	
Yes	90 (30)

Variable	n (%)
No	215 (70)
Previous Tertiary Study Level (n = 90)	
TAFE Certificate	38 (42)
Diploma	22 (24)
Bachelor Partial Bachelor	22 (24)
Tertiary Prep	
Masters	4 (4)
	2 (2)
	2 (2)
Previous Tertiary Study Field (n = 90)	
Fitness/ Sport	36 (40)
Health Science	22 (24)
Other	32 (36)
Previous Professional/ Paid Work Experience (n = 304)	
Yes	101 (33)
No	203 (67)
Previous Professional Work Experience Field (n = 101)	
Physiotherapy Clinic	27 (27)
Sporting Club	23 (23)
Exercise Prescription	13 (13)
Sports Trainer	7 (7)6 (6)
Experience in another health-related field	6 (6)
Experience in an unrelated field	5 (5)
Clinical Measurements Education	4 (4)
Research	2 (2)
Unspecified	8 (8)
Previous Research Experience (n = 303)	
Yes	50 (17)
No	253 (83)
Previous Research Experience Type (n = 50)	
Compulsory research component during coursework	21 (42)
Research Participant Research Assistant	11 (22)
Unspecified role	4 (8)
	14 (28)

Variable	n (%)
Previous Voluntary Work Experience (n = 303)	
Yes	96 (32)
No	207 (68)
Previous Voluntary Work Experience Field (n = 96)	
Exercise prescription/coaching	24 (25)
Sports Trainer/ Massage	20 (21)
Physiotherapy clinic	16 (17)
Sporting Club	15 (16)
Exercise prescription for clinical populations	11 (11)
Research	3 (3)
Other health related areas	2 (2)
Clinical measurements	1 (1)
Unspecified	4 (4)
Current Work in Field of Interest (n = 305)	
Yes	43 (14)
No	262 (86)
Current Work in Field of Interest (n = 43)	
Exercise prescription/coaching	17 (40)
Sports Trainer	12 (28)
Physiotherapist Assistant	6 (14)
Other	6 (14)
Unspecified	2 (5)

Personal factors influencing pre-professional identity

Personal factors contributing to students' PPI were summarised into 18 themes (Table 2) of which three were identified as primary:

(1) *The desire to help others.* Students had a strong desire to help others, and this was influenced by values, interest, personal experience and knowledge of the impact of exercise on health. For example,

> *More of a drive to help people now that I know how important exercise is and how healthy it would keep people, just doing exercise can really decrease your chance for like cardiovascular disease by 50%, so that's important. It could mean a massive difference knowing that little piece of information; it made me want to help more people.*

(2) *Interest relevant to the field of exercise science and disinterest / dissatisfaction with previous field of work or study.* Over one half of the cohort expressed a positive interest in exercise science and or sport, which was primarily connected with their participation in sport. For example,

> *Yeah, I've been doing sports all my life and yeah, just went that direction as well in my profession.*

Students also reported studying exercise science because they were dissatisfied with other career options. For example,

> *... I did exercise science and business and I was thinking about more going into event management for like sport and then I like hated business, it was horrible, I couldn't stand it, I dropped it after first year.*

(3) *Previous experience relating to work or volunteering relevant to the field of exercise science*. One quarter of the cohort reported previous experience in fields related sport or health, such as being employed as a coach or personal trainer or volunteering at a hospital or clinic. Students reported that these experiences were important in shaping their career decisions, which led them to study exercise science. For example,

> *... I mean I started working as a Personal Trainer when I started doing this and I'm still working as a Personal Trainer I want to progress further into that career. So, obviously Personal Trainers are like, they're a level below an Exercise Scientist, so that would be the next step and then potentially after that something else which I haven't thought about yet. So, I'm just progressing further and further into that area.*

Themes, however, were often not distinct. Often a desire to help others and previous experience relating to work or volunteering emerged concurrently. The following quote details the interaction between previous experience and the desire to help others which were used to identify a field of interest and a career path:

> *Like helping, I work in a nursing home, which might be considered like the low grade of the nurse, whatever, but by helping people in need is a lot better than getting say two grand a week by working six days a week ... I had to figure out what would I want to do to help someone. Like what would I be passionate about and I figured I've always been into movement exercise and everything around that field so I chose this degree because it's got to do with movement.*

Table 2.

Factors identified as contributing to the professional identify of Bachelor of Exercise Science students.

Themes		Focus Group* n=28 (%)	Coded Statements^ n=274 (%)
Desire to help people		18 (64)	32 (12)
Interests			
Positive			63 (23)
	Interest or participation in sports and exercise	20 (71)	37 (14)
	General personal interests	12 (43)	19 (7)
	Enjoyment of university subject and learnt skills	6 (21)	7 (3)
Negative			55 (20)
	Dislike of university subject and learnt skills	9 (32)	13 (5)
	Dissatisfaction with previous field	18 (64)	30 (11)
	Dissatisfaction with current field	10 (36)	12 (4)
Previous experience			76 (28)
Work or volunteer experience		14 (50)	22 (8)
Positive practitioner experience		15 (54)	20 (7)
Negative practitioner experience		8 (29)	13 (5)
Injury		9 (32)	12 (4)
Neutral practitioner experience		8 (29)	9 (3)
Family influence		6 (21)	8 (3)
Secondary school influence		6 (21)	7 (3)
Money		5 (18)	6 (2)
External perception (reputation)		3 (11)	5 (2)
Personal and work lifestyle		2 (7)	4 (2)
Peer influence		2 (7)	2 (1)
Other[a]		10 (36)	17 (6)

[a]Other = responses that could not be grouped under a central theme.

Note. Themes derived from the focus groups were presented as a percentage of the number of focus groups in which the theme was discussed* and as a percentage of the total coded responses for each research question

Students were asked to define the five professional identity domains of the Work-Values Scale (Brooks et al., 2003). Student definitions were organised into themes, most of which related to affiliation (n=12) and structure (n=11) (Table 3a and Table 3b).

Affiliation was considered to be multidimensional. Four primary themes emerged from the data: 1) self- and peer- perception of a role including its perceived prestige and utility; 2) the role of networking in the profession; 3) the influence of social and family relationships on the perception and uptake of professional roles; and 4) the relationships developed in the role, both disciplinary and interdisciplinary. These themes relate to environments and relationships, which develop students' PPI. The quote below demonstrates that affiliation is used to promote advantageous relationships which allows an individual to develop key tasks and values:

> *As in you identify yourself in a context or an organisation and are affiliated with them, so like you interconnect and that contributes to your own advantage, what you can do, what you're looking for, what you've contributed.*

Autonomy was perceived, by the students, to be an intersection of two primary themes: 1) control; and 2) choice. Secondary themes indicated that students attributed higher levels of autonomy with higher levels of independence, happiness and contentment, particularly relating to the work environment. The value of autonomy is illustrated in the following quote where it is associated with an individual's drive, motivation, and success:

> *You have more independence and you don't have to rely on other people to be able to be successful I guess, you can go on your own journey of success, sometimes without the help of or as much help from others.*

Autonomy was also perceived to be associated with a student's perception of the practical elements of their chosen career. The quote below highlights that financial factors, scope of works, tasks performed, and approval factors are influenced by the level of autonomy in the role:

> *Because scientist, from the outside it would appear they are very autonomous but they have a very limited budget and so they can't conduct endless experiments, they're going to have to define exactly what they're going to do and they're pretty much going to have to stick to that agenda and if they want to alter that agenda, they're going to have to seek approval for that. So, where's the autonomy with that…*

The definition of autonomy varied as per its application to the professional categories of practitioner, researcher and scientist as demonstrated by the following quote:

> *It's the hierarchy and, so two aspects in my opinion, the autonomy would be hierarchy in regards to, like if you're a researcher you need to get grants, you need to comply with certain regulations that are imposed on you and predefined ways of testing, that's the thing. Whereas, in a practitioner you need to treat in a particular way or you get the choice of how you wish to treat someone. If somebody comes in with the same injury you've got five modalities of treatment that you wish to focus on and you get to choose which one you most want.*

Money was almost unanimously defined as the earning potential of the profession, including the potential salary and/or fee structure, as illustrated by the quote:

> *Well, as much as we don't like to admit that money is a lot like, money shouldn't like govern a lot of things but like in the end the more money we have, the more we're going to be able to do things with our life and enjoy our life, so in the end people are going to want jobs with the highest paid salaries and stuff like that.*

Further discussion identified factors perceived to influence earning potential, including: professional and business experience; business models; marketing and the market demand for the health service; funding sources including research grants, client funding sources or business models; and the desire

to maintain a particular lifestyle. The factors influencing the variability in earning potentials is illustrated in the quote below:

> *Demand would also cover location, like location demand because like if the demand, if you're in rural outback and you have a practice there's not going to be that many people that you're going to be taking in, but if you have a practice in a private hospital or a lot of people then the demand might be higher.*

Science had the greatest variability in responses, and none met the primary theme criterion. This could be attributed to the students' perception that science is a foundational component of research and practice as demonstrated by the following response:

> *It's kind of underlying everything.*

Secondary themes indicated that science was related to evidence-based practice and identifying/ developing theories which underpinning practice:

> *Science is about experimenting and finding new information and correcting theories and coming up with new ones.*

Structure had the highest number of primary themes (n=5). It was perceived to relate to: 1) work hours and daily routine; 2) the guidelines, rules and/or scope of practice that governs a role; 3) the role description and included tasks; 4) the career path or future direction; and 5) the required structure to maintain an individual's personal lifestyle (e.g., reduced work hours for increased recreational activity). These primary themes link to the practical aspects of work structure (e.g., roles, tasks, hours, and environment) and the value that structure contributes to an individual's work and lifestyle. These responses were consistent with the value-orientated factors that were determined to contribute the student's PPI.

> *… it's just basically how it fits with my life or structure of my work with my lifestyle, with the family time, with the extra things that I do. So that's how I would pick my job, if it fits with everything else*

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Table 3a.

Student constructed definitions of the domains of professional identity, Affiliation, Autonomy and Money

Affiliation			Autonomy			Money		
	Focus Group* n=28 (%)	**Coded Statements^ n=105 (%)**		**Focus Group* n=28 (%)**	**Coded Statements^ n=59 (%)**		**Focus Group* n=28 (%)**	**Coded Statements^ n=71 (%)**
Self-perception	13 (46)	18 (17)	Control	13 (46)	19 (32)	Earning potential	28 (100)	71 (100)
Networking	12 (43)	14 (13)	Choice	13 (46)	18 (31)			
External perception	12 (43)	14 (13)	Independence	6 (21)	6 (10)			
Social / family influence	10 (36)	14 (13)	Happiness / contentment	4 (14)	6 (10)			
Work relationships	11 (39)	11 (10)	Freedom	3 (11)	3 (5)			
Connectedness	7 (25)	10 (10)	Other[a]	5 (18)	7 (12)			
Interest	4 (14)	6 (6)						
Location	4 (14)	4 (4)						
Group belonging	3 (11)	3 (3)						
Experiences	2 (7)	2 (2)						
Reputation	2 (7)	2 (2)						
Other[a]	5 (18)	7 (7)						

[a]Other = responses that could not be grouped under a central theme.

Note. Themes derived from the focus groups were presented as a percentage of the number of focus groups in which the theme was discussed* and as a percentage of the total coded responses for each research question^.

Table 3b.

Student constructed definitions of the domains of professional identity, Science and Structure

Science			Structure		
	Focus Group* n=28 (%)	**Coded Statements^ n=41 (%)**		**Focus Group* n=28 (%)**	**Coded Statements^ (n=100) (%)**
Evidence-based	4 (14)	7 (17)	Work hours or daily routine	15 (54)	18 (18)
Theory behind practice	6 (21)	6 (15)	Guidelines, rules and/or scope	10 (36)	16 (16)
Biological predisposition	3 (11)	4 (10)	Role description	9 (32)	13 (13)
Relevance	3 (11)	4 (10)	Career path or future direction	7 (25)	13 (13)
Building on prior knowledge	3 (11)	3 (7)	Impact on lifestyle	9 (32)	10 (10)
Discovering new ideas	3 (11)	3 (7)	Organisation hierarchy	7 (25)	8 (8)
Education	2 (7)	3 (7)	Workplace structure	6 (21)	6 (6)
Legitimacy	2 (7)	2 (5)	Work environment/ location	3 (11)	5 (5)
Other[a]	7 (25)	9 (22)	Freedom	4 (14)	4 (4)
			Stability / security	2 (7)	2 (2)
			Other[a]	4 (14)	5 (5)

[a]Other = responses that could not be grouped under a central theme.

Note. Themes derived from the focus groups were presented as a percentage of the number of focus groups in which the theme was discussed* and as a percentage of the total coded responses for each research question^.

Perceived career direction

The depth of students' understanding of the roles of an exercise scientist was variable. Students identified most with being a practitioner, who they defined as 'working with people'. This involved the application of science and research to help people, as demonstrated by the following quote:

> *By using the information that was found by maybe researchers and scientists and applying it to certain like populations.*

Practitioners were perceived to have the highest level of affiliation (66% of positive responses); money, relating specifically to earning potential (60% of positive responses); and structure (47% of positive responses) (Tables 4 and 5).

There was a limited understanding of the role of a researcher. Two of the three primary themes, 'build on current knowledge' and 'conduct experiments and research studies' demonstrated that students had an understanding that research could lead to improved practice and client outcomes. As one student stated:

> *The researcher just tries to find holes in our knowledge of what's being applied at the moment and so say a particular test being used. They might look for a hole and possibly improve upon that and they try and improve it, try and find a better way of doing things or find out new information that can lead to better practice.*

There was substantial confusion regarding the role of a researcher. This was exemplified by the third most frequent response 'completes research', where students were unable to explain the role of a researcher. In addition, many responses were categorised into the 'other' theme, which included negative statements on the affiliation of researchers, particularly their lack interaction with people and their limited capacity to directly help others. Despite the limited, negative perception of research as a career, researchers were perceived by the students as having the highest level of autonomy (representing 45% of positive responses).

Students had a limited understanding of the role of a scientist as it related to the exercise science profession. They perceived the role of a scientist was similar to that of the researcher, i.e., they conducted experiments. These 'experiments' related to test-retest models with one individual, in comparison to researchers who were perceived to conduct experiments on groups of people. Students also reported that scientists work with researchers and practitioners, however they were unable to unpack the differences in these roles.

Scientists were perceived to have the highest level of science associated with their role (35% of positive responses). When asked to clarify, most students indicated their response was associated with the word 'science' being contained in the title 'scientist.' The lack of clarity of the role of a scientist was further supported through analysis of the discussions on the role of the work value 'science' for practitioners, researchers and scientists. The highest number of undecided responses was gained (25%) when students were asked to describe how science was used in the role of an exercise scientist.

Table 4.

Student constructed definitions of the professional categories associated with exercise science: researcher; scientist; and practitioner.

Researcher			Scientist			Practitioner		
	Focus Group* n=28 (%)	**Coded Statements ^ n=78 (%)**		**Focus Group* n=28 (%)**	**Coded Statements ^ n=53 (%)**		**Focus Group* n=28 (%)**	**Coded Statements ^ n=96 (%)**
Builds on current knowledge	17 (61)	19 (24)	Conduct experiments	11 (39)	14 (26)	Population		46 (48)
Conducts experiments and research	9 (32)	12 (15)	Test and retest	8 (29)	11 (21)	People (general)	22 (79)	31 (32)
Completes research	10 (36)	10 (13)	Works with researchers and practitioner	7 (25)	9 (17)	Clinical or injured clients	8 (29)	8 (8)
Guides practitioners	7 (25)	8 (10)	Similar to researcher	5 (18)	6 (11)	Elderly individuals	4 (43)	4 (4)
Seeks new knowledge	5 (18)	6 (8)	Create and gather data	2 (7)	3 (6)	Athletes	3 (11)	3 (3)
Solves problems	3 (11)	5 (6)	Science	2 (7)	2 (4)	Applies science and research	12 (43)	14 (15)
Boring or unhappy individuals	2 (7)	4 (5)	Other[a]	7 (25)	8 (15)	Helps people	9 (32)	10 (10)
Guide scientists	2 (7)	2 (3)				Hands on	7 (25)	7 (7)
Other[a]	10 (36)	12 (15)				Rehabilitation or exercise	4 (14)	5 (5)
						Recommendations and education	3 (11)	3 (3)
						Works in a clinical environment	2 (7)	2 (2)
						Assessment	2 (7)	2 (2)
						Other[a]	4 (14)	7 (7)

[a]Other = responses that could not be grouped under a central theme.

Note. Themes derived from the focus groups were presented as a percentage of the number of focus groups in which the theme was discussed* and as a percentage of the total coded responses for each research question^.

Table 5.

Highest perceived application of the 5 domains of professional identity to each of the three professional categories associated with exercise science.

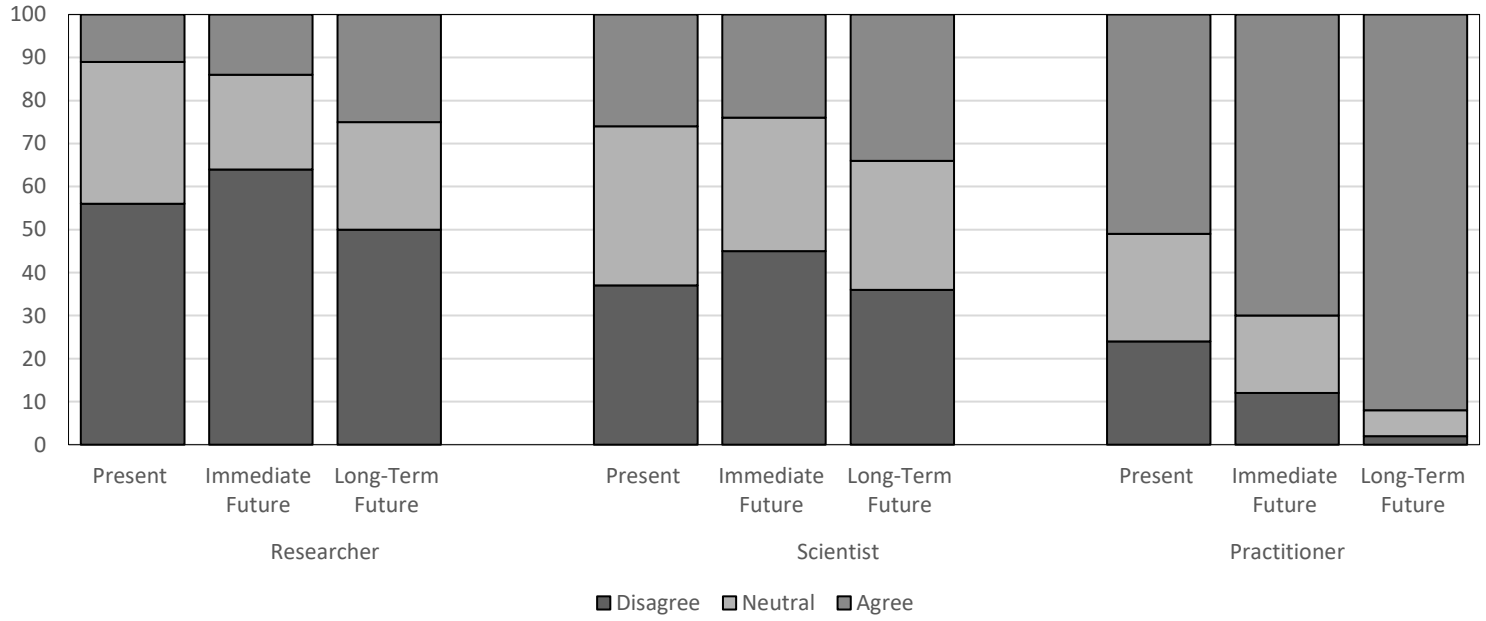
		Focus Group n=28 (%)	**Positive responses n=115 (%)**
Affiliation			
	Practitioner	25 (89)	76 (66)
	Researcher	13 (46)	21 (18)
	Scientist	5 (18)	9 (8)
	Undecided	4 (14)	9 (8)
		Focus Group n=28 (%)	**Positive responses n=89 (%)**
Autonomy			
	Researcher	19 (68)	40 (45)
	Practitioner	14 (50)	26 (29)
	Scientist	3 (11)	5 (6)
	Undecided	9 (32)	18 (20)
		Focus Group n=28 (%)	**Positive responses n=57 (%)**
Money			
	Practitioner	21 (75)	34 (60)
	Researcher	4 (14)	6 (11)
	Scientist	2 (7)	2 (4)
	Undecided	8 (29)	15 (26)
		Focus Group n=28 (%)	**Positive responses n=84 (%)**
Science			
	Scientist	15 (54)	29 (35)
	Researcher	11 (39)	21 (25)
	Practitioner	9 (32)	13 (16)
	Undecided	9 (32)	21 (25)
		Focus Group n=28 (%)	**Positive responses n=127 (%)**
Structure			
	Practitioner	23 (82)	60 (47)
	Scientist	16 (57)	29 (23)
	Researcher	13 (46)	28 (22)
	Undecided	7 (25)	10 (8)

Note. Themes derived from the focus groups were presented as a percentage of the number of focus groups in which the theme was discussed* and as a percentage of the total positive responses for each domain^.

Students were asked to identify: 1) their present readiness to gain employment as a researcher, scientist or practitioner (presented professional identity); 2) the aspirations for employment as a researcher, scientist or practitioner within the next year (immediate future identity); and 3) their aspirations for employment as a researcher, scientist or practitioner within the next 10 years (long-term future identity) (Figure 1). Students mainly identified a readiness or aspiration to fulfil the role of practitioner with this response becoming stronger when anticipating their medium to long-term career pathway (50%, 70% and 92% for present, immediate and long-term future identity respectively). Readiness for employment as a researcher peaked at 25% as a long-term future identity and remained relatively constant over the present and immediate timeframes (ranging from 11-14%). There was little variation in the responses for readiness for employment as a scientist over the presented timeframes (26%, 24% and 34% for present, immediate and long-term future identity respectively).

Figure 1.

Students' readiness for employment as a researcher, scientist and practitioner across three time frames: present; immediate future (within the next year); and long-term future (within 10 years).



Perceived Contribution to Healthcare

Students had an understanding of how they would contribute to healthcare as an exercise scientist (Table 6), such as through the use of interpersonal skills (n=113; 29%) and helping clients (n=70; 18%). Interpersonal skills, which were perceived to contribute positively to healthcare, included: empathy (n=22; 19%); and ability to build rapport and connect with patients (n=13; 12%). The use of interpersonal skills to drive career choices and to contribute to the healthcare profession is illustrated in the following responses:

> *I believe I will contribute much to the healthcare profession as my compassion drives my learning and future career choices.*
>
> *Contribute by being understanding of other people's needs on a psychological and physical level and applying my knowledge to help them.*

Students identified practicing a specific profession (n=63; 16%) or a set of tasks and skills (n=45; 11%) as the means to be able to help clients. Tasks and skills associated with rehabilitation were reported most frequently (n=25; 56%). The application of profession-specific skills to contribute to the healthcare profession is illustrated in the following responses:

> *My level of knowledge gained from university has and will continue to ready me for my career as a health professional, as I am armed and will continue to gain knowledge that will help assist in my work, allowing me to perform to best of my abilities.*
>
> *By helping people improve their individual health, fitness and getting them back to peak physical health. I believe I can optimise individual's performance for daily activities and sporting as well. I believe I can reduce/remove pain.*
>
> *I am interested in contributing to the continued expansion of scope of what is a healthcare professional. Boundaries are made to be broken.*

Table 6.

Student (n=206, 68%) responses identifying their perceived contribution to the healthcare profession.

Theme	**Coded Statements n= 395 (%)**
Interpersonal Skills	113 (29)
Helping People	70 (18)
Reference to a profession	63 (16)
Reference to a set of tasks or skills	45 (11)
Interest and Passion	36 (9)
Knowledge	29 (7)
Experience	15 (4)
Research	9 (2)
Evidence Based Practice	7 (2)
Unsure	5 (1)
Learning Preferences	2 (<1)
No response	1 (<1)

Note. Themes derived from the focus groups were presented as a percentage of the total coded responses for the research question.

Discussion

This study sought to develop an understanding of students' PPI in a higher education setting, and extended the work of Jackson (2016, 2017), and Tomlinson and Jackson (2019). A mixed methods study was undertaken where survey and focus group data were triangulated to form a conceptual understanding of PPI, using the case study of student exercise scientists. This cohort was selected due to the expanding nature of the career pathways for graduates and a limited understanding of professional identity of exercise scientists. We contend that our theoretical approach and methods are transferable to both other health, vocational professions and non-vocational professions.

A key outcome from the case study is a 3-item framework for generating activities or discussions to understand students' PPI: 1) characteristics of the student cohort; 2) personal factors influencing PPI; and 3) perceived career direction. The first item of the framework seeks to gain an understanding of the characteristics of the student cohort. At a minimum, information on students' previous paid or voluntary work experience in their field of interest is required to determine their understanding of- and connectedness to- their chosen profession. Students with limited experience in their professional field have a weak connection between their role as a student, the curriculum and their future profession (Bergmark & Westman, 2018). We found that our cohort mainly consisted of inexperienced students who lack exposure to the field of exercise science. This lack of exposure may lead to misalignment of student expectations of study and the scope of the profession; a factor which is associated with student attrition in other allied health and nursing degrees (Hamshire et al., 2019; Hamshire et al., 2013; McKendry et al., 2014). Reflecting on this finding and the theory contained in the literature, has confirmed that the development of PPI is important for academic achievement, retention and employability, highlighting it's importance for vocation specific and non-vocation specific programs (Good & Adams, 2008; Jackson, 2016; Jensen & Jetten, 2016; Tomlinson & Jackson, 2019; Whannell & Whannell, 2015).

Due to our cohort's lack of exposure to exercise science, immersive experiences in the curriculum are considered important, to educate and motivate students on the role and careers as an exercise scientist (Jackson, 2017). Our results indicate that Australian universities could better reflect on how the PPI of exercise scientists is defined, taught, understood, and assessed within the context of their broader curriculum. Universities could be encouraged to use a range of learning opportunities for PPI that are embedded into the curriculum, particularly in the transition into clinical settings, as this represents an opportunity to foster an understanding of the direct connection between theory and practice. Furthermore, providing positive experiences and role modelling of what an exercise scientist does in practice might help shape the development of a student's PPI. As such, this should be the responsibility of all academics contributing to the delivery of the exercise science program. Furthermore, while currently featuring in the accreditation standards as 'graduate attributes', a clear framework of PPI is not reflected in the assessment expectations of graduate outcomes (Exercise and Sport Science Australia (ESSA), 2021). Therefore, it is recommended that PPI is considered as an explicit component of the curriculum, supported by the accreditation standards, and in this case, endorsed by Exercise and Sports Science Australia. Explicit professional standards to address PPI could include, for example: 1) describe the development of exercise science and its sub-disciplines as a profession; 2) explain personal qualities that complement PPI; and 3) understand the role of a professional exercise scientist in multi-disciplinary organisations.

The second item in our framework, understanding the personal factors that may influence PPI, requires an understanding of students':

(1) Intrinsic values, personal attributes, ambitions and motivations. The findings of this study indicated that reflection on the students' desire to help others, their interests in their intended field and disinterest with previous work or fields of study can provide insight on

the values and motivations of their career selection. Altruism, personal interests and previous experience are all factors that have been identified as influencing the selection of a career in established allied health professions, such as occupational therapy, physiotherapy and speech pathology (Byrne, 2007; Cooperstein & Schwartz, 1992; Mkondo et al., 2007; Whitehouse et al., 2007). The availability of jobs, although a highly sighted factor for selecting a career in occupational therapy and physiotherapy, did not emerged from our data. This could be explained by students' lack of knowledge of career outcomes associated with exercise science;

(2) Extrinsic motivators including peer perception of the role of the profession, the influence of social and family relationships and the interdisciplinary relations of the role can also influence students' PPI. These findings align to those in the allied health literature, which have found that knowing someone in the intended health profession (Byrne, 2007) and family opinions and support (Cameron et al., 2010) are key factors associated with retention and selecting a career.

These personal factors, which focus on students' beliefs and values, are important in the journey to become a health professional, as students internally reconciled these factors against professional norms (Baxter Magolda, 2008b; Jackson, 2019). Drawing students' attention to these factors and facilitating reflection on these may assist students to construct the purpose and meaning of being a practitioner in training, and thus contribute to their PPI development (Jackson, 2016).

The third item in the framework relates to students' understanding of their career direction. Profession-specific factors (earning potential of the profession; work hours and daily routine; guidelines and/or scope of practice governing the role, role description and included tasks; career path and/or future directions; and the influence of the work and structure on the individual's lifestyle) were identified as influencing career identity. In turn, based on the Self Authorship Theory (Baxter Magolda, 2008a), these factors may influence the students' PPI and their perceived and future career identity. These findings are supported by the allied health and nursing literature which cites placement (i.e., work integrated learning) as key factor associated with PPI as well as attrition (Hamshire et al., 2019; Hamshire et al., 2013).

These three items shape students' identity, and consequently their career decisions, success at university and in their chosen profession. They can also be used to promote programs to attract potential students who already may have an alignment of their personal factors, values and beliefs with the professional norms. These concepts well align to the recommendations by Reddick et al (2012), that student success and retention is supported by creating interest in the profession and attracting the right type of students. Moreover, when in the program, these factors could be used to increase student engagement through learning activities which involve the immersion into the intended roles. These activities are important to ensure that students have clear expectations of scope of the profession so that they can make informed decision on whether their career choice is "right for them" (Hamshire et al., 2013; McKendry et al., 2014).

In our study, the Work-Values Scale (Brooks et al., 2003) was used to scaffold how students described the impact of five professional identity factors on their career decision to become an exercise scientist. Our results demonstrated that students are seeking to be affiliated with a professional group to develop relationships to advance their career. This result aligns with other allied health professions, such as speech pathology, where having a professional career was important to speech pathology students (Whitehouse et al., 2007). Student exercise scientists sought autonomy within their career, adequate earning potential, and a flexible structure to facilitate/ maintain their lifestyle. Some of these factors align with more established allied health professions, e.g., physiotherapy students value earning a good salary and a flexible work schedule (Mkondo et

al., 2007). Although these are personal goals, learning activities in curricula can be used to enculturate students to their intended profession so that students have realistic expectations of what it means to practice in their intended field (Jackson, 2016). This is important for retention of not only students but graduates in the profession.

We found that our students had a limited understanding of what it means to be an exercise scientist, including what constitutes the three main roles of practitioner, scientist and researcher. This demonstrates that evolving professions must pay attention to including learning opportunities which explicitly showcase these roles. Such learning opportunities may include simulated learning activities, work integrated learning and research experiences, and reflection tasks. These activities are important to shape students' understanding of what it means to be a health professional in specific field and develop their PPI (Hodge et al., 2009; Jackson, 2019; Ronfeldt & Grossman, 2008; Rosenblum et al., 2016).

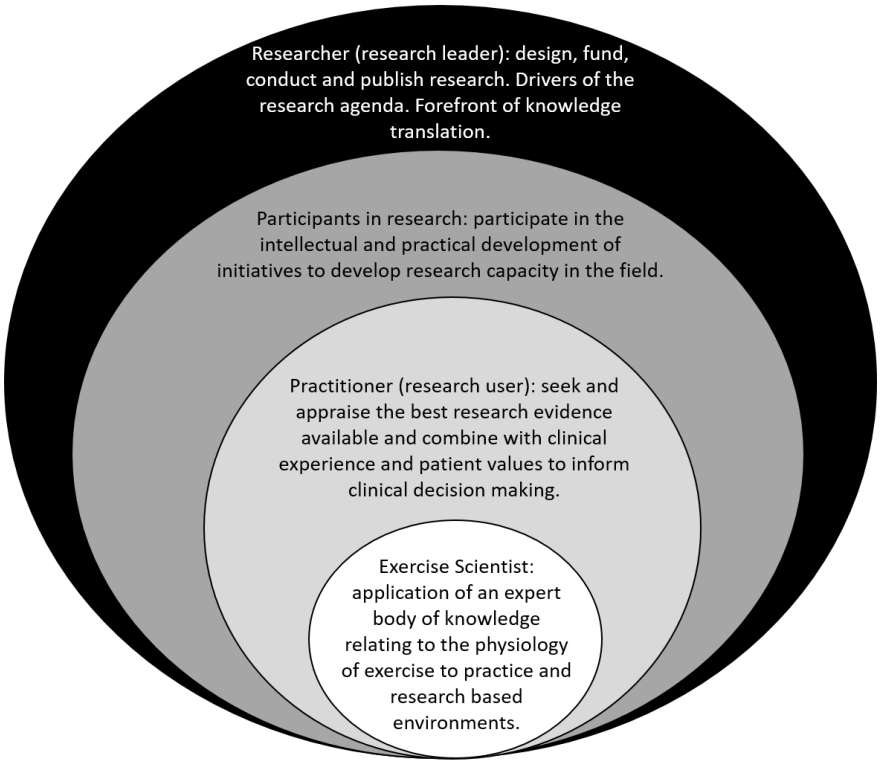
The role of research in practice is important across all health professions because it drives the evolution of the profession and the scope of work, and therefore what is taught at university (Del Mar & Askew, 2004). This is supported by the Science-Practitioner Model (Jones & Mehr, 2007), which promotes an inter-relationship or partnership between practitioners and researchers. This partnership facilitates research that addresses contemporary health issues to produce evidence-based management approaches and to implement these in practice contexts (i.e., implementation science). Students therefore should be exposed to higher order research skills in university curricula so that they understand the components of research, its role and connection with being a practitioner. Exposure to research also will provide opportunities for students to gain a greater understanding of their profession, which is the first step in developing PPI (Jackson, 2019).

Based on our cumulative findings, we developed a model for the PPI of an Exercise Scientist (Figure 2) because an appropriate exiting model could not be found in the literature. At the centre of the model is the professional identity of a scientist where they apply an expert body of knowledge (i.e., physiology of exercise) and research evidence to facilitated best practice. The term 'scientist' is used to demonstrate the interrelationship between research and practice. This is in contrast to the science-practitioner model where the terms 'science' and 'research' are used interchangeably (Jones & Mehr, 2007).

Our model promotes a continuum of research involvement from practitioners, who use research to inform practice decisions, to research leaders, who are immersed in the research process from start (project conception) to completion (knowledge translation). It contextualises the levels of research engagement as proposed in Glasziou's triangle (Del Mar, 2001). We hypothesise that our model will draw students' awareness to the importance of research to the exercise science profession, and its potential to advance the profession as it has been done in other professions (Del Mar & Askew, 2004). This knowledge will, in turn, provide students with a greater understanding of norms, values and expectations of the exercise science profession, so that they can align their behaviour to their future profession (Jackson, 2019).

Figure 2.

Model for the Professional Identity of an Exercise Scientist



We believe our model has two key strengths. First, it provides a definition for the PPI of an Exercise Scientist that promotes the values that underpin the decision-making processes of undergraduate exercise science students, namely the desire to help people through the application of expert knowledge in their field of interest (ES). Second, the model acknowledges the broad employment outcomes associated with a degree in exercise science, through the provision of a continuum of the application of expert knowledge from practice through to research. Therefore, our model acknowledges the interaction between practice and research for the development of evidence-based practice, through the expectation that all health professionals have engagement in research activities, at least through the research literature. This further encourages students to consider their professional identity across a continuum, rather than having a silo approach. This model can be adapted to provide students in other health professions with an understanding of the role of science and research in their profession and the importance of these concepts for the development of PPI. This, in turn, facilitates a more comprehensive understanding of the continuum of evidence based practice – from the application of knowledge to the discovery of knowledge.

A number of assumptions and key decisions were made to inform this research. A professional identity scale could have been administrated to the sample, in lieu of the focus groups, to quantify PPI at one point in time. However, evidence suggests that professional identity scales have limited evidence of their psychometric properties, and do not specifically address PPI (Matthew et al., 2019). Based on these findings, a decision was made to identify student-specific influences on PPI

through targeted focus group questions. The use of published surveys and theory for survey development and focus group questions allowed for a structure to the conversation and included elements for the purposes of describing PPI. Analyses of the qualitative data applied the criteria of primary themes of greater than 30% of focus groups and greater than 10% of the coded responses for the question, which could be considered a low threshold. In this context, these criteria allowed themes that were discussed consistently across groups to be made visible from those that were sporadically mentioned.

Conclusion

In summary, our mixed-methods study on 305 exercise science students found that the desire to help others, interest in sport/exercise and previous sport/exercise experiences contributed to the development of PPI. Students had the strongest understanding of the professional identity domains of affiliation, money and structure and limited understanding of the role of scientist and researcher. From these results, a 3-item framework was developed to describe students' PPI. A worked case study was presented demonstrating how the framework was applied to gain a nuanced understanding of PPI in exercise science. The findings of this study provide information important for exercise science students and universities in which exercise science curricula is developed and delivered. The framework presented here, if applied and supported by accreditation standards, would enhance student understanding of PPI and nurture a positive approach to employability.

Based on our results, we recommend that the methods, as described in this study, could be applied to students studying vocational and non-vocational degrees, other than exercise science, to describe their perception of PPI. PPI can be facilitated through learning activities that facilitate reflection on personal factors and experiences, and the understanding of their chosen profession and possible career directions, and explicitly link these to professional norms and values, and scope of practice.

Future research could include the application of our proposed PPI model across a broad range of exercise science degrees, engagement with currently practicing exercise scientists to further define the model, and application of the research methods to other health science professions.

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