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Dietetics now and into the future

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EDITORIAL

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Expanding perspectives on professionalism in dietetics

Professionalism is highly regarded and valued in how dietitians practise, yet it has been a topic of limited scholarly research and discourse until recently within our profession.[1,2] While professionalism and professional practice have been articulated in broad terms in competency standards in Australia and internationally to support education of dietitians, it has been considered difficult to define and understand. Within dietetics education more specifically, teaching and assessing professionalism has been described as challenging and one of the hardest of the competency areas to assess, and has been associated with a discomfort articulated by educators because of the perceived subjectivity of professionalism.[1–4] I propose this has been influenced and impacted by the way that professionalism has been considered within the context of the sociocultural and historical development of our profession. It is both timely and pertinent to consider new ways of understanding and applying dietetics professionalism as our profession evolves and expands into the 21st century, as highlighted by several papers in this issue of *Nutrition & Dietetics*. It is of value to strengthen and diversify our understandings and applications of professionalism within the profession moving forward.

The historical development of the dietetics profession in Australia and other Western countries (New Zealand, Britain, Canada and the United States of America) over the past century has been founded in, and has privileged, scientific knowing. The scientific approach has informed research, education and practice and has provided solid and rigorous foundations for the profession to prosper and expand, and has 'legitimised' our profession within modern healthcare.[5] However, it is important to consider that a scientific approach typically is aligned with positivist/post-positivist epistemologies (ways of knowing) and positioning (which includes viewing knowledge as objective, looking for a single truth, valuing objectivity, keeping distance etc.).[6,7] This influences 'what' is valued and taught in curricula, 'how' we are taught and learn, 'what' we come to value and privilege, and subsequently, 'how' we practice, socialise and acculturate others into the profession. The 'what' and 'how' of dietetics practice become important areas of focus. As other insiders in the profession have written, by privileging scientific approaches it limits our capacity to fully understand and appreciate '*all complexities influencing nutrition in the social world*'.[6] The scientific paradigm has also impacted the ways in which professionalism has been approached in dietetics – with a desire for discrete definitions to apply across the profession, and for markers and measures of professionalism that are objective and easy to measure.[1,2] Dietetics professionalism does not fit neatly nor is easy to understand or apply when using a scientific approach. Perhaps aligned with medicine, definitions of professionalism have been described as being '*grounded but also stuck in a background of Western, White, heteronormative view of society and the professions of the past*'.[8]

Moving forward now and into the future, it is important to expand our understandings and applications of professionalism in practice, and approach it using an interpretive, rather than a scientific, lens. Professionalism cannot be neatly or succinctly defined, nor should we try to, if it is to have resonance and meaning across the diversity of dietetics practice. Professionalism is a socially constructed concept, it is multi-dimensional, and it changes across time and place, being influenced by culture and context.[1,2] While professionalism is a cornerstone of safe and effective healthcare and practice, it is important to acknowledge that dietetics professionalism means different things across the landscape of dietetics practice[9] and the complex, social and uncertain worlds we work and learn within.[10] If we are to expand and develop shared understandings of dietetics professionalism and to teach and manages lapses in professionalism, it is imperative that we create space and be open to discuss, debate, and interrogate our underpinning assumptions around dietetics professionalism.[8] For example, white [middle class] norms have been the dominant reference standard for what is considered professional.[11] Frameworks conceptualising professionalism in dietetics[1,2] can assist in guiding discussions to explore (and teach) professionalism, and to clarify and articulate professional expectations. We need to expect that professionalism will vary across the landscape of dietetics practice – dietetics professionalism in a rural community nutrition context will likely vary to professionalism expectations in an intensive care/high acuity context etc. Neither is more correct or 'true' (the scientific approach to viewing professionalism), rather professionalism needs

to be '*culturally compatible and emotionally intelligent to the needs of each society*'.[8] Invigorating conversations about professionalism in local and broader contexts, by engaging with a range of stakeholders, will support expanding perspectives and respect for diversity of practice.

There is an emerging literature encouraging reflexivity and critical consideration of established ways of doing and being, towards a more diverse profession and considering the sociocultural aspects within the profession.[5,9,12,13] In this issue, the paper by Boak et al.[14] outlines the need for cultural shifts and change, and for reinvention within the profession. Their paper presents an insightful exploration of the future of nutrition and dietetics in Australia and New Zealand, and relevant workforce implications. This includes descriptions of expanding and future dietetics roles and capabilities required for moving forward including curiosity, creativity, empathy, embracing and harnessing diversity, cultural safety and disrupting expertise.[14] These capabilities are aligned with contemporary dietetics professionalism and necessitate expanding paradigms and ways of thinking, educating and being. Similarly, other papers in this issue, by Blair et al.,[15] Croxford et al.,[16] Kelly et al.[17] and Kirkegaard et al.[18] all speak to an expanding requirement to more explicitly educate graduates in the 'art' of practice – equipping nutrition and dietetics graduates for employability in diversifying roles, in navigating uncertainty and complexity, and developing the critical capabilities Boak et al.[14] describe. This will require ongoing cultural change (and involve learning and unlearning), and philosophical shifts within the profession.

Cultural change and attention to sociocultural factors are required across the profession beginning with the education of our future dietitians.[9,19,20] Sociohistorical systems of educating dietitians in Australia have developed predominantly through the scientific paradigm, and have been influenced by colonialism and the profession's dominant middle-class, white, female history.[5,14] New education approaches are required in dietetics education; where space is created for critical pedagogies and discourse, and a 're-privileging' of the art of dietetics practice. We need to stop referring to the more complex aspects of practice as 'soft skills' – rather invest in conversations and critical inquiry, unpacking and exploring these more complex and nuanced aspects of practice, and develop shared understandings and respect for difference. This requires humility and reflexivity at an individual level, and disruption of power and established hierarchy within education practices and systems more broadly. Examples of dietetics curricula content to support critical inquiry include teaching and learning about colonisation, anti-racism, gender and gender diversity, disordered eating, weight, and exploring implicit and explicit bias. Further, we need to be including and/or amplifying lived expertise and perspectives within dietetics education programs. For example, asking patients and other healthcare consumers about their perspectives of dietetics professionalism. Are we on the same page? Critical analysis can be further applied and integrated into our education and practice – for example, reviewing the narratives represented in our content and assessment – do they champion diversity? It is also important to critically reflect on and consider our terminology and language, our behaviours, and sociocultural practices in university and workplace settings. What are the hidden messages we are transmitting? Are we actively supporting or hindering professional socialisation and transitions? We need to foster a professionalism in dietetics that reflects an internal set of values, including being embracing of diversity, and an authentic commitment to social and racial justice; rather than being something that is performative and externally motivated.[11]

It seems there are numerous influences and signals, including the supporting evidence published in this issue of *Nutrition & Dietetics*, indicating that now is an important time for reinvention and cultural change within our profession looking forward into the 21st century. This is essential if we are to expand, fulfilling new roles moving forward, and truly meeting the needs of our diverse population. Boak et al.[14] and others have highlighted that significant cultural shifts and change are required within the profession and while complex interventions are required to support cultural change, this begins with developing a professional culture of learning and comfort with uncertainty. It is easy to become overwhelmed with the complexity of it all, but the impetus and capacity for change begins with every one of us at a personal and individual level and we need to work together in our local contexts to support cultural shifts. It is up to us as members of the profession, to be reflexive and commit to change. This is an active process, expanding our perspectives and practice, and challenging historical ways of doing and being as we embrace more interpretive and critical approaches and step into conversations in some of these more complex spaces. This includes shifting our focus more to the art of practice, and paying more attention to the sociocultural factors within our profession and our education systems, including how we support transitions and socialisation into the profession.[9] It seems particularly apt to consider expanding professional perspectives in the year that the profession lost one of its great pioneers, Peter Williams OAM, who wrote about the '*limits to what is regarded as acceptable difference*' in the profession only a decade ago.[21] To fully embrace diversity moving forward, the profession '*must reckon*

with its historical roots and step forward'[5] and expand the limits on what has been considered 'acceptable difference'. This requires reinvention and reshaping our ways of thinking, doing and being.

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ORIGINAL RESEARCH

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A qualitative exploration of the future of nutrition and dietetics in Australia and New Zealand: Implications for the workforce

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Abstract

Aim: We aimed to explore the future roles of nutrition and dietetics professionals, and what capabilities the workforce would need to fulfil these roles.

Method: A qualitative interpretive approach was employed. We conducted individual interviews with nutrition and non-nutrition thought leaders external to the profession. In addition, we conducted focus groups with experts within the nutrition and dietetics profession, academic dietetics educators and students/recent nutrition and dietetics graduates (total sample $n = 68$). Key nutrition-related issues and challenges, drivers for change and potential future roles of the profession were explored. Data were analysed using a team-based thematic analysis approach.

Results: Future roles of nutrition and dietetics professionals were described as food aficionados, diet optimisers, knowledge translators, equity champions, systems navigators and food systems activists, change makers, activists and disruptors. In addition, science was identified as a uniting framework underpinning the professions. An additional 16 critical capabilities were considered to underpin practice.

Conclusion: The results demonstrated that the current and future needs for workforce education and development need to address the impact of climate change, growing inequities, the democratisation of knowledge and the disruption of health and food systems. Education providers, regulators, professional associations and citizens need to work together to realise roles that will deliver on better health for all.

Rachel Boak and Claire Palermo are considered as joint first authors.

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KEYWORDS
education, environment, forecasting, qualitative research, workforce

1 | INTRODUCTION

Food and nutrition are central to optimising health and wellbeing, and crucial to the prevention and management of many diseases.[1] An ageing population, virtual worlds creating increased connectivity, the democratisation of knowledge and expertise, and demand for experience and social relationships have been highlighted as impacting on nutrition.[2] In addition, climate change, industrialised agriculture, and a globalised food supply all impact on the ability of nations, communities, households and individuals to maintain healthy dietary patterns.[2,3] Improving future health outcomes and the sustainability of the healthcare system requires shifting focus from treatment of illness to prevention or promoting health and wellbeing.[4] Complex and multi-strategy responses are needed to address these emerging priorities. The nutrition and dietetics profession, that spans food and health systems, is ideally positioned to address these priorities.[1] Yet, data suggests this workforce is limited in number and may not be adequately prepared to address these priorities.[5]

While comprehensive nutrition and dietetics workforce data is lacking, the data available suggest that the Australian and New Zealand dietetics workforce is small with approximately 6870 practitioners.[6–8] Traditionally, the public hospital sector was the dominant place of employment for dietitians. Emerging data suggests that employment in private practice is increasing, and separately, a large number of qualified dietitians work in unrelated occupations.[9,10] Less is known of the nutrition science workforce without dietetics qualifications other than the voluntary register of the Nutrition Societies highlighting approximately 150 registered nutritionists in Australia[11] and 208 registered nutritionists in New Zealand.[12] In the United Kingdom and United States, research has explored important future issues and directions for nutrition and dietetics workforces.[13,14] This suggests a growing demand for nutrition and dietetics professionals in areas such as community-based chronic condition prevention and management, aged care, personalised nutrition, food and agriculture, and technology/digital health.[13,14] In addition, this data suggests that the profession will be challenged to increase in size and build its professional identity, its diversity, and consider specialisation and employability.[13,14] It is clear that the provision of nutrition and dietetics services has great potential to generate economic savings and improved population health outcomes based on prevention, even over nursing and medicine.[15] However, there is limited data describing the future requirements for, and the needs of, nutrition and dietetics professionals in Australia and New Zealand.

Therefore, the aims of the study were to explore the roles of nutrition and dietetics professionals in the future, and describe the capabilities the workforce would need to fulfil these roles. The findings will inform future nutrition and dietetics education and practice in Australia and New Zealand and consider nutrition and dietetics professionals globally as the leaders in the nexus between food and health.

2 | METHODS

We employed an exploratory qualitative study grounded in interpretivism. Interpretivism does not seek a single objective reality but rather privileges multiple perspectives through social interactions drawing on the experiences of researchers and participants.[16] We took a team-based approach to data collection and analysis to support our interpretive approach in ensuring multiple views as we undertook the study. The team of senior dietitian-nutritionist-researchers from across Australia and New Zealand have experience in dietetics education, and practice in a range of settings. Reflexivity was applied during data collection, analysis and reporting, where robust iterative discussions were held between all authors, examining how each author's background and world view was influencing interpretation, and in line with our interpretivist approach to seek multiple meanings and interpretations to the data.[17] Human Research Ethics Committee (HREC) approval was provided by Queensland University of Technology (EC00171), The University of the Sunshine Coast Human Research Ethics (A201389), Monash University Human Research Ethics Committee (24447), Human Ethics the University of Auckland, Latrobe University Human Research Ethics (2000000231) and the University of Wollongong Human Research Ethics Committee (2020/199).

A maximum variation sampling[18] using the principles of information power[19] was used to gather the opinions of three different key groups: thought leaders within and external to the profession of nutrition and dietetics, students and recent graduates of the profession of nutrition and dietetics, academic dietetics educators and expert

members of the profession. The potential sample of thought leaders was identified by the research team through brainstorming known leaders in the profession ensuring diversity of experiences. Those external to the profession were identified through web-based searches related to future focused issues relevant to nutrition and dietetics. Many of the thought leaders were known to the researchers supporting the collection of rich data. An initial sample of 45 potential names was identified including participants from Australia, New Zealand, Pacific Islands, Canada, Europe and the United States. Current students and recent graduates from dietetics and nutrition science education programs were contacted through an email invitation or online learning platform by course coordinators from all accredited dietetics programs across Australia and New Zealand ($n = 19$ courses) at the time of the study. Nutrition science graduates were also invited to participate in the study via social media (private Facebook and LinkedIn). Practitioners, researchers, and interest group leaders were invited via the Australian and the New Zealand dietitian professional associations' weekly emails.

Data were collected through in-depth interviews with thought leaders, and focus groups held with students, graduates and members of the profession. The interview and focus group questions were developed through a preliminary search of the literature on the future of nutrition and dietetics practice from other developed countries and related research in Australia[5,13,14] (Table 1; full question list available from the authors upon request). Questions were adapted for the different participant groups. Informed consent was obtained.

Interviews were conducted by all authors between June and December 2020. Focus groups were conducted by the first author between October and December 2020. Initial focus groups and interviews were conducted with another member of the research team present to facilitate consistency of approach and to provide feedback. Interviews and focus groups lasted between 60 and 90 min and were all undertaken through the online video communication platform Zoom (2021 Zoom Video Communications, Inc.). Data were audio-recorded and transcribed verbatim using an automated transcription program (Otter.ai, 2016). All transcripts were reviewed against the audio-recording to ensure the accuracy of the transcription. Each participant and focus group were given a code. All six interviewers completed contact summary sheets[20] for each interview and focus group. The contact summary sheet prompted interviewers to consider the main issues raised in the interview. It aimed to record salient, interesting, important, or illuminating points and take-home messages. The sheet was completed after immersion in the interview transcript and were used to support data analysis.

TABLE 1 Overview of interview and focus group discussion guides and question logic

Focus of discussion	Logic
Key food and nutrition related issues facing Australia and New Zealand	To explore if issues identified by other countries, nutrition and dietetics professions and key government and nongovernment organisations in Australia and New Zealand reflect the experience of participants
Key influences or drivers of change on nutrition and dietetics practice;	Current and emerging trends in the Australasian environment and political landscape that may influence nutrition and dietetics practice
How current health and social challenges will impact nutrition and dietetics practice	Demographic, health care and other environmental and political influences will potentially change practice and therefore what the profession may need to consider
Future roles of nutrition and dietetics professionals & opportunities and challenges for the discipline	Gather perspective on opportunities for nutrition and dietetics professions into the future and compare how these relate to opportunities that have been identified in other developed countries
Skills required of the profession into the future	Explore if current competencies and education in nutrition and dietetics need to change and considerations for the future

The analysis approach was informed by thematic framework analysis. Framework analysis is a useful approach for team based analysis to ensure consistency in coding.[21] Initially a subset of four different interviews each were selected for analysis by one of each of three authors whereby each researcher analysed different sets of interviews. Line-by-line inductive coding of text was undertaken independently by these authors, who then came together to compare codes and their description. Codes were then compared and defined in short sentences to provide transparency to the coding framework such that it could be applied to the remainder of the data. All other transcripts were then coded by one of these three authors against this coding framework using Microsoft Excel (Microsoft Office, 2018). Where additional codes were identified as coding progressed, the coding framework was adapted to reflect the new code with regular meetings being conducted until data analysis was

complete with the three authors to compare and contrast coding and any new codes and definitions. At the completion of coding, the three authors came together to examine the data in the context of the research questions and examine frequencies and patterns across the data. These patterns were then used to identify future roles and capabilities. One author also produced a mind map which documented key concepts from the data and where ideas overlapped or connected and compared identified roles with contact summary sheets.[22,23] The identified future roles of the profession and capabilities were then presented to all authors for consideration and review. These role descriptors and capabilities were then revised based on feedback and through a process of constant comparison with the mind-map and until agreement was reached with all authors.

3 | RESULTS

A total of 33 individual interviews and nine focus groups were conducted involving 68 participants (Table 2). A further 10 people were invited to interview but either did not respond ($n = 7$) or declined ($n = 3$) due to lack of availability. Of these, six were within the profession and four were external. Eighty-five per cent of the interviewees ($n = 29$) were from Australia and New Zealand with the remaining participants from Canada ($n = 2$, United States ($n = 1$) and Europe ($n = 1$). Attempts to recruit professionals who were permanently based in the Pacific Islands was unsuccessful. A majority (85%) identified as either working in nutrition or dietetics with 40% working in academia (Table 2). Six roles that described the future nutrition and dietetics professionals were identified and potential new areas to utilise this expertise also illuminated from the data (Table 3) and are described below.

TABLE 2 Characteristics of interview and focus group participants

Area	Total participants
Thought leader—nutrition and dietetics professional[a]	25
Students/recent graduates[b]	12
Dietitians Australia members Special Interest Groups[c]	10
Thought leader—external to nutrition and dietetics[d]	8
Dietetics educators/academics	6
Fellows Dietitians Australia	4
Public Health Association of Australia, Food & Nutrition Interest Group	3

[a]Healthcare, Indigenous peoples' health and nutrition, Institutional foodservices, government bureaucrats, elite sports nutrition, academia, professional standards, curriculum and assessment in nutrition and dietetics, private practice, nutrition informatics, food industry.
[b]Final year students currently enrolled in undergraduate or postgraduate nutrition and dietetics programs or nutrition science or human nutrition programs or recent graduates of these programs.
[c]Food and environment, rehabilitation and aged care, food allergy and intolerance, eating disorders, public health and community nutrition, corporate, diabetes.
[d]Systems scientists, International/global health, Indigenous peoples' health and nutrition, sociologies of education, health, food, government bureaucrats, food security, horticulture systems in developing countries, neuromusculosketal health and wellness.

Sixteen capabilities that were essential to perform these roles were also identified including adaptability, advocacy, courage, creativity, critical thinking, cultural safety, curiosity, empathy, leadership, and the ability to translate science, build partnerships, be entrepreneurial, disruptive and solution focused, embrace diversity and use and create technology (Table 4).

The first role was as food aficionados. Participants explained that the nutrition and dietetics workforce should be recognised as the experts on the contemporary human relationship with food and its application to health for people, communities, businesses and populations. They explained that the profession currently lacks the communication skills required. They recognised that the study of nutrients is important but will not be central to how nutrition and dietetics professionals activate optimal health and wellbeing through food in rapidly changing food, health and social environments. They explained that the nutrition and dietetics profession is unique in that it works with the materiality of food as it is converted to biological physicality, social identity and geographical place-making. Having advocacy skills and being entrepreneurial with business literacy in their practice, was suggested as critical in transferring the enthusiasm for food and nutrition to others.

"*I think they [big organisations that are the face of nutrition] know …how complex it is to eat a good diet, and have a good relationship with food, but I don't know that we have the skills to communicate that and, you know, show people that we do really understand these things on a very deep level*" [INT019].

The second role was as diet optimisers in increasingly complex contexts. Participants described that nutrition and dietetics professionals will need to work simultaneously to optimise health and wellbeing as well as manage conditions with overlapping environmental, social, biological, transgenerational and comorbid drivers. It was acknowledged that this will require leading food and nutrition initiatives in settings that transcend the life course and are both inside and outside of the health system. They suggested that the future nutrition and

TABLE 3 Future new practice areas for the future nutrition and dietetics profession identified from the data

Roles	Description of role
Food aficionados	Harnessing cooking as a social practice through endeavours that reduce food work and accompanying mental load. Working with food industry in the development of novel and functional foods with a nuanced understanding of the conflicts of interest and ethical considerations this entails. Building systems where food is a central pillar of circular economies within local communities. Food decision support workers integrating risk management, other available data including that generated by artificial intelligence. School food and nutrition co-ordinators. Driving public policy that optimises healthy food choice. Fusionists, bringing together creative endeavours with food to create social opportunities, solving complex food and food systems problems to improve or optimise health through the fusion of multiple skills and perspectives to advance what is possible.
Diet optimisers in increasingly complex contexts	Mental health and addiction specialists who can design bespoke diets to optimise memory and mental functioning, and ameliorate the impact of a diagnosed mental health issue and facilitate recovery. Ageing health coaches will ensure the quality of life, social connections and optimised diet of an aged population that is living in the community. Personalised life-course diet optimisers (from womb to tomb) using genetic and microbiome data. Microbiome consultants able to optimise the gut and mucosal microbiome with diet, pre- and pro-biotic applications and biota cultivation and transplantation. Gamification designer that develops games with rewards that incentivise healthy diet consumption.
Knowledge translators	The generation, interpretation and communication of multiple "big" data sets that link food and health. Development of algorithms and software that underpin wearable datafication devices, artificial intelligence and Web 2.0 and 3.0 initiatives. Harnessing augmented reality for better health through food Food and science communicators providing real-time information about food products and ethics. Social media influencers and personalities—interpreting the science into visual bites that can be quickly absorbed.
Equity champions	Tailored, personalised, person-centred dietary coaching that is broadly accessible and delivered with empathy. Food equity brokers, working with food insecure individuals, households and the agencies that support them to develop nutritious, stigma-free and sustainable food safety nets. Food sovereignty consultants—working with and learning from Indigenous communities to build food sovereignty approaches to enhance community food security. Local community coordinators will work with communities to bring people together fostering intercultural and intergenerational understanding using food and food production as a key strategy. Food entrepreneurs who will work with individuals, businesses and communities to generate social enterprises that celebrate the culture of food and generate income and are representative of the diversity in society. Disaster food relief co-ordinators and mobilisers (local, national and international contexts).
Systems navigators and food systems activists	Leaders in international development and policy predicated on partnerships linking food with health. Political advisors to enhance systems perspectives. Nutrition sensitive agricultural experts including how changes to food supply will impact diet patterns and health. Nutrition consultants to agri-business, urban farms and gastro-tourism. Sustainable food systems analysts for institutions. Environmental impact consultants of food production and consumption using life cycle and economic assessments.
Change makers, activists and disruptors	Risk assessment, ethical navigation and amelioration, for example working with implant technologies, digital systems integration, artificial intelligence which track physiological, nutritional and biochemical indices.

(Continues)

TABLE 3 (Continued)

Roles	Description of role
	Industry research funding brokerage—ensuring distance between food industry and researchers. Predictive regulation analyst, conducting scans and assessments of food, health, education or other environments. Trade agreement negotiators that will ensure equitable global distribution of food that maximise human health and reduce the risk to planetary health. Minister of Food.

dietetics professional will continue to focus on person-centred care using person-generated data and in consideration of individual social eco-systems for the management of complex medical conditions. They recognised that future workforce will increasingly lead management of diet-related disease through a combination of nutrition support, pharmaceutical prescribing and behaviour change counselling. As diet is critical to health, participants suggested that the nutrition and dietetics professional will be instrumental in building systems, in food and healthcare, and in developing the tools and education for other health professionals to ensure nutritional health is a priority.

"*[in the future] the majority of people are not in aged care facilities. They're at home, and … particularly if you live alone, the motivation to cook well, is less. So I think there's … a huge opportunity for helping, … having community eating opportunities, engaging people, socially, so they're not isolated, assisting with all of that food preparation, so that they're able to eat well*" [INT021].

"*we've got to make sure that when we are caring for people, we're not just caring for them, …we're not just coming in to do what's necessary for the bit of therapy. We're also… saying, Okay, what is the environment this person is living in,…does that in any way, influence their health, is that in any way, impeding … the therapy goals we're trying to achieve here*" [INT008].

The third role was as knowledge translators. Participants suggested that nutrition and dietetics professionals of the future will have the responsibility for generating evidence. In addition, they explained they will need to be able to interpret complex and rapidly evolving nutrition, health and social science knowledge between different groups of knowledge creators, holders and users, translated for practical use. They explained that this role requires defending scientific knowledge from distortion. It was suggested that nutrition and dietetics professionals will critically evaluate and interpret nutrition as a constantly evolving dynamic science and in a crowded information ecosystem. They suggested the workforce will have the responsibility for translating and communicating the scientific evidence in ways that are accessible, pragmatic and practical. They will have a pivotal role in developing and harnessing technologies that increase access to and application of this evidence. The future nutrition and dietetics professional will have the credibility to effectively communicate with broad audiences, to generate meaningful dialogue and to mitigate growing channels of misinformation. They will be an independent, robust and critical voice that will hold others accountable to the defensible science, specifically countering nonscience-based food and nutrition misinformation which threatens to undermine or destabilise human health. They will practice the art of communication, balancing what people want to hear with what the science is saying. Strong science capability will support knowledge translation and communication.

"*We need to see that science was taken seriously….we need to be out there often and make sure we've got good, strong messages that don't fight with each other. And telling people 'what does that mean'? … it's not just the underlying knowledge that has to be good, but the messages about what to do about it.? And I think … part of it is we're just not out there enough*" [FG8].

The fourth role was as equity champions. The participants explained that the future nutrition and dietetics professionals will have to broker partnerships and collaborations that harness and combine their learned expertise in food, nutrition and dietetics with the lived expertise of the communities they serve. They suggested that they will need to be adept at placing the context of people's lives as central to achieving health and health equity through food. They will be able to build capacity and learn from the strengths of Indigenous cultures and other communities to optimise health through food and eating. Access to nutritious food was recognised by participants as a determinant of health and as such nutrition and dietetics professionals need to have a deep, working understanding of the implications of these determinants and how they impact on equitable access to a nutritious food supply. They will need to apply an equity, trauma-informed lens to all of the work that they do. The inequities associated with poverty and geographical isolation are urgent issues that will likely continue into the future. The future nutrition and dietetics professional will have the learned expertise to draw on a deep understanding of

TABLE 4 Critical capabilities identified from 68 participants listed in alphabetical order

Critical capability	Illustrative quote
1. Adaptable, Resilient	"Comfortable with chaos, comfortable with discomfort"
2. Advocacy, Lobbying, Activism	"Independent, robust, critical voice to hold people accountable"
3. Courageous, Confident	"We are risk averse and navel-gazing.... we need to be bold and non-judgemental"
4. Creative	"Innovation is going to be important"
5. Critical technology users& creators	"Harness the technology and keep evolving with it"
6. Critical thinking	"Is about weighing and interpreting the evidence"
7. Cultural safety	"Looking into, 'who am I?', which is one of the most political questions you can ask yourself, because then it orients you to yourself in relation to others and in the world"
8. Curiosity	"A growth mindset is important"
9. Disrupting expertise	"Collaborating with those with lived expertise will strengthen what we do"
10. Embrace and harness diversity	"Respect difference as a powerful resource"
11. Empathy	"Need to be able to put ourselves in other's shoes"
12. Entrepreneurial & business skills literacy	"Building and sustaining a business without relying on public funds"
13. Lateral leaders	"..our leadership needs to come in a much more expansive way in order to be heard.." "...bold, uncompromising, courageous leadership"
14. Partnership builders	"...we are going to have to build alliances, and part of being able to do that strategically is understanding the processes involved"
15. Science translation	"We are scientists but the art is in the translation into practical everyday strategies"
16. Solutions focused, initiating projects, seeking opportunities	".... patient [person] centric, solution driven collaboration, embracing technology"

the science and systems. They will be curious about, and continually seek to integrate the lived life experiences of individuals, communities, businesses and populations in optimising health.

The participants reported that learned expertise of future nutrition and dietetics professionals will only be validated in partnerships with those with lived experience. This includes having the ability to identify and understand how dominant paradigms and ideologies, for example heteronormativity, ableism, colonialism and capitalism, all impact the socio-cultural aspects of food consumption and health outcomes. Future workforces will need to be transdisciplinary, cross-system leaders making sense of the complex context underpinning equitable access to health for all through food. Being curious and culturally safe will be necessary to champion equity. Embracing diversity within and outside the profession and disrupting the power of their learned expertise where it is warranted is crucial.

"*That's the beautiful thing ... is that we can influence positive change at so many different levels across so many different areas. And I think, you know, being more aware of the strength based cultural determinants, not just the more deficit focused social determinants ... . those are a bit more deficit lens as opposed to the cultural determinants*" [INT017].

The fifth role was as systems navigators and food systems activists. Participants suggested that nutrition and dietetics professionals into the future will have to navigate the complexity of and interaction between food and health systems with social, education, political and economic systems. They will have a leading role in systems change and with defending and building ecologically sustainable, just and healthy food supplies. As the world and contexts become increasingly complex and uncertain, they will not only need to be systems thinkers they will need to connect and reimagine these systems. The participants recognised that diet was a modifiable risk factor, but the role of structures and systems which create and perpetuate dietary health problems was a barrier. They will be instrumental in providing leadership to enable other actors within health and food systems to work in ways that go beyond a biomedical model. They will facilitate dietary change and healthy eating through understanding social, cultural, economic and historical drivers of food choices and dietary patterns.

The participants described that future nutrition and dietetics professionals will be the food system activists leading action on generating a sustainable, equitable and healthy food supply for healthy dietary patterns at individual, community and population levels. They will create

and use the scientific evidence on climate, environment, diet and health to inform interventions and guidelines developed with scientific consensus to inform recommendations for nutrition sensitive production and consumption. They will be the leaders at the intersection of recommended food consumption patterns for human health and recommended food systems models which are ecologically sustainable and just, for restoring a safe climate for planetary health. Increasingly their work will also involve leading the preparation and response for food emergencies related to natural, climatic, biological and political disasters. They will work to mitigate threats to the vital relationship that people have with food, from within rapidly changing and fraught food systems. To do this they will need capabilities in lobbying, activism and courage.

"*you cannot call yourself a health professional … unless you advocate fiercely and frequently for the health of the planet, there are no healthy people on a ruined uninhabitable planet, … I think that that becomes a mission and the mantra and a message that that every dietitian can embrace*" [INT026].

The sixth and final role was as change makers, activists and disruptors. Participants explained that nutrition and dietetics professionals will need to drive change to protect the health of the community through food and nutrition. They will perform this work though a sophisticated understanding of the ethical, legal and political frameworks needed to ensure that appropriate positions, services and research are prioritised, financed and delivered. In the future the participants explained that the workforce will be negotiating the complex interactions between protecting human health, creating financially viable, profit-generating solutions and ensuring equitable access. They will be involved in generating and using scientific evidence in financially constrained, politically motivated environments. The future nutrition and dietetics professional will have a deep, nuanced understanding of the ethics of engagement, and the conflicts of interest that need to be managed. They will proactively disrupt systems to ensure equitable access to a healthy food supply and nutrition support. They will be the changemakers, by challenging the status quo and working in partnerships to develop solutions. To do this the participants explained that the future workforce need to be risk takers, capacity builders and will need to embrace technology and finding solutions through entrepreneurial endeavours and critical thinking. They will also need to be adaptable and resilient.

"*…we need to learn how to change society. And we need to learn how to be social justice activists or advocates to do so….Can we be open to…[being] legislators, lobbyists, bureaucrats, activists?…[we]…won't be afraid to stake political opinions, won't be afraid…*" [INT007].

4 | DISCUSSION

This study explored the future roles of nutrition and dietetics professionals and the capabilities needed to fulfil these roles. Potential future roles of Australian and New Zealand nutrition and dietetics professionals have been imagined, with data revealing that future professionals will be food aficionados, diet optimisers, knowledge translators, equity champions, systems navigators and food systems activists, change makers, activists and disruptors. Sixteen critical capabilities were reported. These findings provide key information to shape education and training, work practice and context into the future such that they are effectively positioned to improve nutritional health outcomes.

This study's findings concur with international research on the future of nutrition and dietetics, affirming the need for a clear professional identity, amplifying visibility and influence, embracing advances in science and technology, diversity, career advancement, knowledge translation, evidence generation and systems navigation and building its employability.[13,14] In addition, it affirms the growing demand for nutrition and dietetics professionals in areas such as community-based chronic condition prevention and management, aged health, personalised nutrition, food and agriculture, and technology/digital health.[13,14] The work has also highlighted the importance of nutrition and dietetics professionals generating evidence as well as translating it into practice. The importance of the professions' role in generating and translating research is stronger in this study than has been found in other work.[13,14] In addition, a number of novel findings unique to this study were identified, these include, needing nutrition and dietetics professionals that are capable of defending and building sustainable, just and healthy food systems, opportunities to build capacity and learn from the strengths of Indigenous cultures, the key importance of the human relational connection with food, and being change agents and activists to disrupt the status quo. These novel findings reflect the suggested urgency for nutrition and dietetics to reinvent itself in a world of increasing complexity and uncertainty[24,25] and highlight the emerging roles which must be embraced if they are to have impact and truly make a difference. Advances from the previous work in the United States[13] and United Kingdom[14] may reflect increasing urgency on climate action, and also the global pandemic, further highlighting the dynamic nature of health and health practice, and the quintessential requirements for nutrition and dietetics professionals to manage change.

As described above the emerging roles and future of nutrition and dietetics described by the participants in this study may be explained by shifts in the population's understanding of climate change and growth in technology. There has also been an enormous growth in social

media and knowledge democratisation[26] seen over the several years since these studies were undertaken, which has likely contributed to the study participants' perspectives. The undertones of the participants' perspectives across the data suggests that it is time for a significant cultural shift in the nutrition and dietetics profession which has been previously raised by others.[24] Cultural change requires a culture of learning and being comfortable with uncertainty, whereby innovations and entrepreneurial ideas are embraced and where failing is viewed as learning.[27] In addition, no one single approach will change professional or organisational cultur,e and complex interventions are needed to affect cultural change.[28] Key nutrition and dietetics professional organisations and individuals must work alongside those tasked with educating the future professionals to consider adaptation and embracing new ways of doing, and being to be able to rise up and remain salient and relevant into the future.

The critical capabilities identified in this study are largely reflected in the recently updated 2021 National Competency Standards for Dietitians in Australia,[29] and the 2017 New Zealand standards.[30] However many of the capabilities identified in this study do not reflect current nutritionist competencies,[31] except for those identified for public health nutritionists.[32] While the professions of dietitian, nutrition scientist, nutritionist and public health nutritionist have been delineated in previous work,[33] this study highlights blurred boundaries between these professions as well as incorporating potential for professions that may currently sit outside the traditional nutrition and dietetics space. There is a need for those that currently identify with these distinct professions to work together to potentially create a collective professional identity such that they can overcome these boundaries. This includes education providers, regulators and professional associations. While this study identified future roles, the descriptors and critical capabilities did not define professional boundaries. Flexibility of roles across health care is highlighted as a key part of addressing health shortages, and work practice and context gaps.[34] These boundaries exist across other areas of health care and can be successfully navigated.[34] This data shows there is an urgent need for action in different areas of practice and context, further highlighting the current size and capability of the workforce as inadequate.[5] It is time to define a unified nutrition and dietetics profession, which works together to develop as food aficionados, diet optimisers, knowledge translators, equity champions, systems navigators and food systems activists, change makers, activists and disruptors. Education providers may benefit from considering concept-based approaches[35] as they consider transformation of curricula to meet these needs.

The strengths of this study include the diverse and large qualitative data sample that drew on perspectives inside and outside nutrition and dietetics, and the team-based approach to data analysis. While this sample aimed to recruit Indigenous nutrition and non-nutrition thought leaders across Australia and New Zealand we acknowledge that this sample was small with only three participants identifying as Indigenous across the two countries. Therefore the perspectives of Indigenous peoples on the future of nutrition and dietetics are unlikely to be fully captured.

Overall this current study offers an updated and extended vision of the potential emerging future roles in nutrition and dietetics into the future. It provides specific insights for the nutrition and dietetics professionals in Australia and New Zealand and is also globally relevant. The results point to the need for future nutrition and dietetics workforce education and professional development to address the impact of climate change, growing inequities, the democratisation of knowledge, and the disruption of health and food systems. Education providers, regulators, professional associations and citizens need to work together to realise roles that will deliver on better health for all.

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CONFLICT OF INTEREST

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AUTHOR CONTRIBUTIONS

DG and RB conceptualised the study with input from all authors. All authors collected interview data, RB collected focus group data. DG, RB and CP analysed data with verification from all authors. DG, RB and CP drafted the manuscript. All authors contributed to revising and editing manuscript.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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ORIGINAL RESEARCH

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Underinvestment in nutrition research for at-risk populations: An analysis of research funding awarded in Australia from 2014 to 2021

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Abstract

Aim: To determine the proportion of research projects funded by the National Health and Medical Research Council and Australian Research Council research funding from 2014 to 2021 that aimed to understand or improve dietary behaviours for at-risk populations in Australia and estimate the proportion of total funding allocated during this period.

Methods: Retrospective analysis of the publicly available National Health and Medical Research Council and Australian Research Council funding grants over the 8 years from 2014 to 2021 (n = 18 098). At-risk dietary populations included people living in rural and remote Australia, Aboriginal and Torres Strait Islander people, or people living in socioeconomically disadvantaged areas. Descriptive analysis was undertaken.

Results: In total, 144 out of 18 098 (0.8%) individual grants totalling $96.8 million were identified relating to nutrition research from 2014 to 2021. Out of the 144, only 21 ($19.6 million; 0.1%) of all National Health and Medical Research Council grants were identified for nutritionally at-risk populations, with the majority focused on Aboriginal and Torres Strait Islander people (15/21). The National Health and Medical Research Council and Australian Research Council grants that aimed to improve human dietary behaviours increased by 0.66% and 0.58%, respectively, from 2014 to 2021. However, the National Health and Medical Research Council grants aiming to improve nutritional behaviours in at-risk populations decreased by 0.04% over the 8 years.

Conclusions: Despite slight increases in the proportions of funding to improve dietary behaviours over the past decade, nutrition research specifically targeting at-risk groups is scarce and appears to have decreased over time. Insufficient investment in research for these groups presents a risk for widening health disparities now and into the future. As such, they must be further supported and considered in the design of future funding schemes.

KEYWORDS
Aboriginal and Torres Strait Islander, diet, food and nutrition, funding, health services research, rural health, socioeconomically disadvantaged

1 | INTRODUCTION

Globally in 2017, 11 million deaths and 255 million disability-adjusted life years were attributable to dietary risk factors.[1] In Australia, in 2018, dietary risk factors represented 5.4% of the total burden of disease.[2] Dietary risks were the third leading risk factor contributing to disease burden after tobacco use and overweight and obesity around the world.[1] Due to the many social and commercial determinants of health impacting dietary intake,[3]Australians tend to have poor nutritional behaviours and this is consistent across all age groups. Some subgroups, particularly those of low socioeconomic status or those living outside of major cities, are less likely to meet dietary guidelines[4] due to inequitable access to healthy and affordable foods, which marginalises them.[3] Very little progress in improving population diets has been observed in the Australian population over time.[1,5,6] The 2020 Global Nutrition Report highlights the historical underinvestment in efforts to improve nutrition across the globe as a contributing factor to increasing preventable health burden.[7] The report outlines the risks of ongoing health inequities if the lack of investment continues and the need to emphasise nutritional wellbeing for all, particularly the most high-risk populations. Addressing health inequities is especially important in planning for post-COVID-19 recovery worldwide.[7]

There is significant potential to improve population health by optimising dietary intake and reducing preventable morbidity and mortality.[2,5] For example, fruit and vegetable intakes are well documented to reduce the risk of non-communicable diseases. Multiple randomised controlled trials and prospective cohort studies have shown that adequate consumption of fruits and vegetables positively affects serum lipid levels,[8] blood pressure,[9] insulin resistance,[10] makers of inflammation,[11] in turn reducing risks from non-communicable diseases like cardiovascular diseases, diabetes, chronic kidney disease, some cancers and total mortality.[12] Research and interventions to improve dietary intake across all subpopulations and age groups are urgently needed to improve overall health.

Theoretical changes in diet, for one of Australia's most significant contributors to mortality (cardiovascular disease), have shown great promise in reducing the risk of mortality and morbidity, which leads to less burden on the health system.[13] Significant gains can be made from small changes in diet, with studies observing a reduction in risk per gram increase in intake of fruit and vegetables. For example, in a pooled sample of 937 655 participants, a dose–response relationship for coronary heart disease per 477 g/day for combined fruit and vegetable intake (risk ratio [RR] of 0.88) was observed, with decreasing risks beyond this amount.[14] Despite the potential for reducing risks, national health survey data has shown that Australians generally do not meet dietary guidelines,[15] with only 7.5% of adults consuming the recommended amounts for vegetable intake in 2018.[4] Alston et al. modelled cardiovascular disease deaths in metropolitan and rural Australia and found that if everyone could meet public health recommendations for dietary intake and physical activity, 14 892 deaths would be potentially averted annually.[13]

To date, research into improving diet has shown much promise to reduce chronic disease.[16,17] However, with rapidly changing and unhealthy food environments,[18,19] positive dietary change is challenging, and it is a significant public health concern as detailed in the decadal plan for the science of nutrition.[20] The decadal plan for nutrition is a plan, convened by the Australian Academy of Science, to better utilise and develop the scientific evidence to help address the double burden of malnutrition and obesity, which have been identified as the major nutrition challenges of our time. The plan also focuses on promoting a secure nutrition and food future across all subpopulations in Australia.[20] Addressing dietary risks is also an international priority with the World Health Organization.[21] Dietary intake, quality and diet-related health outcomes follow the social gradient in Australia.[4] These nutritionally 'at-risk' groups include people living in rural and remote Australia, Aboriginal and Torres Strait Islander peoples,[22] people with a disability, or people living in socioeconomically disadvantaged areas.[4,23] These populations face increased challenges in accessing and consuming affordable healthy foods and tend to have higher rates of overweight and obesity, diabetes, cardiovascular disease, and poor oral health.[2,5,20,24,25] These groups are in particular need of equitable and low-cost population health initiatives that have been evidenced informed and based on current diet–health relationships, that also address societal and commercial factors, as outlined in the decadal plan for the science of nutrition.[20] Low investment in population health initiatives among at-risk populations will hinder progress and undoubtedly increase the likelihood of these groups experiencing

ongoing unequal health status for decades to come. It is essential that research funding schemes are reviewed on a regular basis to assess if funding distribution is applied relative to the need for at-risk populations, to ensure progress is made in addressing health among population groups that experience unequal health. Nutrition research will play an important role in addressing current health gaps and in preventing the exacerbation of further inequity.

This study aimed to determine the proportion of research projects funded by the National Health and Medical Research Council (NHMRC) and Australian Research Council (ARC) in the period 2014–2021 that aimed to understand or improve dietary behaviours for at-risk populations in Australia, and to estimate the proportion of total funding this represented in 2014–2021.

2 | METHODS

This study is a retrospective analysis of the publicly available NHMRC and ARC data sets that were available online. Data sets were available over an 8-year period from 2014 to 2021.[26,27] These data were non-human data available on public websites and did not require ethical review by an ethics committee. Grants from NHMRC and ARC were selected as these funding bodies represent the two largest, nationally competitive peer-reviewed funders for Australian research and development. Each data set was independently coded by three authors to determine the proportion of grants in the data set that aimed to understand or improve dietary behaviours, and deliver benefits to at-risk populations. Populations at risk of inadequate nutritional intake were defined by existing literature. They included people living in rural and remote Australia, Aboriginal and Torres Strait Islander peoples, people living in socioeconomically disadvantaged areas, or people living with a disability.[4,13,22,28,29] NHMRC targeted calls for research were included. All infrastructure or equipment and facilities support grants were excluded. Basic science and infrastructure grants were also excluded because the potential outcomes would benefit all Australians. Grants that focused only on policy analyses or assessments, mathematical modelling (or simulation type studies), supplements such as parental/enteral nutrition in critically ill patients were also excluded on the basis that outcomes do not directly target food-related dietary behaviours. Another author independently cross-checked all identified grants and resolved any discrepancies.

The search was conducted in two stages to (1) identify all grants that specifically aimed to understand or improve human dietary behaviours and (2) deliver benefits to at-risk populations. First, for all NHMRC and ARC grants, the 'Primary Field of Research' and the 'FoR Category' were filtered, respectively, for 'Nutrition and Dietetics'. All grant scientific titles and grant summaries/media summaries or plain descriptions were reviewed, and those that aimed to understand or improve human dietary behaviours were identified. To ensure a comprehensive search, a filter search strategy was conducted using the five research keywords or five health keywords for all NHMRC grants, and a keyword search was conducted for all ARC grants. The keyword search terms were broad, including truncations and synonyms of 'nutrition', 'diet', 'food', 'food behaviours', and 'eating behaviours'. Second, the grants identified in Stage 1 were screened to determine whether they aimed to benefit at-risk populations. All scientific titles and grant summaries/media summaries or plain descriptions, and research and health keywords were reviewed related to the at-risk groups of interest (people living in rural and remote Australia, Aboriginal and Torres Strait Islander peoples, or people living in socioeconomically disadvantaged areas). Funding totals were aggregated for both stages and compared to the total funding for the period 2014–2021 using descriptive statistics. All data coding and analysis were conducted using Microsoft Excel (version 16.54, Microsoft 365).

3 | RESULTS

Table 1 shows the total NHMRC and ARC grants from 2014 and 2021, along with the mean proportion of funding allocated across the time. In total, 144 out of 18 098 (0.8%) individual grants were identified relating to nutrition research from 2014 to 2021 (Table 1). Eighteen were identified from ARC and 126 from NHMRC schemes. Of the 144, only 21 (21/18098, 0.1%) individual grants were identified relating to nutrition research for at-risk populations. All 21 individual grants were identified from NHMRC, and none were identified from ARC. Of the 21 grants, 15 were focused on Aboriginal and Torres Strait Islander peoples, 5 were focused on people living in socioeconomically disadvantaged areas, and 2 were focused on people living in rural and remote Australia. No grants were identified focusing on improving dietary behaviours among people living with a disability.

Figure 1 shows that there were only minor differences over time. NHMRC and ARC allocated to grants that aim to understand or improve human dietary behaviours increased by 0.66% and 0.58%, respectively, from 2014 to 2021. NHMRC grants that aim to understand or improve human dietary behaviours in at-risk populations decreased by 0.04% over the 8 years. In 2021, 0.6% of the

TABLE 1 Total Australian Research Council and National Health and Medical Research Council grants by year from 2014 to 2021 that aim to improve human dietary behaviours and among at-risk populations

	2014			2015			2016			2017			2018			2019			2020			2021			Total 2014–2021		
Funding scheme	***n***	**$**	**%**	***n***	**$**	**%**	***n***	**$**	**%**	***n***	**$**	**%**	***n***	**$**	**%**	***n***	**$**	**%**	***n***	**$**	**%**	***n***	**$**	**%**	***n***	**$**	**%**
ARC																											
Nutrition focused	3	$571 606.00	0.05	1	$210 674.00	0.04	2	$749 120.00	0.1	4	$1 521 714.00	0.18	0	$0.00	0	3	$1 077 751.00	0.17	2	$923 147.00	0.09	3	$4 235 093.00	0.63	18	$9 289 105.00	0.2
Nutrition focused on at-risk populations	0	$0.00	0	0	$0.00	0.00	0	0	0.0	0	$0.00	0	0	$0.00	0	0	$0.00	0	0	$0.00	0	0	$0.00	0	0	$0.00	0
ARC total	1421	$1 077 668 620.00	100	1268	$559 954 325.00	100	1256	$591 895 243.00	100	1110	$849 559 463.00	100	1127	$580 663 855.00	100	1170	$629 250 267.00	100	1333	$1 078 447 609.00	100	1126	$676 011 044.00	100	9811	$6 043 450 426.00	100
NHMRC																											
Nutrition focused	18	$8 313 837.00	1.02	19	$8 312 894.00	1.06	9	$5 315 048	0.6	21	$12 457 048.00	1.5	16	$11 633 554.70	1.33	14	$8 840 081.00	1.13	18	$19 862 922.45	2.15	11	$12 822 598.00	1.68	126	$87 557 983.15	1.3
Nutrition focused on at-risk populations	2	$1 575 215.00	0.19	4	$2 233 614.00	0.29	2	$1 562 247	0.2	2	$1 061 999.00	0.13	5	$4 225 564.30	0.48	0	$0.00	0	5	$7 852 962.99	0.85	1	$1 169 419.00	0.15	21	$19 681 021.29	0.3
NHMRC total	1257	$811 901 785.00	100	1093	$780 645 195.00	100	1135	$896 140 626	100	1056	$828 821 760.00	100	1103	$877 678 619.25	100	1045	$783 269 192.00	100	857	$923 247 229.38	100	741	$762 465 859.00	100	8287	$6 664 170 265.63	100
ARC and NHMRC																											
Total nutrition focused	21	$8 885 443.00	0.47	20	$8 523 568.00	0.64	11	$6 064 168.00	0.4	25	$13 978 762.00	0.83	16	$11 633 554.70	0.8	17	$9 917 832.00	0.7	20	$20 786 069.45	1.04	14	$17 057 691.00	1.19	144	$96 847 088.15	0.8
Total nutrition focused on at-risk populations	2	$1 575 215.00	0.08	4	$2 233 614.00	0.17	2	$1 562 247.00	0.1	2	$1 061 999.00	0.06	4	$4 225 564.30	0.29	0	$0.00	0	5	$7 852 962.99	0.39	1	$1 169 419.00	0.08	21	$19 681 021.29	0.2
Total	2678	$1 889 570 405.00	100	2361	$1 340 599 520.00	100	2391	$1 488 035 869.00	100	2166	$1 678 381 223.00	100	2230	$1 458 342 474.25	100	2215	$1 412 519 459.00	100	2190	$2 001 694 838.38	100	1867	$1 438 476 903.00	100	18 098	$12 707 620 691.63	100

Abbreviations: ARC, Australian Research Council; NHMRC, National Health and Medical Research Council.

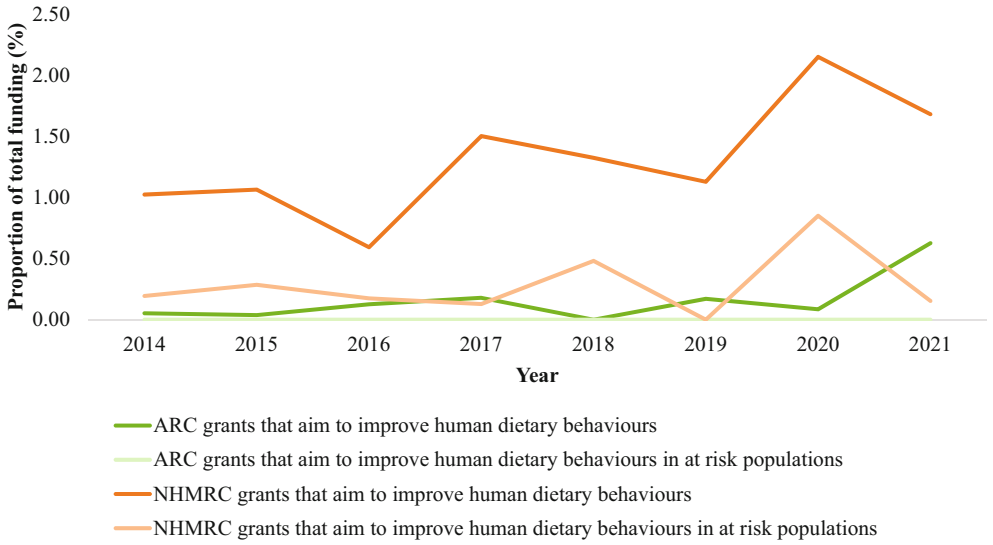

FIGURE 1 Total proportion of Australian Research Council and National Health and Medical Research Council grant funding by year from 2014 to 2021 that aim to improve human dietary behaviours and in at-risk populations. ARC, Australian Research Council; NHMRC, National Health and Medical Research Council

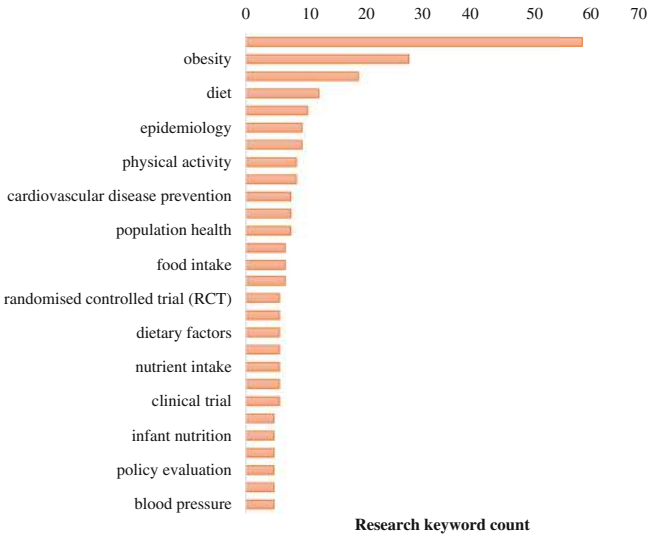

FIGURE 2 Top research keyword count for National Health and Medical Research Council grants from 2014 to 2021 that aim to improve human dietary behaviours and in at-risk populations. ARC, Australian Research Council; NHMRC, National Health and Medical Research Council

ARC funding went to grants to understand or improve dietary behaviours, the highest since 2014. Of the NHMRC grants, the year 2020 included the highest percentage of budget allocated to grants to understand or improve human dietary behaviours at 2.15%, with the lowest year being 2016 (0.6%). The average proportion of NHMRC funding allocated to grants that aim to understand or improve dietary behaviours was 1.31% from 2014 to 2021. An average of 0.3% went to grants focussing on nutritional behaviours in at-risk populations. The total proportion of funding (both ARC and NHMRC) allocated to grants to understand or improve dietary behaviours and dietary behaviours in at-risk people was 0.75% and 0.15%, respectively, over 2014–2021.

The top research keywords assigned by applicants to grants (63 total, five per grant for the 126 NHMRC grants) were nutrition ($n = 60$), followed by obesity ($n = 29$), dietary intervention ($n = 20$), diet ($n = 13$), public health ($n = 11$), Aboriginal health ($n = 10$) and epidemiology ($n = 10$; Figure 2). There were a further 464 keywords with four mentions or less.

Figure 3A outlines the total grants awarded from 2014 to 2021 that aim to understand or improve human dietary behaviours and Figure 3B outlines the total grants that aim to understand or improve human dietary behaviours in at-risk populations from 2014 to 2021. The figure shows an uneven distribution across the states, with New South Wales researchers receiving the largest funding (total $28 891 664) over the 2014–2021 time frame and the lowest being Tasmania (total $304 596). Investment in nutrition research in at-risk populations followed a different pattern. Most of the funding was awarded to researchers in Western Australia ($5 084 023), which was more than half (54.4%) of the funding awarded to Western Australia during the time frame. Tasmania received no investment in nutrition research in at-risk populations from 2014 to 2021.

4 | DISCUSSION

Overall, from 2014 to 2021, there was minimal NHMRC and ARC funding to grants which primarily focused on understanding or improving dietary behaviours. Although there was more allocation from NHMRC than ARC, the highest mean proportion of funds allocated was 2.15%, with even less going to grants focussing on at-risk

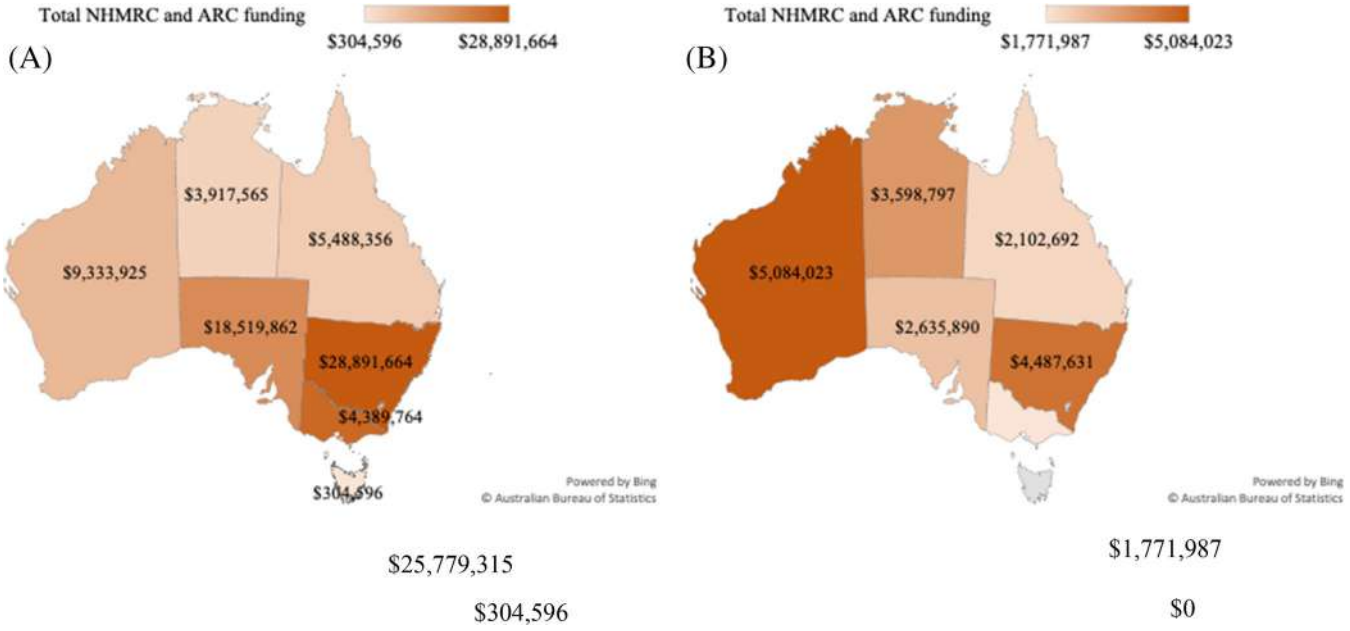

FIGURE 3 (A) Total funding distribution by state from grants that aim to improve human dietary behaviours from 2014 to 2021 and (B) total funding distribution by state from grants that aim to improve human dietary behaviours in at-risk populations from 2014 to 2021. ARC, Australian Research Council; NHMRC, National Health and Medical Research Council

populations such as rural and remote or Aboriginal and Torres Strait Islander peoples, or people living in socioeconomically disadvantaged areas. The very minimal research funding in this area is of particular concern. There appears to be a low investment in improving diets, limiting progress made in addressing dietary risks in Australia, among those most at risk. The lack of investment in nutrition research among at-risk populations is despite the Federal government's long-term National Health Plan, which aims to provide equitable health for all, focusing on preventative health, where diet research would play a key role.[30] There was also an unequal distribution of funding across Australia, with New South Wales receiving most of the funding for research focussed on improving human dietary behaviour. In terms of research focused on at-risk populations, Western Australian researchers received the most funding. This analysis provides evidence that Australia needs a national and strategic plan for building and streamlining nutrition research. This has been done in other developed countries, including the National Institutes of Health (NIH) in the United States. The NIH has released a strategic plan to accelerate nutrition research from 2020 to 2030, with major focuses including addressing health disparities and nutrition among minority groups.[31]

Our findings appear consistent with the research literature, especially around under-researched, at-risk populations. For example, a recent review by Alston and Partridge found that there has been minimal research over the past 20 years, describing interventions to improve dietary behaviours in rural Australia and even less focused on Indigenous Australians.[17] Another study also found that only a few nutrition interventions aim to improve food supply or food environments in non-metropolitan areas, in Australia and across the globe.[32] Our findings are also consistent with a review of NHMRC funding targeting all rural health research (awarded from 2000 to 2014), which highlighted a significant lack of investment relative to the health needs in rural communities.[33] Our findings support the assumption that rural health research focusing on improving dietary behaviour is still under-investigated. Limited change in investment has been observed over the 20-year period between our current study and the deficits in research funding previously highlighted.[33]

Populations of low socioeconomic status in developed countries like Australia tend to have an average of 2.1 years lower life expectancy due to their socioeconomic status alone.[34] Achieving a healthy diet is further challenged by the perceived and actual cost of healthy food.[35] Consistent with our findings of low investment in nutrition research aimed at disadvantaged groups, a review by Lewis et al. identified only a few studies investigating the cost of healthy food in Australian populations experiencing high levels of disadvantage.[36] Additional evidence shows that low socioeconomic groups are not well represented in nationally representative samples that examine patterns in dietary intakes to inform public health initiatives. This therefore is a further limitation to developing new knowledge to address inequities.[37] The same applies to people with a disability in Australia, another priority

population for nutrition research. This population is at an increased risk of poor diet than those without a disability and are at a higher risk of chronic disease.[23] For example, in 2018, 47% of people living with a disability reported not meeting fruit and vegetable intakes, compared to 41% of those without a disability in Australia.[23] Despite more than 4.4 million people with a disability in Australia, these data show that no funding has been allocated to research aimed at improving dietary behaviours in this population.[23]

Although it may reflect the position of nutrition-focused research teams across Australia and the Eastern positioning of the major eight Australian Universities (or 'Group of Eight'),[38] total funding distribution was not equal across the states. It is also difficult to ascertain whether research funding in these states was national or multistate in focus or included researchers collaborating across different areas. Nutrition researchers in NSW received the largest total funding across the time frame, perhaps a reflection of being the most populous state in Australia (including the largest Indigenous population in the country) and NSW has the most Universities out of any state.[29] Due to the higher population numbers, NSW may potentially have the higher nutrition research capacity and capability than other states.[39] Nutrition research is likely to be limited in this region. Tasmania received the least funding of all the states analysed, and further exploration is needed to understand why existing nutrition research capacity and capability are limited in this state.

Adequate research funding for advancing understanding or improving human dietary behaviours in Australia is critical to developing and translating effective interventions that will enhance nutrition and wellbeing, and prevent non-communicable diseases.[2] As such, a lack of funding support for such projects poses a considerable risk to the current and future health of the Australian population. Low investment in translational research has been reported by Zurynski et al., who found most medical research funding in Australia continues to be spent on basic research rather than on health services and public health research. Arguably, translational research in health services and public health research is where much of the translation needs to be embedded to effect change in population diets.[40] Furthermore, a lack of investment in researching nutritionally at-risk populations generates an environment where observed health disparities will continue to exist and likely widen, especially for morbidity and mortality associated with dietary risks in these groups.[2,4,23,29] There are already gaps in the data on dietary intake for at-risk populations in Australia, even among nationally representative surveys.[24,41]

To address the lack of funding for nutrition research, a national nutrition policy should be considered to guide and direct the prioritisation of diet-related research into critical areas of need by the nationally competitive funding bodies, including the NHMRC and ARC.[42] Australia has not had a national nutrition policy for nearly 30 years, despite poor diet being a significant contributor to the estimated $8.6 billion (in 2014–2015) dollars in annual healthcare costs and lost productivity from overweight and obesity in Australia.[43] Individual dietary risk factors alone have been estimated to cost Australia approximately $561 million annually in productivity impacts.[44] Given the economic and societal burden of poor nutrition, there have been increasing calls from expert nutrition researchers through the decadal plan for the science of nutrition to develop 'cost-effective, equitable population health initiatives developed from accurate knowledge of current diet–health relationships and addressing societal and commercial factors'.[20] Further research investment in robust nutrition interventions along with knowledge generation studies that include assessments of the drivers of the challenges experienced by at-risk groups, aligned with a national nutrition policy would significantly enhance this call to action. In addition, a focus on building capacity in food and nutrition research science as whole needs to be considered as a priority by universities, along with creating research coalitions focusing on improving diet in 'at-risk' populations. This will increase the likelihood of greater success of receiving funding.

This study utilised a comprehensive data set describing all ARC and NHRMC grant funding allocated over an 8-year time frame and used a robust method to categorise and define grants based on search terms and cross-checks by four experienced researchers. Limitations of this study include that the funding analysed does not include other funding sources, such as government or other foundation funding (such as the National Heart Foundation and Medical Research Futures Fund) and does not consider unfunded nutrition research that may have met the defining criteria, such as that being undertaken by higher degree research students. However, as NHMRC and ARC present as two of the most prestigious categories of funding considered in the Australian academic setting, these results provide an adequate picture for future consideration. It is important to note that the ARC grant scheme does have a lower proportion of funding due to different eligibility criteria compared to NHMRC (i.e. do not support 'research with direct medical and or human health aims or purpose'), which may also explain the lower funding allocations found for this scheme.[45] In addition, data from 2015 did not include media summaries, however, search terms and the researcher project summaries were still searched, so there is not expected to be variation in results due to this limitation. It is recognised that some grants may have addressed at-risk groups but did not mention such groups in the media or plain text summaries, titles or research keywords. However, it is assumed if at-risk population groups are the

critical priority population of the grant proposals, such groups should be mentioned, particularly in the research keywords. Further, we were not able to analyse the allocation of grants based on gender. This could be a significant influence as, broadly, the nutrition field is largely female-dominated and it has been documented that female researchers have experienced inequity in research funding.[46] This gender bias could be a factor impacting on grant allocation for nutrition research among at-risk populations.

Despite the immense potential for optimising diets to improve health in Australia, the NHMRC and the ARC funding for dietary research has been lacking for most of the past decade. Even more concerning is the low investment in research focusing on improving diets in Aboriginal and Torres Strait Islander people, rural, regional and remote residents, people experiencing socioeconomic disadvantage, and no funding among people with disabilities. Inadequate investment in research in these groups presents a real risk for widening health disparities now and into the future. Consideration of these deficiencies is needed when prioritising and designing nationally competitive funding schemes.

CONFLICT OF INTEREST

The authors declare no conflicts of interest relevant to this study.

AUTHOR CONTRIBUTIONS

LA and SRP conceived the research idea. LA, RR, SSJ and SRP all coded, analysed, contributed, wrote and reviewed the manuscript.

DATA AVAILABILITY STATEMENT

The data is publicly available.

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ORIGINAL RESEARCH

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An exploratory study of industry perspectives to inform undergraduate nutrition employability initiatives

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Abstract

Aim: The aim of this study was to explore nutrition professionals' perspectives of nutrition graduates' employability skills, and knowledge and skills required in the industry to understand gaps in undergraduate nutrition curriculum.

Methods: Nutrition professionals ($n = 26$) across Australia were approached to participate in semi-structured interviews via telephone in 2018. Interviews were transcribed verbatim, data analysed using thematic analysis, and results interpreted and discussed.

Results: Nine participants across six work environments completed interviews. Common work roles were identified in their diverse areas of practice: nutrition educators, food developers, team members, and business leaders. Nutrition professionals identified that, in addition to evidence-based discipline knowledge, key skills and knowledge needed for their roles were interpersonal communication, including writing and listening. Participants highlighted the need for employability skills to be embedded within curriculum with emphasis on professional skills, business skills and discipline-specific skills in communicating complex science messages to a range of audiences. Networking, and formal and informal work-integrated learning were viewed as important vehicles for developing required skills. Participants expected that universities develop curriculum to address gaps; however, reflection by the academic researchers suggested this should be a joint role.

Conclusions: Early career planning, professional skill development, work experience and networking opportunities should enhance graduate employability.

KEYWORDS

employability skills, nutrition graduate, professional skills, work-integrated learning

1 | INTRODUCTION

Nutrition graduates have a breadth of career opportunities available to them. Traditional roles include public health and policy, food industry, research and nutrition education, and there are many emerging roles such as in media and retail.[1] The Nutrition Society of Australia has established recommended national nutrition science competency standards to inform university education and ensure graduates are well prepared for these roles.[2] However, nutrition students and graduates have expressed anxiety and a lack of awareness of, and preparedness for, relevant employment opportunities.[3,4]

Formal and informal experiences during university education can shape students' awareness of, and preparedness for, future career opportunities. Employability in undergraduate nutrition programs is an emerging area of interest,[3,5] with studies designed to inform discipline-specific career readiness programs. A recent scoping review found that the most successful employability interventions are those that embed employability initiatives within the curriculum.[3] This may require support from individuals outside of the faculty, as a qualitative exploration of academic views found that those who have built careers as academics without relevant industry experience feel ill-equipped to provide careers advice.[3] More research is needed regarding the views of other stakeholders including students, graduates and industry professionals.

Based on the limited available research, it would seem that undergraduate nutrition students require opportunities to engage with the nutrition workforce in formal activities that are embedded in the curriculum and integrate key employment skills that are prioritised by future employers.[3] International research exploring the views of students, academics and industry in a broad range of disciplines has identified work-integrated learning, or internships, as the most popular and important method of increasing graduate employability.[6] These researchers also found that collaboration between universities and industry may support academics to include more authentic learning activities and assessment tasks.[6] However, they found that measures perceived by academics and students as important for improving graduate employability may be seen as less important by employers, therefore highlighting the need to understand employers' perspectives.[6]

The aims of this study were to explore how nutrition professionals working across the nutrition industry in Australia view knowledge and skills of nutrition graduates; to understand industry perspectives of knowledge and skills required to work in the industry; and thus identify gaps in nutrition graduate employability, with a view to using key findings to inform curriculum design in undergraduate nutrition programs to increase employability.

2 | METHODS

Ethical approval for the project was granted by the La Trobe University Human Ethics Committee (HEC18430). Funding for this study was through a 2016 La Trobe University Scholarship of Learning and Teaching Grant.

This study took place at La Trobe University, within the discipline of Dietetics and Human Nutrition. The discipline offers on-campus and online undergraduate human nutrition, undergraduate and postgraduate dietetics, and higher degree research studies. The focus of this research relates to employability of graduates from human nutrition undergraduate programs.

The research team hold the ontological view that there are multiple, socially constructed realities, and the epistemological position that knowledge is socially constructed by those active in the research process. These views align with constructivism, a research paradigm in which researchers collect and interpret naturalistic (real world) data to create new knowledge.[7] Constructivist research is typically qualitative, with findings presented dependent on the lens of the researcher in interpretation of the data.[7] The construction of new knowledge involves the incorporation of new information with existing understanding, and therefore the new knowledge that is constructed will reflect both the new data collected in the research process and the pre-existing understandings of the researchers. As such, it is important that the researchers' values are made explicit in the research process, and recognition of researcher stance is critical for internal coherence in nutrition research.[8]

The researchers involved in this study included academics involved in delivering undergraduate nutrition education, and a trained research dietitian contracted to undertake study activities including recruitment and interviews. All seven academic educator-researchers held undergraduate degrees in nutrition. Five had gained broad industry experience before beginning their academic careers. Their experience as nutrition educators ranged from 5 to 20 years. The perspectives and values of the research team were actively collected through semi-structured interviews of academic co-investigators. Formal review and thematic analysis of researcher perspectives, as well as discussion of results amongst the research team, was used to identify researchers' perspectives and reflect on how researcher views aligned with/differed from participants. These views add important context and meaning of findings for real-world application.

To capture the diversity of education, training, skills and experience of nutritionists, industry employers of nutritionists were mapped and included Australian food companies, multinational food companies, food producer associations, food retailers, meal delivery companies, quick service restaurants, local, state and federal, government and statutory agencies, not-for-profit organisations, corporate health organisations, media, marketing, public relations and communications agencies, entrepreneurs and sports nutrition services. Industry participants for this study were required to be working in a nutrition-focused role within one of the abovementioned sectors. Industry participants were identified using a purposive and snowball recruitment strategy to maximise representation across the sector. Initial industry participants were approached via email through networks of the research team and secondary participants through these links. Reminder emails were sent to all potential participants prior to and during the data collection period. A broad call for participation was not used as a recruitment strategy due to the limited time frame for data collection as outlined in the Grant guidelines.

Data were collected using semi-structured interviews, a method commonly used in interpretivist research to gather raw data that is subject to analysis and interpretation.[7] Interview questions were developed collaboratively by the research team using inquiry logic[9] and designed to address the aims of the study by eliciting information regarding graduate employability, skills required in the industry and gaps in undergraduate nutrition curriculum to inform the development of employability initiatives. The interview guide consisted of 12 questions focusing on five areas: current employment and role description, formal and informal education and training pathways taken, recommendations for curriculum based on work experiences following graduation, past employment and advice for graduates looking for their first job (see Appendix S1).

Telephone interviews were conducted by the research assistant at times convenient to participants. All participants were provided with a Participant Information Statement and Consent Form with their invitation to participate. Participants were provided the opportunity to discuss the research prior to completing and submitting their consent and were able to raise any issues at conclusion of the interview. All interviews were conducted in September 2018. Interviews were audio-recorded and transcribed verbatim. Participant names were not included in data files for analysis to provide maximum anonymity. Data files were stored on La Trobe University's secure research portal. NVivo 11 qualitative data analysis software was used as a tool to support data analysis.

Data were analysed using thematic analysis because it provides a structured and rigorous method for interpreting data, and constructing meaning, without generating theory.[10] Inductive thematic data analysis was conducted using Braun and Clarke's six-phase approach.[11] Two members of the research team conducted initial analysis of the data. During this first stage of analysis individual researchers conducted in-depth line-by-line reading of the data. While the interview questions suggested priori codes these were not developed further given the inductive approach to analysis. Next, initial codes were identified by individual researchers. Where meaning in the text was unclear, researchers discussed the text to reach consensus. Codes were cross-checked between researchers and where disagreement occurred, a third person, from the broader research team, resolved the issue. Following this, further analysis by the same individual researchers identified themes by collating codes. Codes were collapsed when the apparent themes were congruent. Major themes were confirmed by the two researchers when the text became repetitive, where text presented a high degree of commonality across several transcripts, and where a process of comparing and contrasting text yielded clear similarity to other text. Results were presented to the broader research team as summary tables of codes, major and other themes, and extracts from transcripts were selected to provide relevant examples.

Terms used frequently by participants that may have complex interpretations have been defined below in a manner best representing the views of participants to enable a common understanding:

Professional skills: non-technical skills or those unrelated to discipline skills that are inherent or acquired through education experiences including communication, teamwork, leadership, adaptability and interpersonal skills – these are also known as soft skills.
Work-integrated learning: educational activities that involve academic learning of a discipline within the practical application of a workplace, also referred to as 'internships'.

The *Checklist for Authors and Reviewers of Qualitative Research*[12] was used to guide the reporting of this study.

3 | RESULTS

A total of 26 nutrition professionals were approached to participate, 14 did not respond and nine participated. Reasons for not participating ($n = 3$) included lack of time, unable to find suitable time, connectivity issues at

TABLE 1 Common career roles, work responsibilities, and required skills and knowledge identified by industry participants in current roles (major themes in bold)

Career roles	Work responsibilities	Skills and knowledge needed
Nutrition educators	Writing/creating nutrition related content Translation of evidence-based science Communicating on food and nutrition	**Interpersonal communication** **Writing** Credible, evidence-based nutrition knowledge Social media skills
Food developers	Food and recipe development	Credible, evidence-based nutrition knowledge
Team members	Communicating with people	**Interpersonal communication** **Listening** Teamwork/collaboration Reflective Resilient/confident Accountable
Business leaders	General business skills and acumen, e.g. budgeting Managing people	Influencing people/policy Strategic thinking/planning People management

the time of interview, and inability to reschedule during study period. Eight participants were female and one male. The relatively small number of industry participants is a limitation that is acknowledged by the research team; however, analysis revealed common themes. Industry participants represented nutritionists across the following sectors: multinational food companies ($n = 2$), not-for-profit organisation ($n = 1$), producer association ($n = 1$), media, marketing, public relations and communications ($n = 3$), entrepreneur ($n = 1$) and meal delivery company ($n = 1$).

While there is a diverse range of career opportunities available to nutritionists, the responsibilities described by participants could be collapsed into four main work roles common to many areas of practice: nutrition educators, food developers, team members, and business leaders. Participants described the required skills and knowledge for their current positions which also aligned with these work roles, with strong interpersonal communication skills, including writing and listening, identified as major themes (Table 1).

Overwhelmingly, industry participants reported that undergraduate nutrition education did not provide adequate preparation for their current or intended industry role, with the acknowledgement that several held senior management positions not suitable for new graduates and requiring upskilling from postgraduate studies, internal training or on-the-job experience. Education was perceived to provide only the theoretical (scientific) background for the industry role; however, there was acknowledgement that some professional skills were developed, e.g. independence. Gaps in current education identified were development of strong interpersonal communication skills and translating scientific terminology into lay language.

One participant commented:

> 'I've interviewed a lot of graduates and I - again, I still feel that there is a real gap in their ability to communicate, to translate. I give them little assignments to do. They have to bring back blog posts and Facebook posts and all sorts of things for me. It's just really interesting that a lot of them just don't really know how to think from a comms/marketing perspective in terms of, who's my target, what would they need to know? How do I research to ensure that I've got good quality evidence to support what I'm saying? I just think there's some fundamental gaps in their ability to do those things'. I2

Additional themes identified as gaps in current education included professional skills, e.g. presentation skills; business skills; writing proposals; entrepreneurship; and support for volunteering.

To address these gaps in education, industry participants proposed a range of ideas for future curriculum development through structure and delivery of courses, and development of knowledge, skills and attributes, including professional skills, such as managing criticism, and business skills, such as marketing (Table 2).

One participant commented that the curricula should be:

> '...more about starting your own business, entrepreneurship, project management, presentation skills; I think more soft-skill-based activity that would enable you to perform

TABLE 2 Strategies recommended by participants to address employability-related gaps in undergraduate nutrition education

Structure and delivery of courses	Skills and attributes to develop through learning activities
Accommodate different learning styles	Business skills
Develop dedicated employability subjects	Marketing
Offer streams of study for diverse career options	Resume building
Invite guest speakers from industry	Media, social media management
	Project management
	Leadership
	Presentation skills
	Solution-based learning
	Reflection, understanding strengths
	Resilience, managing criticism
	Assertiveness
	Influencing people
	Translation of evidence-based nutrition science into lay terms

> your role ... you need to be a good person and you need to know how to conduct yourself and hold yourself ... and have all these skills in addition to having the intellectual knowledge'. I6

A greater emphasis on communication skills and building an understanding of the diversity of industry roles were also proposed. Industry professionals felt specific units of study focusing on industry employability would be of greater benefit than learning outcomes embedded throughout a degree program.

Another theme identified from industry participants was the high value of industry work experience for students, either from volunteering, internships or work-integrated learning, as a pathway to acquiring postgraduate contractual or part-time employment. Work experience was reported to lead to new networks and development of relationships with role models, mentors and potential employers. Industry participants were most familiar with dietetic, industry work-integrated learning, and reported a clear value to students with mutual benefits to the workplace. Work-integrated learning was seen to prepare students for the workforce by providing network links to employment and insights into the scope of opportunities in the field. For industry, work-integrated learning was an opportunity to access and nurture potential recruits plus obtain business support via student projects. The responsibility for providing work-integrated learning was perceived to be that of the university with industry taking a secondary, reactive role in responding to requests, rather than initiating independent or sector-wide programs.

One participant explained the links to employability:

> 'So placement's not just placement; placement is advertising of you [the student] as an employable person. We've supervised lots of students and I can see when there's potential, because sometimes you get people, who just get it. I would always say to students that your placement's not just a box that you're trying to tick to get your degree. ...these are your colleagues you're working with and they will be your colleagues for the rest of your career. You're advertising yourself to them. It's like a job interview. [my x company] has hired ... people out of university - three from their [dietetic] placements because we could see potential'. I3

When addressing advice to students seeking careers in industry, two themes were identified. The importance of establishing business networks with genuine connections whilst a student was seen to be key through social media visibility (e.g. LinkedIn) and seeking out multiple opportunities for face-to-face interactions. Secondly, volunteering was emphasised as a vital platform to grow networks. Additional themes included seeking assistance to build a strong resume, being nimble to different opportunistic pathways, and early strategic thinking towards industry career goals.

One industry participant commented:

> '...looking at their work experience history is a really important one and finding, especially in the area that I work, I was very interested in students that had sought out writing internships or more communication style of placements and had experience and volunteer - even volunteer work in writing or speaking or - just I guess something a little bit more consumer-focused...'. I4

4 | DISCUSSION

Nutrition professionals from a range of practice areas in this study offered valuable perspectives on knowledge and skills required to enhance nutrition graduate employability. They identified that communication skills were critical in their current roles, with business skills and professional skills required in addition to discipline-specific skills and knowledge. Nutrition professionals shared a range of potential strategies to improve graduate

employability. These included student-driven activities such as strategic career and study planning, networking, work and volunteer experience, as well as university-driven activities such as explicit teaching of business and professional skills, and creating more opportunities for work-integrated learning. These recommendations align with those of Australian dietetic graduates. Bacon et al.[13] surveyed graduates who reported the need for greater emphasis on communication skills and more placement. They also recommended more business, management, marketing, technology and job recruitment awareness be included in the curriculum. Interviews with Australian dietetic graduates confirmed that they experience a lack of support in transitioning to the workplace.[14] Dietetics education programs in Australia are specifically designed to support students to enter the workforce as entry-level practitioners and include at least 100 days of supervised workplace learning. There are no such requirements from accrediting bodies guiding nutrition education programs, thus highlighting the need for universities to develop and implement strategic initiatives to support graduate employability.

Participants represented a diverse range of nutrition career pathways including consultants, business owners, public health nutritionists, nutrition magazine editors, nutrition managers at large private food companies, and product developers. Given the diversity of nutrition career pathways and the differentiation of desirable skills required, consideration needs to be given to how employability skills, as well as role specific skills, are developed and offered to nutrition undergraduates.

Participants deemed effective communication with others as well as the ability to translate and present scientific evidence in lay terms as essential skills of industry nutritionists and highlighted the importance of professional skills for graduate employability. Finch et al.[15] also identified professional skills such as communication, interpersonal skills, and the ability to problem-solve and employ critical thinking as the skills most desired by graduate employers, and recommended that universities include learning outcomes related to professional skill development in their programs. The scoping review by Murray et al.[3] also concluded that employability skills development should be embedded within curriculum. However, during reflexive interviews, the research team academics involved in delivery of the nutrition curriculum reported experiences suggesting that students can be resistant to learning employability skills at university, perceiving that universities are designed to teach nutrition science rather than professional skills. Student resistance to learning non-technical skills has been reported by academics in other disciplines,[16] and Succi and Canovi[17] found that students undervalue the importance of professional skill development relative to employers.

While participants acknowledged that the university setting adequately addressed development of academic skills in relation to research and scientific writing, they felt that students' ability to transfer these skills to a workplace requires further development. Participants highlighted the relative lack of entrepreneurial skills including business and project management, budgeting, planning, and understanding how to conduct oneself in the workplace. Participants acknowledged that they had developed these skills on the job or through further training yet suggested that these skills should be embedded in undergraduate university education. Business skills as well as other pathway-specific skills such as media communication are not included as competency skills of a nutrition graduate.[2] However, with industry recognising the benefit of business acumen, and the constantly growing demand for students to better understand media communications, development of these skills could be beneficial for some nutrition career pathways. Embedding all skills for every nutrition career pathway is not realistically achievable due to an already crowded curriculum; however, the university setting may be able to provide an opportunity for students to acquire specific skills through major or minor streams, or with targeted elective subjects incorporating work-integrated learning. This would allow students to attain skills related to the study pathway of choice and provide them with a specific career-ready advantage. The realities of the current university environment in Australia and impacts of staffing and resources, and the COVID-19 related contraction of business,[18] may encourage opportunities for cross-discipline or discipline-university service collaborative approaches to provide opportunities for students to develop the required skills.

Work experience was universally identified by participants as positive for undergraduates, with benefits including building networks, understanding employability skills, building professional skills, and applying theory to practice. A potential barrier to implementing nutrition work-integrated learning, beyond the administrative burden on the academic institution, is the desire to seek and maintain work-integrated learning partners that include a broad range of nutrition career pathways. Secondly, there may be a requirement for students to choose a pathway prior to work-integrated learning and the potential that degrees may take longer to complete in order to incorporate a work-integrated learning opportunity.[19] However, not including work-integrated learning or some form of work experience as part of undergraduate nutrition programs is a disservice to industry, as participants in this study claim that graduates require

additional on-the-job training to develop role-specific skills. Participants suggested that the work experience could be formal work-integrated learning or voluntary work as both offer the opportunity to gain experience in a workplace setting. Both mandatory and optional volunteering were perceived to offer valuable skills and a 'means to expand networks and experience' by participants in the Griffith Dietetics Graduate Outcomes Survey.[20] Both options provide students with valuable work experience, and a platform to develop employability skills and build networks, as well as benefit industry by providing additional capacity and a more work-ready workforce. A future direction could see greater industry involvement or ownership of structured work-integrated learning; however, industry participants in this study did not appear to see this as their role, placing the responsibility with academic institutions.

Advice for students offered consistently from participants was the importance of networking and building experience. Networks were identified as including peers, work-integrated learning employers and teams, connections made through independent work experience, and volunteering connections. Participants identified that beyond building a network of people that students know, it is equally important to build a professional reputation through networking to benefit potential career pathways. This position is supported in the literature where networking has been related to internal and external perceived employability by increasing access to information and resources,[21] and a longitudinal study that found networking was related to career satisfaction, salary, and rate of growth of salary.[22] The second key message related to 'getting involved', referring primarily to engaging in volunteer opportunities with organisations recognised for their work in food, nutrition and health. Not only does this provide an opportunity to expand the students' networks, but also provides an opportunity to gain valuable industry-related work experience, and develop highly valued professional skills such as interpersonal skills, communication, problem solving and critical thinking, all of which enhance employability skills. The final key piece of advice for students was related to early identification of their desired career pathway to maximise the opportunity to specialise in relevant areas of study, take up targeted extracurricular activities and enhance future employment opportunities.

Participants expressed their view that professional skills be taught in the university setting, and that students need to recognise that they are learning these employability skills and the purpose for learning them. O'Leary[23] also concluded that perception of employability skills development opportunities is a key factor in how well employability attributes are actually enhanced in graduates. Reflecting upon this finding, the researchers propose that while looking at ways to further develop employability skills, it may also be prudent to signpost the inclusion of existing professional skill development and communicate the purpose and benefit to the student's future career. Given the current challenges facing the university sector, it might be a more promising alternative for industry and academia to work together to increase students' awareness of the importance of professional skills, and to provide more opportunities for students to develop professional skills through work experience.[17]

Fit-for-purpose skill building for future careers provides students with the opportunity to develop knowledge and skills specifically related to roles within the student's chosen nutrition pathway. While challenging, university nutrition degrees approach this in several ways, including offering streams of study focusing on developing the required skills for specific pathways, or offering electives that support the student's chosen pathway where concepts and content sit outside of the core competency areas.[2] Prior to being able to take advantage of either of these strategies, students need to know the pathways available, understand the career opportunities related to the pathways, and have decided about the pathway they wish to pursue. Participants suggested that more needs to be done to assist students to better understand the diverse range of pathways for nutritionists. If students have clear goals, then they can choose elective subjects, work-integrated learning, or seek volunteer opportunities to further develop the skills specifically related to their area of interest. Reddan[24] found that both career planning and work experience increased student perceived work self-efficacy in undergraduate students.

The diversity in nutrition career pathways creates opportunities and challenges for students, the university sector, and industry. To meet these challenges, all stakeholders need to contribute to supporting the development of work-ready nutrition graduates. The university sector should provide early study and career pathway planning, supported work-integrated learning opportunities, and signpost professional skill and competency development in collaboration with industry, and other cross-university disciplines and systems. Students should build networks, seek out relevant paid and voluntary experience, and develop employability skills. Industry should actively generate and support formal work-integrated learning programs, contribute to university curriculum advisory panels, and careers and other events that make clear for students the application of their study to industry roles.

Limitations of this study include the small sample size, yet a strength is the diverse range of perspectives from industry stakeholders included in the analysis. The majority of the participants had experienced work-integrated learning in their university education,

which provided important insight into the benefits of work-integrated learning and work experience from the perspective of both the graduate and employer. A strength of this study was the theoretical positioning of the research team, academics involved in the delivery of undergraduate nutrition education, that drove the study design, analysis and interpretation of results for application in the real world of undergraduate nutrition education. While the purpose of this research was to inform curriculum at one Australian university, the insights gained are applicable for nutrition programs throughout Australia and internationally.

Industry professionals in this study identified gaps in employability of nutrition graduates, and roles for students, industry and universities to address these gaps. Early career planning, professional skill development, work experience, and networking opportunities in undergraduate nutrition programs, developed in partnership with industry should enhance graduate employability.

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CONFLICT OF INTEREST

Emma Stirling has been involved in nutrition consulting to industry for more than 15 years on a range of separate projects; however, there is no direct conflict of interest to this research. All other authors report no conflicts of interest.

AUTHOR CONTRIBUTIONS

AF conceptualised the study. All authors contributed to study design. EM conducted the interviews. SC and EM completed data analysis. SC, ES, SM, JB and AF drafted the manuscript. All authors critically reviewed and approved the final manuscript, and declare that the content has not been published elsewhere.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

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ORIGINAL RESEARCH

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The Australian and New Zealand dietetics graduate outcomes survey: A cross-sectional study

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Abstract

Aim: There is a paucity of comprehensive and current employment data for dietitians. It is unclear if, and where, dietetics graduates are being employed and if they are sufficiently prepared to meet workforce and community needs. The aim of this study was to identify employment outcomes for recent dietetics graduates from Australia and New Zealand at 4–6 months post degree completion.

Methods: A cross-sectional survey was distributed to graduates from accredited dietetics degrees across Australian and New Zealand. Those who completed their university study in 2020 were eligible to participate. Descriptive statistics and frequencies were analysed and open text answers underwent summative content analysis.

Results: A total of 294 usable survey responses were received from 631 eligible graduates (response rate 47%). Seventy-five percent of graduates were employed in any field and 60% were employed in a role that required their degree. The most common area of dietetics employment was private practice, followed by hospital practice. Most commonly, graduates who did not need their degree to get their job were employed in healthcare-related roles, or nutrition- and food-related roles.

Conclusions: These findings are important for curricula development to ensure that students are suitably prepared for available employment opportunities. Work-integrated learning experiences may need to shift focus to skill development, rather than a specific job role, to better prepare graduates for the jobs of the future. Further monitoring of employment outcomes is necessary to track changes over time.

KEYWORDS

dietitian, education, employability, graduate, workforce

1 | INTRODUCTION

A key purpose of university education is to create employable graduates who can be effective members of their chosen workforce.[1] Due to the recently implemented performance-based funding model, government funding to universities is now partially based on graduate employment outcomes.[1] A strong and effective workforce is one that provides the opportunity for a sustainable livelihood for its members, and ensures that society gains the greatest benefit from utilisation of that workforce.[2] Due to a paucity of data exploring employment outcomes for dietitians, it is uncertain if current university curricula reflect contemporary employment opportunities. It is also unknown if the graduating dietetics workforce is being optimally utilised to the benefit of the community.

Professional dietetics associations (Dietitians Australia, Dietitians New Zealand, Academy of Nutrition and Dietetics, British Dietetic Association, Dietitians of Canada) collect data about members, which likely includes employment outcomes. However, these data are not always publicly available, and would not include individuals who choose not to be members of these organisations. Anecdotally, dietetics graduates in Australia report difficulty in finding employment post-graduation and it is perceived that there is an oversupply of new graduates for available positions.[3] In the UK, little is known about dietitians who work outside of the publicly funded National Health Service[4] and in the USA some dietitians report leaving the profession due to an inability to find employment, or being attracted by increased wages in alternative fields.[5] Understanding employment post-graduation provides essential data to inform competency-based education and accreditation systems, and to understand health systems and workforce needs.

In Australia, employment outcomes for all university graduates are collected annually by Quality in Learning and Teaching (QILT).[8] However, data for dietitians are published within the broad "health services and support" category.[6] Further analysis is not readily available, and under a data-sharing agreement, the data lack the specificity of the field in which dietitians work. Available graduate outcome data from Australia from two accredited programs indicated that, 6 months post-degree completion, between 85% and 95% of graduates were employed as dietitians.[7,8] The numbers of dietitians employed in private practice appear to be increasing, while those employed in hospital positions appear to be decreasing.[7,9] Older data indicate that 41% of individuals with a dietetics degree worked in an unrelated field.[10] However, these data are limited. That is, there is an over-representation of dietitians employed in the public hospital sector,[11,12] outdated information from more than a decade ago,[9–11] and graduate outcomes reported from single universities.[7,8] Comprehensive and current workforce data are lacking, and these data are necessary for workforce planning and development.[3,7,9,10]

In Australia and New Zealand, the dietetics workforce is educated according to two key documents: the national accreditation standards[13,14] which inform universities of their responsibilities to students, and the competency standards, which outline the skills graduates must have in order to enter the profession.[15,16] These standards and associated university curricula should reflect contemporary workforce needs. Employment outcome data are necessary to understand the contemporary workforce and accurately inform accreditation and competency standards, and curricula.

The aim of this study was to identify employment outcomes for recent dietetics graduates from Australia and New Zealand at 4–6 months post degree completion. These data can help the profession to monitor the changing nature of dietetics employment and health system needs, and can be utilised to inform changes to accreditation and competency standards, and curricula. This will ensure that graduates are being prepared for the contemporary employment landscape and that the emerging workforce is being optimally utilised.

2 | METHODS

A cross-sectional survey study of dietetics graduates in Australia and New Zealand was undertaken using Qualtrics XM (Provo, UT), which included questions adapted from the national Graduate Outcomes Survey (administered by QILT)[6] and the Griffith Dietetics Graduate Outcomes Survey.[7] It was pilot-tested by three of the authors who are expert researchers in the field, with more than 50 years combined experience in dietetics education research and one author with previous experience conducting the Griffith Dietetics Graduate Outcomes Survey.[7] In addition, doctoral candidates from Griffith and Monash Universities, who were dietetics graduates from previous years, also pilot-tested the survey to test for face and content validity. A summary of the survey questions can be found in the Table S1, and the full survey is available from the authors upon request. In order to encompass a wider range of roles beyond the title of "dietitian", the question was asked "did you need your dietetics degree in order to get this position?" rather than if graduates were employed as a dietitian. In order to explore the utilisation of "employability skills",[17] graduates who were employed in positions where a dietetics degree was not needed, were also asked to nominate skills that they

acquired during their studies that they utilised in their work. After completing the survey, participants could enter a prize draw for one of five online professional development nutrition courses offered by Monash University and winners were randomly selected.

Ethical approval was received from Monash University Human Ethics Research committee (project ID 24556). Representatives from every university in Australia and New Zealand with an accredited dietetics program[18] were identified through one author's networks and invited to participate. Online meetings were conducted with each representative to explain the project and garner support, with 18 out of 19 universities agreeing to circulate the survey. Representatives were asked to present an information video to their graduating students explaining the project and to collect personal email addresses from them prior to degree completion, as student emails can expire. The number of dietetics graduates from each university for the relevant period was also provided by the representatives.

Recruitment occurred between September 2020 and July 2021. There were 631 graduates eligible to participate four months after becoming eligible for provisional accreditation with their national body, typically after completing their university studies. A total of three email invitations were sent to graduates (invitation, reminder, final reminder) through university representatives over a period of 3–5 weeks. Social media and e-newsletter advertising was also utilised, through the industry-specific platforms of Dietitians Australia, Dietitians NZ, Dietitian Connection and Education in Nutrition, in addition to one of the author's personal LinkedIn profile, which had been advertised in the explanatory video previously shown to graduates.

Data were imported into SPSS version 26 (IBM Corp. Released 2019. IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp) and descriptive statistics and frequencies were analysed. Responses were excluded if they did not progress through the survey far enough to answer the question "Are you currently employed?" Partial answers beyond this question were included, and some questions were not answered by all respondents. Responses to four open-text questions (Table S1) were extracted, combined and inductively analysed using summative content analysis[19] in NVivo software (QSR International). Text was assigned a code and codes were then grouped into categories by one researcher. The other researchers independently crosschecked one-third each of the qualitative data to assess for relevance and agreement of the codes and categories, which resulted in minor updates to coding. The number of times a code appeared was calculated, and those most commonly occurring were reported.

3 | RESULTS

A total of 294 usable responses to the survey were received (from 631 eligible graduates; response rate 47%). Of these, 280 responses were from Australia (587 eligible graduates, response rate 48%) and 14 were from New Zealand (45 eligible graduates, response rate 31%). The age of participants ranged from 21 years to over 45 years (mode 23 years). The majority were living in Australia (93%) and were Australian citizens (81%; Table 1). Seventy-five percent of respondents were employed (in any field) and 60% were employed in a role that required a dietetics degree. The most commonly reported income bracket was $50 000–69 000 (24%) and 17% of respondents had relocated to find work.

One-third of respondents held multiple employment positions and a total of 350 jobs were reported (Table 2). The most common field of dietetics employment was private practice (28% of jobs held by respondents) followed by hospital (16% of jobs held by respondents). Graduates employed in roles that they perceived did not require a dietetics degree were most commonly employed in healthcare-related positions (5% of all jobs, 15% of non-dietetics jobs) and nutrition- and food-related positions (5% of all jobs, 15% of non-dietetics jobs).

Less secure employment, including contracts less than 1 year (full time and part time), casual and contractor positions represented 72% of all jobs (Table 2). The most common employment condition was casual (36%) with higher rates in non-dietetics positions (56%) than dietetics positions (26%). Permanent positions or long-term contracts of greater than 1 year accounted for 23% of positions. Thirty-two percent of positions involved less than 10 h of work per week and 29% of positions were 30 h or more, although this was higher in the dietetics positions (34%) than the non-dietetics positions (18%). Unemployed participants were mostly seeking only nutrition- and dietetics-related employment (79%; $n = 42/53$) and most commonly spent between 5 and 8 h each week on job-seeking activities (55%; $n = 29/53$; data not shown).

For graduates employed in positions that required their dietetics degree, the most frequent ways they found out about the job were through job advertisements (29% of all jobs; 44% of dietetics jobs) and networks related to university studies (19% of all jobs; 28% of dietetics jobs; Table 2). Graduates employed in positions that did not require their degree most commonly had the job prior to finishing their studies (17% of all jobs; 49% of non-dietetics jobs). The three most commonly reported tools that contributed to successful employment were (1) skills from previous work experience, (2) psychological factors, such as resilience, persistence and self-confidence

TABLE 1 Demographic and employment information of Australian and New Zealand dietetics graduates who completed their degree in 2020, and responded to the dietetics graduate outcomes survey at 4–6 months post degree completion ($N = 294$)

	n	(%)
Age		
21–25 years	211	71.8
26–30 years	47	16.0
31–35 years	15	5.1
36 years and over	21	7.1
Gender		
Female	266	90.5
Male	27	9.2
Prefer not to say	1	0.3
Country of study		
Australia	280	95.2
New Zealand	14	4.8
Member of Dietitians Australia or Dietitians New Zealand		
Yes	281	95.6
No	13	4.4
Country of residence		
Australia	272	92.5
New Zealand	13	4.4
Hong Kong (S.A.R.)	4	1.4
Malaysia	2	0.7
Singapore	2	0.7
Other[a]	1	0.3
Country of citizenship		
Australia	239	81.3
Hong Kong (S.A.R.)	16	5.4
New Zealand	15	5.1
Malaysia	12	4.1
China	4	1.4
Singapore	2	0.7
Other[a]	6	2.0
Employment status		
Employed (in any field)	220	74.8
Unemployed, actively looking	53	18.0
Studying, and employed	7	2.4
Employed after completing degree, but not currently	7	2.4
Studying, not employed	5	1.7
Not seeking employment at this time	2	0.7
Number of jobs[b]		
One	132	44.9
Two	74	25.2
Three or more	28	9.5
No employment	60	20.4
Employed as a dietitian[b,c]		
Yes	175	59.5
No	51	17.3
No employment	60	20.4
Specific fields of dietetics employment[b,d]		
Private practice	82	27.9
Clinical (hospital)	55	18.7
Community	23	7.8
Public health	13	4.4
Research	10	3.4
Sports nutrition	6	2.0
Aged care	3	1.0
Food industry	2	0.7
Food service	1	0.3
Other[e]	11	3.7
Relocated to find work[b]		
No	183	62.2
Yes	51	17.3
No employment	60	20.4
Annual gross income		
$1–$9999	30	10.2
$10 000–$19 999	25	8.5
$20 000–$29 999	29	9.9
$30 000–$39 999	33	11.2
$40 000–$49 999	17	5.8
$50 000–$59 999	35	11.9
$60 000–$69 999	36	12.2
$70 000–$79 999	23	7.8
$80 000–$89 999	2	0.7
$90 000–$99 999	2	0.7
I do not know	43	14.6
Prefer not to say	19	6.5

[a]Countries with only one response
[b]Includes respondents who were previously employed
[c]Eight data points missing
[d]Respondent has at least one job in this field and may work in multiple fields
[e]Nutrition counselling ($n = 4$), health related ($n = 3$), research related ($n = 2$), media ($n = 2$)

TABLE 2 Information relating to the positions currently and previously held by Australian and New Zealand dietetics graduates who completed their degree in 2020, and responded to the dietetics graduate outcomes survey at 4–6 months post degree completion ($N = 350$)

		Dietetics jobs ($N = 233$)		Non-dietetics jobs ($N = 117$)		Total[a] ($N = 350$)	
		n	%	n	%	n	%
Employment conditions	Casual	60	25.8	66	56.4	126	36.0
	Contractor	54	23.2	4	3.4	58	16.6
	Part time (>1 year)	26	11.2	19	16.2	45	12.9
	Full time (>1 year)	25	10.7	11	9.4	36	10.3
	Part time (contract ≤1 year)	30	12.9	7	6.0	37	10.6
	Full time (contract ≤1 year)	26	11.2	3	2.6	29	8.3
	Own business	11	4.7	5	4.6	16	4.6
	Other	1	0.4	2	1.7	3	0.9
Hours worked per week at each job	Less than 10 hr	77	33.0	36	30.8	113	32.3
	10–20 hr	45	19.3	43	36.8	88	25.1
	20–30 hr	32	13.7	17	14.5	49	14.0
	30–40 hr	68	29.2	19	16.2	87	24.9
	More than 40 hr	11	4.7	2	1.7	13	3.7
Field of employment							
Jobs that required a dietetics degree (N = 233)[b]	Private practice	99	42.5			99	28.3
	Clinical (hospital)	57	24.5			57	16.3
	Community	25	10.7			25	7.1
	Public health	15	6.4			15	4.3
	Research	10	4.3			10	2.9
	Sports nutrition	7	3.0			7	2.0
	Aged care	3	1.3			3	0.9
	Food industry	2	0.9			2	0.6
	Food service	1	0.4			1	0.3
	Other[c]	11	4.7			11	3.1
Jobs that did not require a dietetics degree (N = 117)[d]	Healthcare related			17	14.5	17	4.9
	Nutrition or food related			17	14.5	17	4.9
	Education sector			12	10.3	12	3.4
	Research			10	8.5	10	2.9
	Fitness industry			9	7.7	9	2.6
	Retail (not food related)			9	7.7	9	2.6
	Administration in healthcare			7	6.0	7	2.0
	Food retail			6	5.1	6	1.7
	Hospitality			6	5.1	6	1.7
	Other[e]			13	11.1	13	3.7
First heard about position							
Jobs that required a dietetics degree (N = 233)[f]	Advertised position	102	43.8			102	29.1
	Networks related to university studies	65	27.9			65	18.6
	Extra-curricular networking	30	12.9			30	8.6
	Through previous employment	7	3.0			7	2.0
	Approached employer directly	6	2.6			6	1.7

(Continues)

TABLE 2 (Continued)

		Dietetics jobs ($N = 233$)		Non-dietetics jobs ($N = 117$)		Total[a] ($N = 350$)	
		n	%	n	%	n	%
	Created own business	6	2.6			6	1.7
	Networks related to family and friends	3	1.3			3	0.9
	By putting name on a casual register	3	1.3			3	0.9
	Other	9	3.9			9	2.6
Jobs that did not require a dietetics degree (N = 117)[g]	Had job prior to finishing degree			57	48.7	57	16.3
	Advertised position			17	14.5	17	4.9
	Networks related to family and friends			12	10.3	12	3.4
	Utilising employment services			6	5.1	6	1.7
	Approached employer directly			5	4.3	5	1.4
	Networks related to university studies			4	3.4	4	1.1
	Approached by an employer			3	2.6	3	0.9
	Volunteering			2	1.7	2	0.6
	Other			1	0.9	1	0.3

[a]Should be $N = 364$ ((132 × 1 job) + (74 × 2 jobs) + (28 × 3 jobs) = 364); 14 data points missing from total.
[b]Three additional data points missing.
[c]Nutrition counselling ($n = 4$), health related ($n = 3$), research related ($n = 2$), media ($n = 2$).
[d]Eleven additional data points missing.
[e]Administration (not healthcare; $n = 5$), sports related ($n = 3$), media ($n = 2$), other ($n = 3$).
[f]Two additional data point missing.
[g]Nine additional data points missing.

and (3) networks related to university, such as other students, lecturers and placement contacts (Figure 1). These were also utilised by those who were yet to find employment. The most common employability skills utilised by respondents in jobs that did not require a dietetics degree were communication, teamwork, and planning and organisation (Figure 1).

Twenty five percent of respondents had some form of professional work experience prior to studying dietetics, and the most common fields were administration/clerical (32% of those with professional experience; $n = 24/74$), hospitality (26%; $n = 19/74$) and sales/customer service (26%; $n = 19/74$; Table 3). Eighty percent of respondents were employed during their studies, most commonly in a casual position (75% of those who had employment; $n = 176/235$), working 5–15 hr per week (51%; $n = 120/235$). Hospitality (31%; $n = 73/235$) and retail (29%; $n = 67/235$) were the most common fields. Sixty-four percent of respondents volunteered during their degree and this was most commonly nutrition related (89% of those who volunteered; $n = 168/189$) and included more than 50 total hours (33%; $n = 63/189$). After completing the degree, 32% of respondents volunteered and this was most often nutrition-related (85% of those who volunteered; $n = 80/94$) and was most commonly 20 h or less of total volunteering time (49%; $n = 46/94$). Forty eight percent of respondents had completed between one and 10 job applications and 67% attended between one and four interviews for nutrition- and dietetics-related positions. The majority of respondents (63%) did not apply for jobs not related to nutrition and dietetics, nor attended interviews (78%).

Content analysis identified that the most commonly preferred job in 5 years was hospital work (48%), followed by private practice (33%; Table 3). Some graduates indicated that they had several alternative preferences (20%) or stated that they would prefer to work in multiple sectors at once (17%). Some graduates highlighted specialty areas they would like to work in with the most popular being paediatrics (4.4%) followed by sports nutrition (3.6%) and eating disorders (2.8%). When comparing their current work locations and their 5-year goal, 55% ($n = 137/250$) were not working in their desired sector, while 44% ($n = 110/250$) of respondents had at least one current role in the sector they wished to work (not shown). Four percent ($n = 11/268$) of respondents indicated that they had worked in an overseas position, and 71% ($n = 189/268$) expressed an interest in possibly working overseas in the future (data not shown).

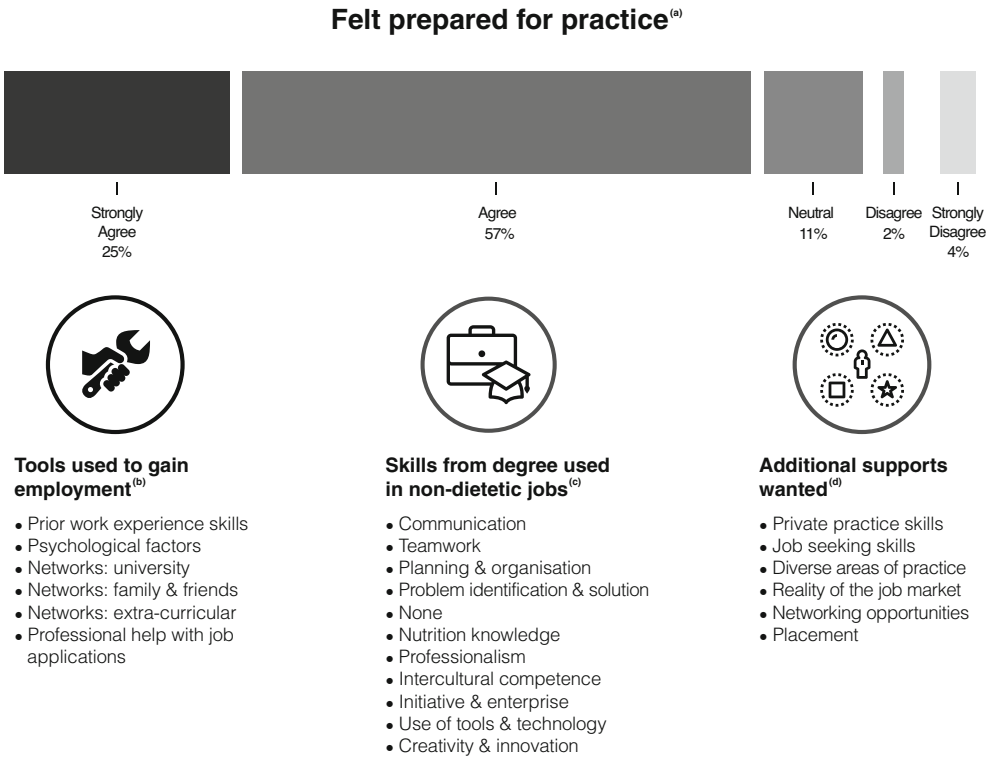

FIGURE 1 Perspectives on employability and preparedness for practice of Australian and New Zealand dietetics graduates who completed their degree in 2020, and responded to the dietetics graduate outcomes survey at 4–6 months post degree completion [a]Percentages do not total 100, due to rounding. [b]Respondents could select multiple options and some categories are synthesised from multiple categories: Prior work experience skills ($n = 354$), Psychological factors ($n = 295$), Networks: university ($n = 200$), Networks: family and friends ($n = 105$), Networks: extra-curricular ($n = 73$), Professional help with job applications ($n = 49$). [c]Respondents could select multiple options for each job reported ($n = 117$ jobs): Communication ($n = 62$), Teamwork ($n = 48$), Planning and organisation ($n = 43$), Problem identification and solution ($n = 38$), None ($n = 32$), Nutrition knowledge ($n = 31$), Professionalism ($n = 29$), Intercultural competence ($n = 24$), Initiative and enterprise ($n = 20$), Use of tools and technology ($n = 20$), Creativity and innovation ($n = 19$). [d]Private practice skills ($n = 47$), Job seeking skills ($n = 44$), Diverse areas of practice ($n = 32$), Reality of the job market ($n = 19$), Networking opportunities ($n = 14$), and Placement ($n = 10$)

The majority of respondents (83%) either "agreed" or "strongly agreed" with the statement "[my university degree] provided me with knowledge and skill preparation for entry level nutrition and dietetics practice" (Figure 1). Content analysis of all open text responses identified additional support that respondents would have liked from their universities to assist with entry-level practice and employability. The three most common were private practice skills, job-seeking skills (e.g., resume writing, practising for interviews and addressing key selection criteria) and knowledge of, and preparation for, diverse areas of practice (Figure 1).

4 | DISCUSSION

The aim of this study was to provide current data on employment outcomes for dietetics graduates from Australia and New Zealand at 4–6 months post degree completion. This research provides valuable information which can assist the dietetics profession to monitor the changing nature of dietetics employment. The results demonstrated that more than half of graduates are employed in a role that required their degree 4–6 months after completing their studies, and private practice was the most common field of dietetics employment. This study is important for providing data to ensure that students are suitably prepared for available employment opportunities and to identify workforce trends and gaps.

Employment rates for graduates in Australia and New Zealand are lower in dietetics than the Australian national average. Overall employment rates (in any field) for dietetics graduates were 75% which is lower than the QILT rates of 85% for all university undergraduates and 92% for postgraduates.[6] Although care must be taken with this comparison, in the current survey, unemployed graduates may be less inclined to participate, and therefore unemployment rates could potentially be higher than reported. Employment rates in all occupations vary

TABLE 3 Employment and volunteering experience of Australian and New Zealand dietetics graduates who completed their degree in 2020, and responded to the dietetics graduate outcomes survey at 4-6 months post degree completion ($N = 294$)

		n	%
Work prior to study			
Professional work experience prior to studying[a]	No	220	74.8
	Yes	74	25.2
Field of professional experience prior to studying[b]	Administration or clerical	24	8.2
	Hospitality	19	6.5
	Sales/Customer service	19	6.5
	Reception	15	5.1
	Retail	12	4.1
	Nutrition related	11	3.7
	Business	9	3.1
	Hospital	8	2.7
	Food preparation	7	2.4
	Marketing	7	2.4
	Education	6	2.0
	Aged care	4	1.4
	Other[c]	30	10.2
Employment during study			
Employed while studying	Yes	235	79.9
	No	59	20.1
Employment conditions	Casual	176	59.9
	Part time	51	17.3
	Full time	2	0.7
	Contract	4	1.4
	Other	2	0.7
Hours worked while studying	Less than 5 h per week	18	6.1
	5–10 h	63	21.4
	11–15 h	57	19.4
	16–20 h	47	16.0
	21–25 h	33	11.2
	26–30 h	14	4.8
	31–35 h	0	0
	36–40 h	2	0.7
	More than 40 h	1	0.3
Field of employment while studying[b]	Hospitality	73	24.8
	Retail	67	22.8
	Administration or clerical	37	12.6
	Sales/Customer service	37	12.6
	Reception	26	8.8
	Education	23	7.8
	Nutrition related	22	7.5
	Food preparation	19	6.5
	Hospital	19	6.5

(Continues)

TABLE 3 (Continued)

				n	%
	Fitness or sports industry			14	4.8
	Healthcare related			11	3.7
	Marketing			10	3.4
	Business			5	1.7
	Aged care			5	1.7
	Other[d]			17	5.8
Volunteering					
		While studying		After degree	
Volunteered	Yes	189	64.3	94	32.0
	No	105	35.7	200	68.0
Nutrition related	Yes	168	57.1	80	27.2
	No	21	7.1	11	3.7
Total hours spent[e]	10 h or less	23	7.8	28	9.5
	11–20 h	31	10.5	18	6.1
	21–30 h	33	11.2	12	4.1
	31–40 h	20	6.8	6	2.0
	41–50 h	16	5.4	4	1.4
	More than 50 h	63	21.4	22	7.5
	Prefer not to say	3	1.0	1	0.3
Job seeking experiences					
		Jobs related to nutrition and dietetics		Jobs NOT related to nutrition and dietetics	
Applications completed	None	7	2.4	184	62.6
	1–5	88	29.9	75	25.5
	6–10	53	18.0	24	8.2
	11–15	49	16.7	6	2.0
	16–20	32	10.9	4	1.4
	21–25	16	5.4	0	0.0
	26–30	13	4.4	0	0.0
	More than 30	36	12.2	1	0.3
Interviews attended	None	59	20.1	46	15.6
	1–4	196	66.7	63	21.4
	5–8	24	8.2	1	0.3
	9–12	7	2.4	0	0.0
	13–16	1	0.3	0	0.0
	Not applicable	7	2.4	184	62.6
Preferred job in 5 years ($n = 250$)[b]					
Preferred field	Clinical (hospital)			121	48.4[f]
	Private practice			83	33.2
	Multiple different options			49	19.6
	Multiple sectors at once			42	16.8
	Community			28	11.2
	Public health			19	7.6

(Continues)

TABLE 3 (Continued)

		n	%
	Research	17	6.8
	Own business	16	6.4
	As a dietitian	14	5.6
	Food industry	11	4.4
	Aged care	7	2.8
	Academia	5	2.0
	Alternative healthcare field	5	2.0
	Unsure	5	2.0
	Further study	4	1.6
	Other[g]	6	2.4
Preferred specialty	Paediatrics	11	4.4
	Sports nutrition	9	3.6
	Eating disorders	7	2.8
	Gastroenterology	7	2.8
	Media	4	1.6
	Chronic disease	4	1.6
	Non-diet/HAES[h]	4	1.6
	Other[i]	9	3.6
Additional preferences	Full time employment	22	8.8
	Rural or remote location	5	2.0
	Metropolitan location	1	0.4

[a]Full time employment.
[b]Respondents could nominate multiple fields.
[c]Food industry ($n = 3$), fitness industry ($n = 3$), research ($n = 3$), management ($n = 3$), healthcare related ($n = 2$), finance related ($n = 2$), arts ($n = 2$), other ($n = 12$).
[d]Childcare ($n = 5$), research ($n = 3$), beauty therapy ($n = 2$), other ($n = 7$).
[e]Three data points missing.
[f]Percentages in this column are based on $n = 250$.
[g]Food service ($n = 3$), dietetics combined with another field ($n = 2$), business ($n = 1$).
[h]Health at Every Size.
[i]Mental health ($n = 3$), disability ($n = 2$), women's health ($n = 2$), oncology ($n = 1$), sustainability ($n = 1$)

by state relative to population size[20] and state funding allocations can affect dietetics employment opportunities.[21] Dietetics graduates are also faced with insecure (perceived to be temporary[22]), or precarious (time limited[23]) employment, as almost three quarters of all positions held by graduates were short term, casual or contractor roles. The Australian workforce in general is experiencing an increase in job insecurity.[22] This is concerning given that insecure and precarious employment negatively impacts health and wellbeing[24] and the ability to plan for the future.[25] However, the flexibility offered by short-term and casual employment may be appreciated by some individuals, with work–life balance reported to be better for women working in casual positions.[26] In addition, the staff turnover created by individuals taking maternity leave[27] creates temporary back-fill positions that may be valued by job seekers as a means of acquiring experience. It is concerning, however, that older data show that 41% of Australians with a dietetics degree do not work in the field,[10] which has financial implications given the investment in education made by both students and taxpayers. Long-term data will be required in order to assess if the prevalence of insecure or precarious employment continues long term, or results in individuals choosing to leave the dietetics profession.

The previously available data on fields of dietetics employment in Australia is 17 years old.[9] These data reported that, across the profession, rates of private practice employment increased from 15% in 1991 to 21% in 2004.[9] The current study shows that this rate is higher among current new graduate dietitians, with 28% of respondents having at least one job in private practice. This is reflective of broader health system changes which demonstrate a move towards ambulatory care.[28]

Concurrently, the literature demonstrates a reduction in the number of dietitians working in hospitals or nursing homes from 54% in 1991 to 43% in 2004.[9] Graduates have previously reported that dietetics university degrees focus heavily on preparing graduates for hospital roles, leaving them feeling unprepared for alternative fields, such as private practice and other emerging areas of practice.[3] The current study also demonstrated this, with private practice skills noted to be a key area that respondents felt was lacking in their preparation for the workforce. In addition, respondents identified knowledge of, and preparation for, diverse areas of practice as something they would have liked from their university study. This is challenging given that many jobs of the future are yet to be identified.[29] Graduates need to think broadly about potential work options; hence, more diverse placement settings may be beneficial. Placements that develop skills in areas such as entrepreneurship, business and communications (to name a few), rather than just matching placements with jobs, may help graduates to be more prepared for the future work environment. Accreditation standards should consider being more adaptable to changing workforce needs to encourage and support university programs to create a modern and flexible workforce.[30] Ongoing employment data will be essential to continue to identify emerging work settings.

Information about the reality of the job market was also highlighted as lacking in current university degrees. Graduates have previously reported that the challenging nature of finding employment was not made apparent to them until too late in their degree.[3] Comprehensive workforce data were previously lacking, so the reality of the job market was not known. The current study provides valuable information that can better inform prospective and current students about the reality of the jobs that are available. Key messages that should be conveyed to students and prospective students are that employment rates for this profession may be lower than the national average, and that hospital work is not the predominant employment setting. In addition, the profession is seeing a move away from preparing graduates for "jobs" and envisaging a skilled workforce equipped to work across a broad range of settings.[31] Recently published futures research details six emerging roles for nutrition professionals, and as an example, includes such roles as food aficionado, diet optimiser and knowledge translator.[31] This is very different from the previous dietetics silos of hospital, public health and food service. Students need to be forewarned that work opportunities for dietitians are evolving, and a level of tolerance for uncertainty will be essential for navigating this career successfully.[32]

A strength of this study was that distribution through university representatives enabled a wider range of graduates to participate rather than only those connected to professional networks, such as Dietitians Australia and Dietitians NZ. This potentially captured individuals in diverse roles, and those yet to find employment. Students were informed about the survey prior to finishing their degree and the invitation came from someone known to the graduate, with the goal of enhancing response rates. The response rate to this survey was higher than others.[6] The experience of graduates who did not complete the survey and the reasons for going into private practice remain largely unknown. The extraordinary circumstances created by the COVID-19 pandemic are likely to have affected the employment experiences of graduates. Long-term data will be needed to understand whether this resulted in reduced employment due to widespread job losses[33] or increased employment due to expansion and diversifying of the COVID-19 health workforce.[34] The use of validated survey questions is also a strength and the instrument should be considered for use in future studies.

Employment rates for dietetics graduates are lower than the national graduate average, and work locations are changing, with almost a third of graduates employed in private practice. Work-integrated learning experiences may need to shift focus to skill development, rather than a specific job or work context, to better prepare graduates for the jobs of the future. Continuous monitoring of employment outcomes is necessary in order to track changes over time and meet the evolving needs of graduates and the communities they are trained to serve.

CONFLICT OF INTEREST

Claire Palermo is an Editorial Board Member of Nutrition & Dietetics. They were excluded from the peer-review process and all decision-making regarding this article. This manuscript has been managed throughout the review process by the Journal's Editor-in-Chief. The Journal operates a blinded peer-review process and the peer reviewers for this manuscript were unaware of the authors of the manuscript. This process prevents authors who also hold an editorial role to influence the editorial decisions made. The authors declare no other conflicts of interest.

AUTHOR CONTRIBUTION

All authors contributed to conceiving the study. MB analysed the data and drafted the manuscript. CP, LM and SG crosschecked qualitative data analysis and provided critical revisions to the manuscript. The authors wish to acknowledge the Griffith University Dietetics Graduate Outcomes Survey developed by Dr Lana Mitchell and Prof Lauren Williams which helped form the basis for this project.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

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ORIGINAL RESEARCH

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A novel perspective of Australian primary care dietetics: Insights from an exploratory study using complex adaptive systems theory

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Abstract

Aims: Effective quality improvement strategies are essential to enhancing outcomes of dietetic care. Interventions informed by complex adaptive systems theory have demonstrated effectiveness in other healthcare settings. This study aimed to explore primary care dietetics practice using complex adaptive systems theory and to identify factors that individuals across the healthcare system can examine and address to improve the quality of dietetic care.

Methods: Qualitative analysis of semi-structured interviews of healthcare consumers and professionals involved in the provision of dietetic care. Data collection and analysis was guided by a complexity-informed conceptual framework. The Framework Method was used to code transcripts and identify themes describing primary care dietetics.

Results: Twenty-three consumers and 26 primary care professionals participated. Participants described dietetic care as being delivered by individuals organised into formal and informal systems that were influenced by the wider environment, including legal, economic, and socio-cultural systems. Dietitians described interactions with consumers as a learning opportunity and sought education, mentoring, or supervision to address knowledge and skill gaps. Relationships underpinned transfer of information between individuals.

Conclusion: Complex adaptive systems theory proved to be a useful conceptual framework for primary care dietetics. Factors identified at the macro (e.g., funding), meso (e.g., professional networks), and micro (e.g., consumer education) levels should be examined and addressed to improve the quality of dietetic care.

KEYWORDS

qualitative research, primary care, private practice, quality of care, complex adaptive systems, systems analysis

1 | INTRODUCTION

Dietitians provide nutrition care to prevent and treat disease and have demonstrated effectiveness at improving clinical outcomes associated with chronic disease.[1,2] Studies exploring healthcare consumer experiences of care provided by primary care dietitians have identified opportunities for improvement.[3] A recent study described high-quality nutrition care from the consumer perspective as being personalised, evidence-based, and integrated into broader societal systems.[4] Primary care dietitians can use this model when identifying opportunities to improve quality. However, there is inconclusive evidence on whether strategies that aim to improve the quality of dietetic care translate to better health outcomes.[5]

Quality improvement is the practice of identifying and addressing opportunities to improve care outcomes.[6] Lessons from the quality improvement literature highlight the importance of synergy between the quality improvement approach and context.[6,7] For example, reductionist approaches to quality improvement have been effective in quality improvement studies in surgical settings[6] where processes can be reduced to discrete steps for review and improvement. However, in other healthcare contexts, such as primary care, the system is reportedly different.[7] A 15-year program of organisational change initiatives in primary care concluded that traditional mechanistic approaches to quality improvement were less likely to achieve practice transformation compared to complexity-informed approaches.[7] On that basis, the authors called for the development of quality improvement strategies to be guided by complexity science.[7]

Complexity science is an umbrella term for a group of closely related complexity and systems-related theories, including complex adaptive systems theory, and has informed quality improvement efforts in various healthcare contexts.[8] A scoping review of 22 interventions assessed empirical evidence supporting complexity-informed interventions.[8] The authors acknowledged that the implicit nature of complex systems made it difficult to demonstrate cause-and-effect but recognised that interventions compatible with complexity science appeared to be effective.[8] Among the interventions, complexity science (or a related theory) was most frequently used to increase capacity to fulfil a given responsibility or to identify solutions to defined problems.[8] A wide range of positive outcomes were reported among the studies, from improved communication and collaboration to referral rates and disease management practices. However, further evidence is needed to demonstrate the value imparted by employing a complexity-related conceptual framework.

Primary care dietetics has not been explored using complexity science or a related theory. This study explored primary care dietetics using a complexity-informed conceptual framework to address two aims: firstly, to distinguish features of primary care dietetics using complex adaptive systems theory to understand whether complexity-informed approaches to quality improvement should be developed; and secondly, to identify factors that individuals across the healthcare system can examine and address to improve the quality of dietetic care.

TABLE 1 Concepts of complex adaptive systems used in this study to explore primary care dietetics practice derived from Plsek and Greenhalgh.[10]

CAS concept	Description
Agents and systems	A complex adaptive system is comprised of individual agents who can be simultaneously members of multiple systems. Systems can be embedded within systems, and the systems to which an agent belongs can change. These properties mean that the boundaries distinguishing one system from the next is not fixed, that is, the boundaries are fuzzy
Self-organisation	The structure of a complex adaptive system results from interactions between the system and external environment. Changes to the environment can cause dynamic changes to the system. Self-organisation emerges from local interactions between individuals
Initial conditions	Complex adaptive systems are sensitive to initial conditions. Initial conditions are historical factors that influence agents in the present and result in non-linear behaviour
Co-evolution	Agents interact and influence each other. They evolve together. Understanding one agent must be done with reference to other agents. Describes actions that an agent takes to influence or change the actions another agent takes
Adaptation	Complex adaptive systems interact with the environment. Agents adapt their behaviour, or take different actions, in response to an event

CAS, complex adaptive systems

2 | METHODS

This exploratory study was situated within a pragmatic paradigm. Pragmatism is a useful paradigm for research that adopts a practical world view to produce actionable knowledge.[9] Qualitative methods were used to explore Australian primary care dietetics to form a practical

understanding of primary care dietetics practice as a complex adaptive system. The conceptual framework (see Table 1) was developed from complex adaptive systems theory as described in the most highly cited article[10] in a bibliometric analysis of complexity science in health care.[11] The conceptual framework informed both data collection and analysis and guided the process of distinguishing features of primary care dietetics from participant experiences. Semi-structured interviews were used to document participant experiences and to explore influencing factors. The Framework Method[12] was chosen to guide the analysis as it allowed the data to be organised in such a way that a practical view of primary care dietetics could be developed by integrating participant experiences using the conceptual framework. For example, data illustrating co-evolution could be compared across consumers and dietitians to explore how one influences the other in a care relationship. This study was approved by the Griffith University Human Research Ethics Committee (Ref No: 2018/167) and was reported in accordance with Standards for Reporting Qualitative Research (SRQR).[13]

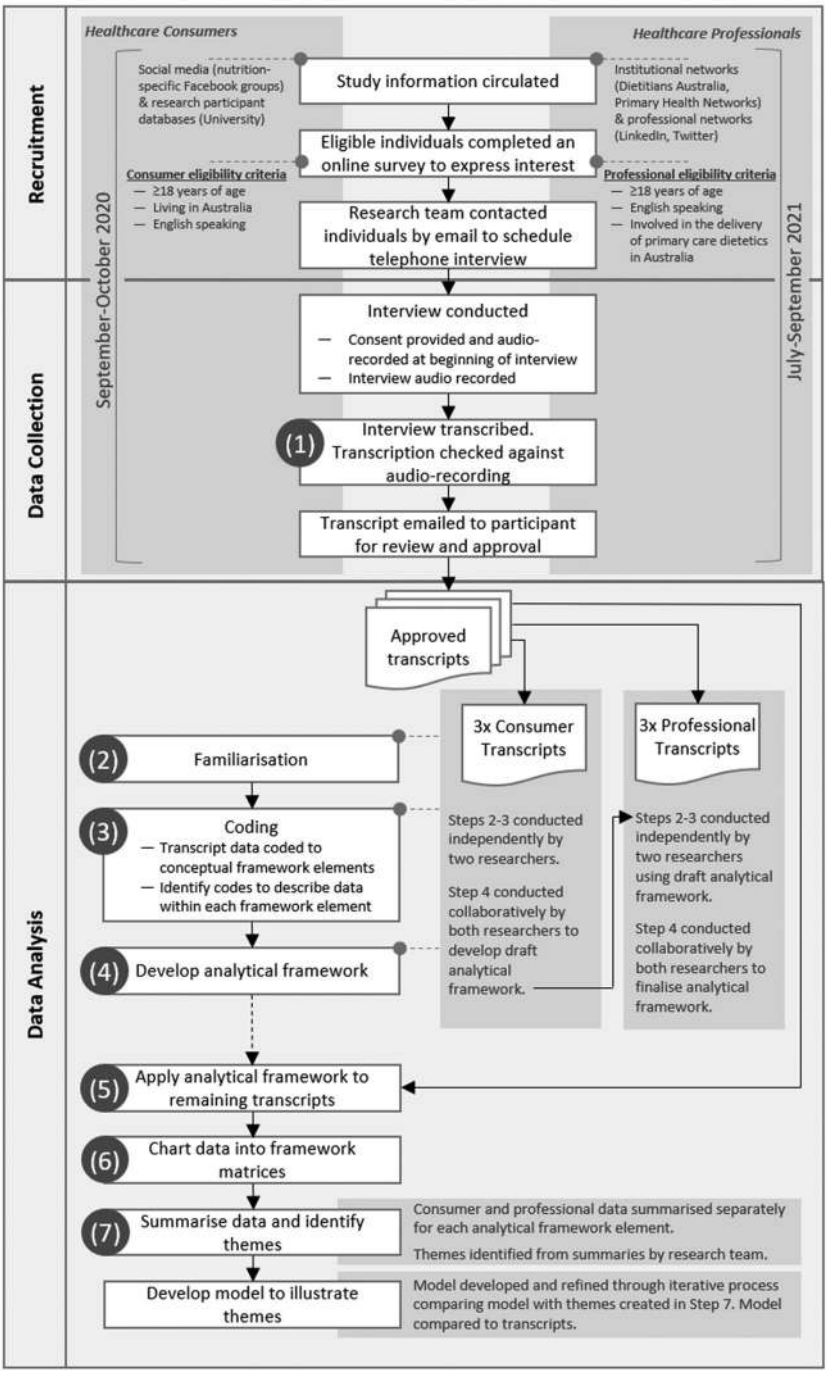

FIGURE 1 Methods used in this study to recruit participants and collect and analyse data. All data was collected prior to analysis. Items numbered 1–7 identify the Framework Method and comprised the following steps: (1) transcription; (2) familiarisation with transcripts; (3) coding transcripts; (4) developing the analytical framework; (5) applying the analytical framework to remaining transcripts; (6) charting data into framework matrices using participants (rows) and analytical framework elements (columns); and (7) interpreting the data to identify themes. Steps 2–4 were conducted by two researchers by first coding three consumer transcripts and then three professional transcripts. These six transcripts were selected by the lead author to maximise variation in content between the transcripts. Steps 5–6 were conducted by the lead author. A matrix was created for each of the five components of the complexity-informed conceptual framework in Step 6.

The study method is outlined in Figure 1. Agents within a complex adaptive system are influenced by internal (e.g., beliefs originating from historical experiences) and external (e.g., other agents or systems) factors. This made it necessary to document first-hand experiences from agents involved in primary care dietetics so that interactions could be explored from both sides, thereby generating a working understanding of primary care dietetics as a complex adaptive system. Agents of interest were directly (consumers, dietitians, referring practitioners) or indirectly (administration, management) involved in the delivery of dietetic care and formed two samples that were eligible for participation: (1) healthcare consumers (consumers); and (2) primary care professionals (professionals). Selection criteria for consumers were: ≥18 years of age; living in Australia; and English speaking. Consumers who had not previously received dietetic care were included to distinguish the boundary of dietetic care. Selection criteria for professionals were: ≥18 years of age; English speaking; and directly or indirectly involved in the delivery of primary care dietetics in Australia.

Consumers were recruited using methods described elsewhere.[4] Briefly, this included circulating study information on social media (e.g., nutrition-related Facebook groups) and research participant databases (e.g., Griffith University). Professionals were recruited through institutional (e.g., Dietitians Australia) and professional (e.g., LinkedIn) networks. Institutions shared study information through established communication channels (i.e., e-newsletter, website). Study information was shared with professional networks and contacts encouraged to share with others. Consumers and professionals completed an online survey, which included screening items, to express interest. Professional status was verified by searching the relevant practitioner registry. Maximum variation sampling[14] was employed by reviewing screening criteria to increase the likelihood of achieving a heterogenous sample. Verbal consent was given by the participant at the beginning of the interview and audio recorded. Participants received an AU$20 voucher to compensate for their time.

Two semi-structured interview protocols were developed – one for consumers and one for professionals – to explore the same concepts but from different perspectives. For example, consumers were asked what care they had received and who was involved, while professionals were asked how they were involved in, and who they worked with to provide, care. The interview protocols and rationale are provided as supplementary material. Each protocol was pilot-tested with an individual who met the relevant inclusion criteria to check question design and sequence, and amended based on feedback. Pilot data was not included in the analysis. The interview protocols explored experiences receiving, providing, or supporting those who provided, dietetic care. Interviews were conducted by the lead author, who is a dietitian with primary care experience, with individual participants via telephone. All interviews were audio-recorded and transcribed, with the transcript sent to participants for review and approval. The approved transcript was used in the analysis.

The Framework Method[12] was used to analyse transcripts in NVivo[15] as outlined in Figure 1. Transcript data was coded to an analytical framework before being organised into matrices. Data contained in the matrices was interpreted to identify themes. All data were treated equally throughout the analysis. A conceptual model of primary care dietetics was developed from themes using an iterative process in which the model was compared to the themes and refined. The model was then compared to the transcripts to confirm that it represented the transcript data.

Strategies were employed to improve the trustworthiness of findings; that is, the degree to which participant experiences were reflected in the findings.[16] Credibility concerns the degree to which findings are based in the data and is enhanced through investigator triangulation, a process involving two or more researchers to analyse and interpret data.[16] In this study, investigator triangulation included a collaborative approach to developing the analytical framework and including the whole research team in identifying themes from the matrices. The research team comprised dietitians who differed in years of experience and professional background, limiting the influence of individual perspectives. The lead author maintained a reflexive diary in which assumptions and preconceptions were noted and consulted during analysis.

3 | RESULTS

Sixty-seven consumers and 26 professionals registered their interest. Twenty-three consumers completed an interview during September and October 2020 and 26 professionals completed an interview between July and September 2021. Interviews were recorded totalling 12 h and 21 min (average 32 min; range 23–47 min) for consumers and 15 h and 13 min (average 35 min; range 20–53 min) for professionals. Moser and Korstjens describe data saturation in qualitative research as the point where no new information arises.[14] Data saturation was defined in the current study as the point where all elements of the analytical framework were sufficiently addressed by quality data as agreed by the research team. Data saturation was achieved for consumers but not for

TABLE 2 Demographic characteristics of consumers ($n = 23$) and professionals ($n = 26$) participating in this study exploring primary care dietetic practice through a complex adaptive systems lens

	Consumer		Professional	
Variables	***n***	**%**	***n***	**%**
Role				
Consumer	23	100%	–	–
Dietitian	–	–	15	57.7
Director (dietitian)	–	–	3	11.5
Other Allied Health Practitioner	–	–	3	11.5
General practitioner	–	–	2	7.7
Practice manager	–	–	2	7.7
Nurse	–	–	1	3.8
Experience range (years)				
1–4	–	–	10	38.5
5–9	–	–	5	19.2
10–14	–	–	3	11.5
15–19	–	–	3	11.5
20+	–	–	5	19.2
Gender				
Female	17	73.9	22	84.6
Male	5	21.7	4	15.4
Unspecified	1	4.3	0	0.0
Age range (years)				
18–29	8	34.8	10	38.5
30–39	7	30.4	7	26.9
40–49	3	13.0	4	15.4
50–59	3	13.0	4	15.4
60–69	2	8.7	1	3.8
Location				
Queensland	13	56.5	10	38.5
New South Wales	3	13.0	7	26.9
Victoria	3	13.0	7	26.9
Western Australia	3	13.0	1	3.8
South Australia	1	4.3	0	0.0
Australian Capital Territory	0	0.0	1	3.8
Chronic condition/s[a]				
Overweight/obesity	8	34.8	–	–
Coeliac disease	3	13.0	–	–
Endocrine diseases (diabetes, thyroid)	3	13.0	–	–
Cardiovascular disease	2	8.7	–	–
Eating disorder	2	8.7	–	–
Endometriosis	1	4.3	–	–
No chronic disease	6	26.1	–	–

(Continues)

TABLE 2 (Continued)

Variables	Consumer		Professional	
	n	%	*n*	%
Received dietetic care				
Yes	15	65	–	–
No	8	35	–	–

[a]$n \neq 23$ as participants could identify multiple chronic conditions; percentages calculated as a proportion of 23.

professionals. Participant demographic information is outlined in Table 2. Two-thirds (15/23) of consumers had received dietetic care and most (17/23) reported living with at least one chronic condition. Professionals were predominantly dietitians (18/26), but also included a practice nurse, a physiotherapist, an exercise physiologist, and a speech pathologist.

Three themes and seven sub-themes describing primary care dietetics through a complexity lens were identified from the data by the research team, as detailed in Table 3. Illustrative quotes are provided in Table 3 and referenced throughout the following section. A model representing primary care dietetics, as described by participants, is illustrated in Figure 2.

The first theme, '**primary care dietetics is comprised of agents organised into systems embedded within systems**', described the agents and systems that, collectively, are responsible for the provision of dietetic care in primary care.

Sub-theme 1a was *'agents self-organise to form systems'*. Participants described professions involved in the provision of dietetic care as a dietitian, general practitioner (GP), nurse, specialist, allied health (physiotherapist, psychologist, occupational therapist, speech pathologist), and business services (administration, management) (Table 3, Quote 1). Participants described these agents as organising into healthcare organisations (legal entities) and care teams (networks of healthcare professionals).

Healthcare organisations varied in complexity and interconnectedness. Basic organisations were described as a sole dietitian who typically operated from a larger practice or provided services via telehealth. These dietitians performed a wide range of tasks and used basic systems to manage medical and financial records. Complex organisations were represented as dietetic or allied health practices comprising multiple healthcare and business-focused professionals. These organisations had defined organisational structures, roles and responsibilities, and defined processes for care delivery, communication, and professional development. A high degree of specialisation was described by participants, with different agents performing clinical, support, and managerial activities.

Care teams were described as existing wholly within a single healthcare organisation or spanning multiple healthcare organisations. Participants described how the consumer or healthcare professional influenced care team composition. For example, one consumer reported that their GP recommended a dietitian (Table 3, Quote 2) while another consumer chose a dietitian recommended by a family member (Table 3, Quote 3). Factors including location, technology, and organisational processes influenced movement of information within care teams. Co-located care teams transferred information directly through shared technological systems (e.g., medical record) and informal communication channels (e.g., instant messaging). Where care teams spanned across healthcare organisations, referral letters and reports were often the only method of information transfer within care teams, with the quality of information contained therein dependent on the referring practitioner.

Sub-theme 1b was '*healthcare organisations are open systems that interact with the environment*'. Professionals described systems that influenced the organisations in which they practised, including economic, legal, education, socio-cultural, science, and food systems. Funding schemes, including Medicare Benefits Schedule (Medicare), National Disability Insurance Scheme (NDIS), Department of Veterans Affairs, and community funding, influenced healthcare organisations in several ways. Dietitians who accepted clients financed by these schemes described the funders' influence on caseload, consultation fees and length, communication, and dietitian accreditation. For example, a dietitian practising within an organisation that serviced NDIS-funded consumers charged fees and prepared reports as required by the scheme. Conversely, a dietitian who saw consumers who paid fees themselves or through an insurance scheme was not required to write these reports. Funding schemes also influenced how dietitians collaborated with other professionals. One dietitian described how Medicare funding for group services treating people with type 2 diabetes motivated them to collaborate with an exercise physiologist to develop a formalised program.

Legal and regulatory systems influenced dietitians and healthcare organisations. Dietitians described the

TABLE 3 Illustrative quotations for sub-themes identified from the analysis of 49 interviews of consumers and healthcare professionals

Theme and sub-theme	Illustrative quotations
Theme 1. Primary care dietetics is comprised of agents organised into systems embedded within systems	
Sub-theme 1a – Agents self-organise to form systems	Quote 1. "...we have now grown to more than 35 staff, including ... dietitians, exercise physiologist, diabetes educators, and reception, administration, management and accounting staff, and IT staff, to be able to deliver the services we need to ..." (P43, Director) Quote 2. "...she [the GP] had mentioned that there was a nutritionist in the medical centre ..." (P12, Consumer) Quote 3. "...my sister had seen her [the dietitian] because she had the same issue with her child, so I would have gotten a referral from my GP..." (P18, Consumer)
Sub-theme 1b – Healthcare organisations are open systems that interact with the environment	Quote 4. "...there's the standards of practice and code of practice, and so of course I have to follow that." (P32, Dietitian) Quote 5. "...other dietitians I know working in the NDIS space that I've graduated with ... I will go to if there's a case I'm not sure about ..." (P40, Dietitian) Quote 6. "...going through the supermarket aisles and looking for the crackers that are lower carb. Then I can advise my clients what to eat." (P26, Dietitian)
Theme 2. Agents learn and adapt as they move towards their purpose	
Sub-theme 2a – Agents and healthcare organisations have a history	Quote 7. "I would probably just look at the experiences and say they were not helpful; I'm not going to see another one [a dietitian]." (P15, Consumer) Quote 8. "I've always wanted to go into dietetics. I had a lot of allergies as a kid." (P28, Dietitian) Quote 9. "Being able to grow my business ... providing more opportunities for junior dietitians. As you know allied health, especially dietetics, has been really challenging in terms of finding work after graduation ... I can provide the mentoring and support and clinical supervision so they can develop their career in the dietetics space." (P24, Director)
Sub-theme 2b – Consumers seek and integrate information in line with their purpose	Quote 10. "... it's my health, it's my weight, it's my nutrition, and all the people around me, all they can do is advise me and give me the tools and the confidence to do it. But ultimately it's up to me." (P8, Consumer)
Sub-theme 2c – Dietitians learn and adapt their practice in line with their purpose	Quote 11. "...if something is not working for a client, you really want to get to the bottom of why? ... What other professional development do I need to be able to help the client?" (P31, Dietitian)
Theme 3. Relationships underpin information exchange between agents within the primary care dietetic system	
Sub-theme 3a – Referral and multidisciplinary relationships	Quote 12. "I did a presentation ... on when is it appropriate to refer to a dietitian." (P40, Dietitian)
Sub-theme 3b – Care relationships	Quote 13. "I found I was really comfortable with them. They made me feel at ease. I did not feel like I was being forced to do anything. I felt like they were really working with me instead of against me ... I felt like they were on board with what I was trying to achieve and what they were trying to help me achieve." (P14, Consumer) Quote 14. "I did not feel quite comfortable with her [the dietitian] and I did not feel a connection deep enough to share..." (P7, Consumer) Quote 15. "I'm very confident in articulating that I'm not happy with something or I disagree... but I think a lot of people are not ..." (P3, Consumer)

Abbreviations: GP, general practitioner

role of Dietitians Australia, the self-regulating body for dietitians in Australia, and its impact on their practice. Dietitians Australia was described as establishing professional standards and codes of practice, and managing credentialling and continuing professional development programs (Table 3, Quote 4). Some dietitians described Dietitians Australia as an advocate that promoted dietetics in healthcare policy. Healthcare organisations were influenced by guidelines, particularly with regards to the use of "*testimonials*" (P28, Dietitian), and resources "*to*

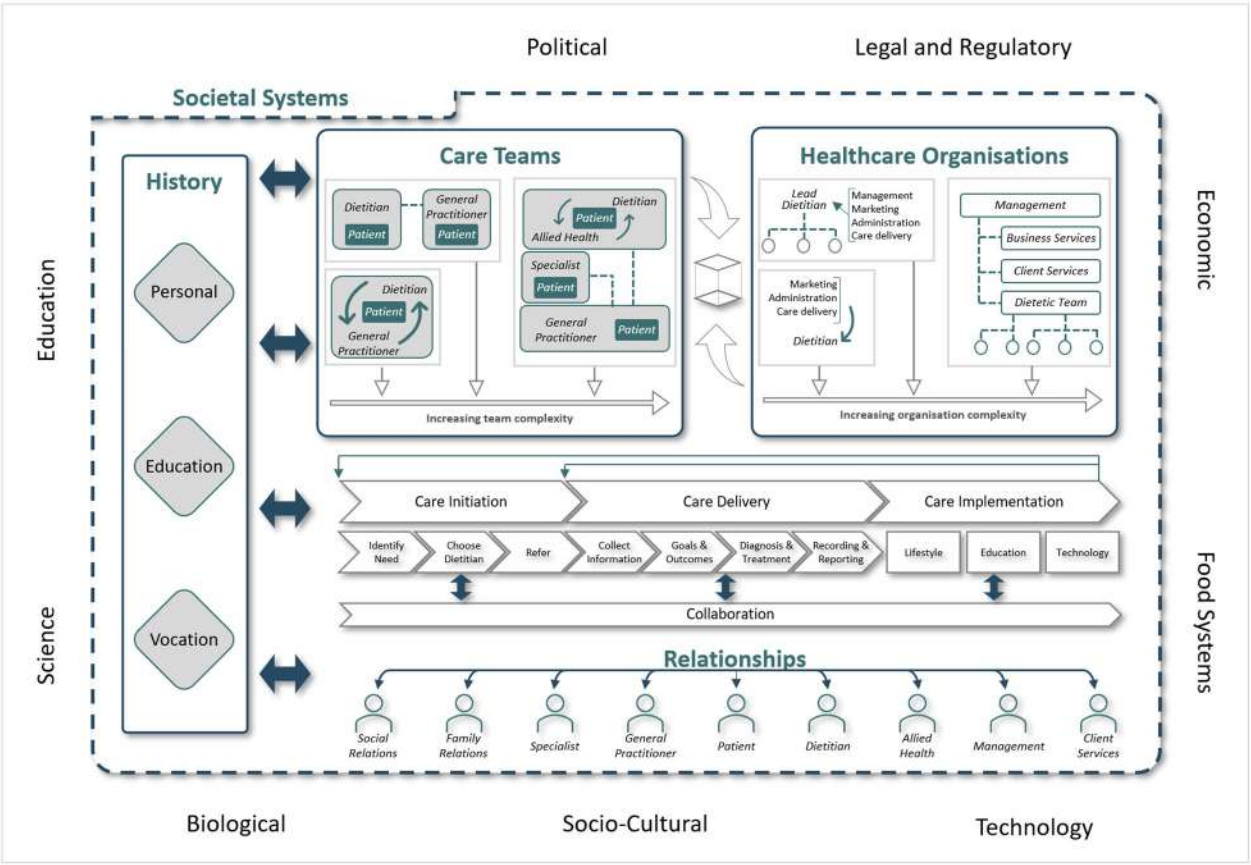

FIGURE 2 Conceptual model of primary care dietetics as a complex adaptive system derived from experiences of consumers and professionals. The inner box represents primary care dietetics while the outermost box represents other systems in the environment. The dotted line between the two illustrates that agents are simultaneously members of all systems. Within the inner box, 'history' represents historical factors that influence agents in the present. 'Care teams' and 'healthcare organisations' represent two types of systems to which agents belong. Healthcare organisations are the legal entities within which dietitians practice while care teams are networks of healthcare professionals who work together to provide care to consumers. These systems range in complexity and maturity. The arrows connecting 'care teams' and 'healthcare organisations' illustrate that the systems are superimposed on each other. In the middle of the box is the care process, comprising initiation, delivery, and implementation. Collaboration among agents, including healthcare professionals and the consumer, occurs throughout the care process. Relationships between agents facilitate the movement of information, and the strength of relationships dictates the level of integration and communication.

set up and structure a business for private practice" (P34, Dietitian). Practice managers described other regulatory frameworks against which organisations were accredited, including the *Standards for General Practice*[17] and *National Safety and Quality Health Service Standards*.[18]

Dietitians reported engaging in education to develop knowledge and skills to improve practice through private (e.g., Dietitian Connection), not-for-profit (e.g., Diabetes Australia), and public (e.g., universities) providers. Dietitians developed social systems comprising formal and informal networks of mentors and peers to develop knowledge and skills (Table 3, Quote 5). Universities played an important role in forming these networks. Science influenced dietitians as the advice they provided was informed by scientific research, and technology systems facilitated care delivery. Dietitians described the food system as influencing practice, with current product knowledge a prerequisite to recommending food products (Table 3, Quote 6).

The second theme, '**agents learn and adapt as they move towards their purpose**', described the evolutionary nature of consumers and dietitians, including their history, learning and adaptation, and the purposes that drove change.

Sub-theme 2a was '*agents and healthcare organisations have a history*'. Consumers and dietitians described previous experiences that influenced their behaviour, including personal, educational, and vocational experiences. Consumers reported that prior education helped them to understand the importance of nutrition, which motivated them to seek information and support when personal concerns arose. Health-related experiences influenced how the consumer

engaged with dietetic care. For example, one consumer reported how a negative childhood experience with a dietitian made them resistant to engaging a dietitian as an adult (Table 3, Quote 7). Similarly, a consumer who had a positive experience receiving dietetic care after a diabetes diagnosis proactively sought a dietitian when they needed weight management advice.

Dietitians were influenced by personal health-related experiences, with several dietitians reflecting that it motivated them to choose a career and specialisation in dietetics (Table 3, Quote 8). Vocational experiences played a key role for dietitians, where unsuccessful attempts to gain employment in a hospital setting led some to venture into primary care, while, for others, experiences in hospital settings validated their preference for primary care. Dietitians who established healthcare organisations acknowledged that the lack of opportunities for novice dietitians motivated them to establish their business and create opportunities for these dietitians to gain experience (Table 3, Quote 9). Experiences working in other healthcare organisations motivated some dietitians to establish their own businesses, believing that they "*could do it better*" (P22, Director).

Sub-theme 2b was '*consumers seek and integrate information in line with their purpose'*. Consumers described being responsible for their health and sought information that supported this purpose (Table 3, Quote 10). Information came from a range of sources, including family and social relations (e.g., online groups), educational organisations (e.g., websites, not-for-profit organisations), and healthcare practitioners (e.g., dietitian, GP). Consumers incorporated information into their lifestyle. For one consumer, this involved educating teachers at their child's school, while for another, it required them to have "*fun with it* [advice]" (P7, Consumer) to make changes sustainable. Consumers who felt that their needs were not met by the dietitian often terminated the relationship, with some consumers continuing to seek information through self-directed research, other programs, or another dietitian.

Sub-theme 2c was '*dietitians learn and adapt their practice in line with their purpose'*. Dietitians primarily described their purpose as "*helping people*" (P38, Dietitian) and meeting "*a need in the community*" (P22, Director), while engaging in enjoyable, flexible, and viable work, and improving and caring for themselves and their peers. Dietitians reported that first-hand interactions with consumers were a key driver of professional development. Knowledge and skill gaps were self-identified based on these interactions, and education sought to fill these gaps (Table 3, Quote 11). Dietitians learned from observing other healthcare providers, both in a professional capacity and as a consumer themselves. Dietitians learned through formal and informal feedback mechanisms. Formal feedback included consumer surveys and clinical supervision, which involved an experienced dietitian observing a less experienced dietitian to provide feedback. Informal feedback included verbal feedback from consumers and healthcare providers, self-reflection, and practice measures (e.g., number of review appointments).

The third theme, '**relationships underpin information exchange between agents within the primary care dietetic system**', described the relationships between agents and their role in the exchange of information among agents.

Sub-theme 3a was '*referral and multidisciplinary relationships'*. Healthcare professionals highlighted the importance of relationships among care team members. Dietitians reported that collaboration in multidisciplinary teams was driven by the GP but that cultivating relationships with healthcare providers improved communication and facilitated referrals. Dietitians educated healthcare providers on their specialisation, approach, and when to refer (Table 3, Quote 12). Referring practitioners described technology (e.g., directory) and other practitioners as ways to find a dietitian. Dietitians reported that being co-located or within the same healthcare organisation as the referring practitioner promoted strong relationships. Referring practitioners described how they considered communication from the dietitian alongside consumer feedback to evaluate dietitian competence, which had the potential to influence their referral practices. Dietitians established relationships with consumers by having an in-person (e.g., events) and online (e.g., website) presence. Consumers attempted to learn about the dietitian from other consumers by reading "*Google reviews*" (P12, Consumer) or listening to others' experiences.

Sub-theme 3b was '*care relationships'*. The relationship between the consumer and dietitian impacted information sharing and tailoring of care. Consumers reporting positive relationships described how this influenced care, including a willingness to engage in goal setting and proactively collecting information to inform care (Table 3, Quote 13). Some consumers felt that it was the dietitian's responsibility to develop the relationship by listening and getting to know them. Consumers who did not feel a strong connection with the dietitian said that this led them to withhold sensitive information (Table 3, Quote 14). Consumers described instances where the dietitian recommended strategies but did not ask for input. In these instances, consumers either did not feel comfortable, or like it was not their role, to communicate their thoughts with the dietitian. Other consumers described feeling comfortable to challenge and

critically analyse the information provided by the dietitian (Table 3, Quote 15).

4 | DISCUSSION

This study described primary care dietetic practice using complex adaptive systems theory. Primary care dietetics comprised a wide range of healthcare professionals that self-organised into healthcare organisations and care teams to deliver dietetic care. Professionals and consumers interacted with, and were influenced by, the wider environment in different ways, with economic, legal, educational, and social systems being key influencing factors.

Participants described how public and private funding schemes influenced the delivery of dietetic care. An investigation into the effect of payment mechanisms on healthcare provider behaviour identified payment rate and accountability as two mechanisms that influenced behaviour.[19] Similarly, several studies of Australian dietitians reported using strategies to accommodate the Medicare scheduled fee, including reducing the consultation length or charging a gap fee,[20–22] and are consistent with strategies described by dietitians in the current study. However, such strategies reportedly have detrimental effects on effectiveness[22] and quality of care.[20] Concerns about the Medicare items were raised shortly after the items were introduced, with Forster and colleagues describing how misalignment (e.g., between the typical cost of allied health services and scheduled fee) presented allied health practitioners with a dilemma.[23] Dietitians in the current study described providing services under other funding schemes, including NDIS and community funding. The impact of these schemes, which differ from the Medicare scheme, have not been explored and require further research to identify which payment models deliver quality consumer outcomes at a reasonable cost.

Communication and collaboration within care teams was described as influencing the consumer perspective of care quality. A scoping review identified technological and organisational factors, including documentation and processes, as enabling individuals to deliver team-based care.[24] Access to practice software facilitated collaboration in the current study, but few participants described formal processes for engaging with the care team, even when co-located with the referring practitioner. Power imbalances between professionals were identified in a thematic synthesis as a barrier to interprofessional collaboration.[25] In the current study, dietitians described collaboration as being driven by the GP, with some experiencing good engagement and others receiving no engagement beyond the referral. Communication and competence have been identified as important in addressing power imbalances and trust.[26] GPs in the current study described dietitian competence, as determined by communication and consumer feedback, as important. Financial incentives also impact collaboration,[25] with one instance of formalised collaboration – a group program for diabetes – described in the current study as viable due to Medicare funding. Collaboration between care team members is key to quality care, but the effectiveness of collaboration is affected by organisational, professional, and financial factors. Funding schemes should encourage collaboration among care team members and opportunities for technology to facilitate collaboration across healthcare organisations need to be explored.

Supervision, mentoring, and peer networks were described by participants as important factors that supported primary care dietitians to provide quality care. Mentoring plays an important role in early career development[27] and is an opportunity for dietitians to enhance confidence and competence.[28] Primary care dietitians have described receiving support from team members (both dietitians and other professions), networks and peer groups, and professional supervision,[29] which echoes findings from the current study where all dietitians reported receiving support from at least one of these sources. Dietitians operating in sole practice largely relied on peers and mentoring from experienced dietitians, while clinical supervision was only provided when inexperienced dietitians were part of a healthcare organisation that provided it. New Zealand dietitians in a study by Paulin emphasised the need for supervision for dietitians working in private practice to address professional isolation.[30] Policies and infrastructure are important to support primary care dietitians to access supervision and mentoring, and to establish peer networks. Primary care dietitians should proactively seek supervision and mentoring to enhance competence and care quality.

The qualitative methodology and sample used in this study both strengthen and limit the findings. The degree to which the findings communicate study participants' experiences was enhanced through in-depth approaches to data collection and analysis. However, limitations may exist regarding the transferability of findings to some consumer and professional groups involved in primary care dietetics. Study participants were predominantly young (18–39 years) and identified as female, and most consumers reported living with at least one chronic condition. As such, the findings are more likely to resonate with individuals who identify with these characteristics. While we sought to collect perspectives from a diverse sample, some groups were either not represented (e.g.,

Aboriginal or Torres Strait Islander and non-English speaking people) or underrepresented (e.g., males, older people). Further research is needed to test the findings with groups that were underrepresented, or not represented, in this study.

This study explored primary care dietetics by applying complex adaptive systems theory to consumer and primary care professional experiences of dietetic care. This is the first study to describe the complex arrangement of individuals and systems that interact to provide dietetic care and the findings have implications for individuals involved in dietetic care across the healthcare system. At the macro level (e.g., healthcare system), funding was described as an important factor that influenced collaboration among care teams and highlighted the importance of appropriate funding models for high-quality dietetic care. At the meso level (e.g., Dietitians Australia), social networks, experiences, and regulations informed dietetic care and highlighted opportunities to enhance quality through these mechanisms. At the micro level (e.g., dietetic practice), many factors that influenced consumers, other healthcare professionals, and dietitians were identified. Dietitians can examine and address these factors to improve the quality of care they provide. For example, consumers described themselves as seeking and integrating knowledge from multiple sources. Dietitians can use this knowledge to expand their consumer education to include techniques to evaluate the quality of information from other sources. Complex adaptive systems theory proved to be a useful conceptual framework for primary care dietetics and identified factors that can be examined and addressed to improve the quality of dietetic care.

AUTHOR CONTRIBUTIONS

All authors contributed to the conceptualisation and design of the study. AK collected data. All authors contributed to the analysis and interpretation of results and to writing the manuscript. All authors critically reviewed the manuscript and approved the final version submitted for publication. The authors acknowledge Dr Bryce Brickley for contributing to the analysis of transcripts in this study.

CONFLICT OF INTEREST

There are no conflicts of interest to declare.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

Griffith University Human Research Ethics Committee (Ref No: 2018/167).

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

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ORIGINAL RESEARCH

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How have temporary Medicare telehealth item numbers impacted the use of dietetics services in primary care settings?

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Abstract

Aim: The aim of the study was to describe the quantity and cost of in-person and telehealth dietetics services reimbursed under Australia's Medicare Benefits Scheme, before and during the coronavirus pandemic.

Methods: Publicly available Medicare Benefits Scheme dietetics service activity data were extracted from an online database, between January 2019 and June 2021. For allied health telehealth items, it was assumed that between 10% and 20% of all consults were dietetic related.

Results: Dietetics service claims reimbursed through the Medicare Benefits Scheme averaged 115 thousand per quarter in 2019. In quarter 2 of 2020, service delivery dropped by 25% compared to quarter 1 of 2020 and 32% compared to 2019. This drop recovered in quarters 3 and 4, with dietetic consultations claimed through the Medicare Benefits Scheme remaining relatively comparable to 2019 data. Dietetics services cost AUD 5,868,021 in quarter 1 2019 and AUD 5,742,632 in quarter 1 2020. Since the introduction of allied health telehealth items, the number of consultations claimed per quarter has accounted for between 17.7% (quarter 2 2020) and 4.5% (quarter 2 2021) of all consultations per quarter.

Conclusions: The provision and costs of dietetics services in Australia have remained relatively constant compared to 2019 data, indicating telehealth was being used for substitutive rather than additive care, apart from an initial reduction of 25% between March and June 2020. The introduction of telehealth items for dietitians has been modest, peaking at 17.7% and now consistently averaging 5% of total dietetics services. The permanent implementation of telehealth items is unlikely to cause significant increases in cost or access and will assist Australians to eat better to support improved chronic disease outcomes.

KEYWORDS
COVID-19, diet, nutrition care, primary care, medicare, telehealth

INTRODUCTION

Poor diet is recognised as the most common modifiable risk factor for chronic disease, causing an estimated 350 000 years of healthy life lost in 2015.[1] Over 93% of Australian adults do not eat the recommended daily serves of vegetables which significantly increases their risk of developing chronic disease.[1] Dietitian services are fundamental for preventing and managing chronic diseases in the community. In the past 15 years, the number of dietitians operating in primary care has more than tripled, signifying increased demand from community members for support to eat well.[2]

One of the most significant investments by the Australian Government in chronic disease management is the Enhanced Primary Care (EPC) program introduced in 1999, which expanded to the Chronic Disease Management (CDM) program in 2004.[3] Under this program, a general practitioner (GP) can refer an individual to a range of allied health practitioners for up to five subsidised consultations per calendar year,[3] including dietitians. In an evaluation of private practice dietetics services between 2004 and 2013, dietitians were the third most commonly referred to allied health professional in the CDM program.[4]

With the 2020–21 public health efforts to mitigate the impact of the novel coronavirus (COVID-19) pandemic, this made access to face-to-face appointments more challenging, regardless of geographic location. Travel restrictions, public health orders to maintain social distancing, self-isolation requirements, and advice to avoid non-essential medical activities substantially impacted health utilisation all over the world, resulting in an estimated 37% reduction in total healthcare utilisation between February and May 2020 across more than 10 countries worldwide.[5] Furthermore, people have been more likely to avoid healthcare settings if they had minor illnesses or did not perceive a service as lifesaving, and it remains to be seen what long-term impact this may have on individual and population health.[5] In an attempt to mitigate this risk, the Australian Government announced temporary financial support through the Medicare Benefits Schedule (MBS) to allow people who would otherwise be eligible to use the CDM program to be able to access services through phone and videoconference modalities.[6] This significant change in policy was coupled with the introduction of telehealth item numbers on the MBS for dietitians to deliver eating disorder consultations, first introduced in November 2019.[7] Whilst this support has been a welcomed policy direction, it remains unclear how dietetics service utilisation has been impacted, whether telehealth MBS items are sustainable as a permanent component of Medicare.

The aim of this study was to describe the quantity and cost of in-person and telehealth dietetics services reimbursed under the MBS, before and during the coronavirus pandemic (2019–June 2021).

METHODS

This was an ecological study involving population-level MBS data to describe dietetics services reimbursed by Medicare between January 2019 and June 2021,[8] reported using descriptive statistics. Ethical exemption was granted by The University of Queensland's Human Research Ethics Committee (2021/HE002244).

All MBS publicly available data for dietetics services delivered in-person, by videoconference or phone, were accessed from the Medicare Australia website, provided by the Australian Government. The database is an accurate and reliable representation of all publicly-funded services in Australia. Services examined included general dietetic consultations performed by an Accredited Practising Dietitian (APD) and referred from a GP, for individual, group assessment and follow up, specific Indigenous, eating disorders, and residential aged care consultations.[9] Telehealth consultations, defined by the MBS as telephone and videoconference consultations performed by a dietitian to a patient, were also examined. A full list of the extracted codes and their associated introduction time is presented in Table S1 (supplementary material).

Data were exported from the Medicare Australia website to Microsoft Excel (2018, Microsoft Corp.) for handling and cleaning, prior to analysis. Rates of service provision were reported as quantity of, and cost for, services for each quarter of the year. Descriptive analyses were conducted and involved calculating quarterly totals, means for monthly totals, and proportion of videoconference, telephone and telehealth modalities as percentages. Monthly services were graphed by delivery mode (in-person, videoconference and phone).

Some of the temporary telehealth item numbers for allied health consultations (item numbers 93000, 93013, 93048 and 93061) did not delineate between different allied health providers' speciality (see '*' in Table S1 for each of these item numbers). Therefore, to approximate the quantity and cost of allied health telehealth services which were conducted by dietitians, a series of dietetic telehealth scenarios, using descriptive analysis and an assumption that dietitian services would account for 10%–20% of all allied health MBS data, were used. This assumption was conservatively made based on data showing that dietitian consults make up 7% of all in-person appointments for allied health EPC referrals[4] and

all other allied health (except for podiatry and physiotherapy) make up a collective total of ~25% of total allied health EPC referrals[10] (codes with * in Table S1 signify where these assumptions are used). Three scenarios were then modelled where the total allied health phone and video consultations (item numbers 93000, 93013, 93048 and 93061) would be conducted by dietitians and compared this to the change in in-person dietetic MBS claims (item numbers 10954 and 81320) to define a proportion of this change which would have been driven by telehealth uptake during the observational time period.

Data on MBS claims and costs were exported to Microsoft Excel and were analysed using simple descriptive statistics (counts and percentages). All data analyses were conducted in Microsoft Excel.

RESULTS

Prior to the COVID-19 pandemic, dietetics service claims through the MBS averaged 115 thousand per quarter (Q) in 2019 (Table 1). At the onset of the pandemic, videoconference and phone items became available mid-way through March 2020. Despite this, there was a reduction in services in Q2 2020. In 2020, MBS claims were less consistent per quarter. Specifically, in Q1, total claims averaged 35363 consultations per month (an 8% decrease from Q4 of 2019). The largest fall in service delivery occurred in Q2 of 2020 (April–June; at the height of the first wave of the pandemic in Australia), where the average number of dietetics services dropped to 26638 consultations per month, representing a decrease of 25% from Q1 of 2020 and 32% compared to Q2 of 2019. This rate recovered in Q3, with dietetic consultations claimed through MBS representing only a 1% reduction compared to Q3 of 2019. Total dietetics services increased in Q4 of 2020 by 8% (and a 10% increase compared to Q4 of 2019), which was sustained into the first 2 quarters of 2021 (Table 1).

Some of the increases in MBS activity observed in the first 2 quarters of 2021 were due to the introduction of new eating disorder MBS items in the fourth quarter of 2019. These new services gradually increased from 4745 consultations in Q1 2020 to 10054 in Q2 2021 (Table 2). Other new MBS items were introduced in December 2020 for services provided into residential aged care facilities; however, there have only been 5 claims since their introduction. Comparing MBS dietetic consultations made in Q1 and Q2 of 2021 to 2019 without the eating disorder items showed a 4% increase and 1% decrease, respectively, suggesting there has been no meaningful change in dietetics services uptake as a result of

TABLE 1 Quarterly data for dietetics services (MBS items) reimbursed by Medicare between 2019 and June 2021

	2019				2020				2021	
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Number of consultations										
Quarter total in-person, *n*	110 785	117 456	117 347	114 668	105 959	65 801	105 430	116 711	118 849	121 969
Quarter total videoconference[a], *n*	NA	NA	NA	NA	37 [28;46]	6335 [5182;7489]	5871 [5109;6633]	5387 [4876;5897]	3415 [3107;3723]	3465 [3210;3720]
Quarter total phone[a], *n*	NA	NA	NA	NA	91 [66;117]	7779 [5418;10 140]	5287 [3736;6838]	4239 [2980;5497]	2705 [1940;3471]	2280 [1653;2906]
Quarter total, *n*	110 785	117 519	117 410	114 731	106 088	79 915	116 588	125 836	124 969	127 714
Proportion of consultations by modality										
Videoconference, %	NA	NA	NA	NA	0.0%	7.9%	5.0%	3.9%	2.7%	2.7%
Phone, %	NA	NA	NA	NA	0.1%	9.7%	4.5%	3.4%	2.2%	1.8%
Telehealth, %	NA	NA	NA	NA	0.1%	17.7%	9.6%	7.3%	4.9%	4.5%
Average monthly total, *n*	36 928	39 173	39 137	38 244	35 363	26 638	38 863	41 945	41 656	42 571

Abbreviations: Q1, quarter 1; Q2, quarter 2; Q3, quarter 3; Q4, quarter 4; *n*, number; MBS, Medicare Benefits Schedule.

[a]Assuming 15% of Allied Health general consultation codes were performed by dietitians (item numbers 93000, 93013, 93048 and 93061), range of 10%–20% presented in [].

TABLE 2 Quarterly data for each itemised MBS telehealth dietetics services between 2019 and June 2021

Dietetics service delivered	Delivery mode	Item no.	2020				2021	
			Q1	Q2	Q3	Q4	Q1	Q2
Assessment for group services	In-person, *n* (% of total)	81120	356 (100%)	295 (95.2%)	278 (83.5%)	272 (89.8%)	404 (87.1%)	165 (86.4%)
	Videoconference, *n* (% of total)	93284	NA	1 (0.3%)	16 (4.8%)	4 (1.3%)	3 (0.6%)	5 (2.6%)
	Phone, *n* (% of total)	93286	NA	14 (4.5%)	39 (11.7%)	27 (8.9%)	57 (12.3%)	21 (11.0%)
Group service	In-person, *n* (% of total)	81125	476 (100.0%)	164 (89.6%)	521 (94.4%)	607 (98.9%)	394 (95.9%)	547 (100.0%)
	Videoconference, *n* (% of total)	93285	0 (0.0%)	19 (10.4%)	31 (5.6%)	7 (1.1%)	17 (4.1%)	0 (0.0%)
Eating disorder service ≥20 min (introduced in November 2019)	In-person, *n* (% of total)	82350	4054 (85.4%)	3891 (52.9%)	6300 (61.3%)	6797 (62.0%)	7198 (71.6%)	8381 (71.4%)
	Videoconference, *n* (% of total)	93074	10 (0.2%)	2873 (39.0%)	3550 (34.5%)	3821 (34.8%)	2481 (24.7%)	2677 (22.8%)
	Phone, *n* (% of total)	93108	681 (14.4%)	595 (8.1%)	435 (4.2%)	352 (3.2%)	375 (3.7%)	681 (5.8%)
Individual care recipient in a residential aged care facility[a]	In-person	93528	NA	NA	NA	0	0	0
	Videoconference	93537	NA	NA	NA	0	0	0
	Phone	93538	NA	NA	NA	0	0	3
Individual care recipient in a residential aged care facility of Aboriginal or Torres Strait Islander descent[b] Introduced in November 2020	In-person	93583	NA	NA	NA	0	0	0
	Videoconference	93592	NA	NA	NA	0	0	1
	Phone	93593	NA	NA	NA	0	0	0

Abbreviation: NA, not applicable, quarter pre-dates code introduction; MBS, Medicare Benefits Schedule

[a]Introduced in December 2020.

[b]Introduced in November 2020.

telehealth items for CDM and group-based dietetics services.

The uptake of telehealth item numbers is summarised in Table 2. Since the introduction of allied health telehealth items in March 2020, the number of consultations claimed per quarter has accounted for between 17.7% (Q2 2020) and 4.5% (Q2 2021) of all consultations per quarter. The greatest uptake of telehealth (17.7% of all consults for both phone and videoconference consultations) also corresponded to this quarter (Figure 1). Figure 1 provides a graphical presentation demonstrating the overall trend for both activities across Australia from January 2019 to June 2021. The first noticeable decline in service provision rates occurred between April and May 2020, corresponding to the initial height of the COVID-19 pandemic.

Assuming a total proportion of 15% (10%, 20% reported in parenthesis) of total allied health telehealth conducted by dietitians, there was a peak of 18% in Q1 2020, dropping to a level of 5% in Q1 through Q2 of 2021. The adoption of phone compared to videoconference consultations has been relatively similar. Initially, phone consultations dominated videoconference in Q1 2020 after the items started on 13 March and reduced to 55 percent of all telehealth consultations in the following quarter. However, videoconference consultations have made up greater than 50 percent of telehealth consultations from that point forward to date (Table 2).

As the total estimated costs only relate to MBS reimbursement, the trend and changes in costs mirror the claims data reported above (Figure 1). Dietetics services cost Medicare AUD 5,868,021 in Q1 2019, AUD 5,742,632

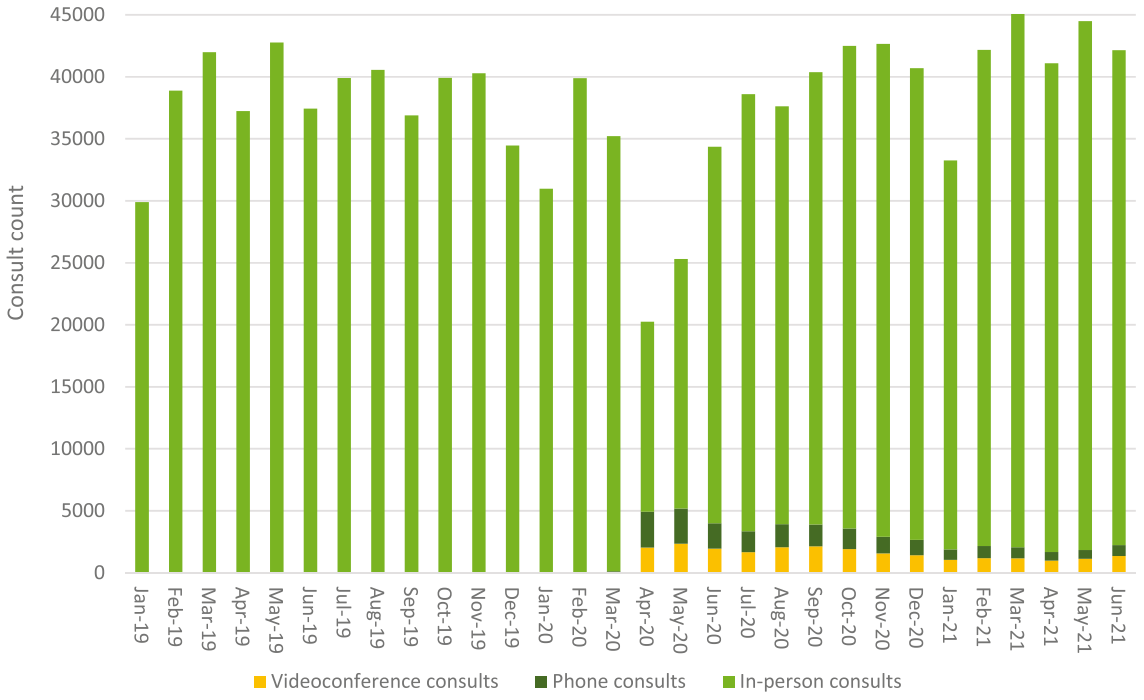

FIGURE 1 Monthly claimed Medicare dietetics services from January 2019 to June 2021, broken down into in-person, phone and videoconference consultations (assuming 15% of allied health codes were dietetics services)

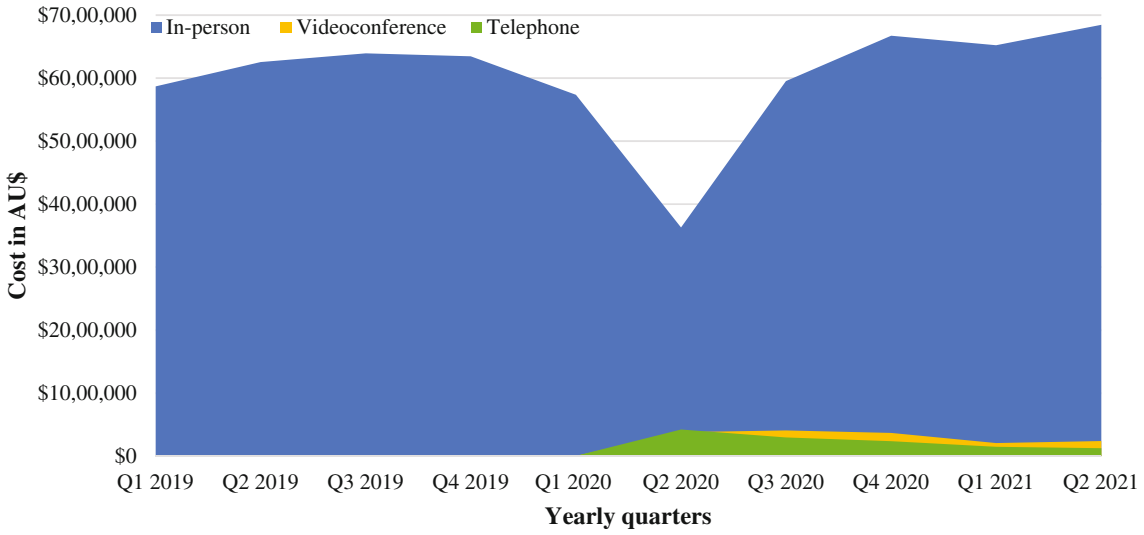

FIGURE 2 Monthly cost of Medicare reimbursement for dietetics services between January 2019 and June 2021, delineated by in-person, phone and videoconference consultations (assuming 15% of allied health codes were dietetics services)

in Q1 2020 and AUD 6,880,841 in 2021 (assuming 15% of allied health consultations were dietetics) (Figure 1). During Q2 in 2020 when the use of telehealth reached its peak, it accounted for 19% of the cost of dietetics services provided by Medicare. Phone consultations accounted for approximately AUD 425,000 of the AUD 4.4 million total cost in this quarter, whilst videoconference consultations accounted for approximately AUD 379,000. This reduced to AUD 241,000 for telephone consultations (2% of the total quarterly cost) in Q2 2021 and AUD 127,000 for videoconference consultations (3%).

DISCUSSION

This study aimed to describe the quantity and cost of in-person and telehealth (videoconference and phone)

dietetics services reimbursed by Medicare, before and during the (current) COVID-19 pandemic in Australia. The primary findings are that, apart from an initial reduction in dietetics services in March–April 2020 coinciding with the onset of the pandemic, the provision of dietetics services in Australia and their associated cost has remained relatively constant (Figures 1 and 2). The early reduction was observed across all Medicare services, with a reported reduction in non-hospital services from approximately 34 million in March 2020 to 29 million in April 2020.[11] Telehealth consultations offered by videoconference and phone have become part of routine practice since the temporary codes were announced in March 2020. In fact, it was recently announced by the Australian Department of Health that all allied health (including dietetics) telehealth-delivered primary care services will remain permanent.[12] Additionally, the constant nature of the overall number and cost of claims indicates that telehealth is primarily being used for substitutive rather than additive care. This potentially dispels speculation that allied health telehealth services would result in unfeasibly large cost increases.

The findings show that the introduction of telehealth MBS item numbers has allowed dietitians in primary care to continue to function as usual and deliver continuous dietetic care to all Australians. The pattern of eating disorder item numbers (which sit outside the CDM and group-based consultations and were first introduced in November 2019[7]) is still steadily increasing since their introduction, at the time of writing. Thus, including these claims, the total estimated dietetics services are up ~10% on 2019 MBS claims, but when removed, the difference in total dietetic claims (and the costs associated with these claims) has remained comparable to 2019.

These findings contribute to the evidence base suggesting that continuing telehealth item numbers permanently for dietitians in Australia is beneficial for continuing health access in primary care. However, further investigation is needed to test the effects of this policy change on improving dietetic care access and outcomes in primary care. The evidence base for telehealth-delivered dietetic care continues to grow, showing that these interventions are cost-effective and demonstrate equivalent or improved outcomes as standard in-person care.[6,13] Based on our current data, telehealth uptake has been apparently modest, suggesting it is being used as a substitution service rather than contributing to an increase to usual services. Therefore, the current study's data supports the rationale for continuing telehealth item numbers for dietitians by the Australian Government. This evidenced-informed decision will continue to expand the opportunities for people to access dietetic care.

The modest uptake of telehealth shown, and substitutive nature it is being used for, may also be indicative of the fact that many vulnerable Australians are missing the opportunity to access essential dietetic care. This may create a 'digital divide' which could be exacerbated by the social determinants of health, which telehealth itself is not a cure-all for. Therefore, this is an area of research, advocacy and promotion that requires much more work and attention.[14]

The COVID-19 pandemic has challenged business continuity for health services, including primary care. Australia's primary care response to enable dietitians to temporarily deliver services via telehealth recognised that most vulnerable people require ongoing interactions and support to continue self-managing their care during various public health restrictions. Primary care is Australia's panacea for chronic disease management, and for this reason alone, it could be argued that more is needed to improve health access via telehealth expansion and investment.[6] Telehealth item numbers are part of the 'function' of the National Primary Care Targeted Action Plan, to preserve the functional capacity of the healthcare system.[15] The *Medical Journal of Australia* together with VicHealth (a Public Health Promotion Foundation in Victoria, Australia) recently speculated on how Australia can become a healthy, fair and sustainable society by 2030, strongly advocating for investment in telehealth and digital health technologies to become more business-as-usual, as one of these key enablers.[16]

Telehealth is a supportive arm of primary care and is not a replacement for face-to-face services. The current study shows that the adoption of telehealth peaked in Q2 of 2020 at 18%, which has regressed to a relatively steady 5% throughout 2020 and 2021. This rate does contrast with other countries that have more experience with telehealth, however were also significantly challenged by the COVID-19 pandemic. For example, in the US, approximately 11% of consumers used telehealth in 2019 compared to over 46% of consumers in 2020 who were using telehealth instead of in-person visits to receive healthcare.[17] However, we know that Australia has been slow to adopt telehealth. As an example, a previous analysis of pre-COVID psychology-related MBS claims (which have been implemented for longer than the temporary dietetics items) reveals that telehealth typically accounts for less than 2% of total MBS claims.[18,19] This likely indicates that the primary care ecosystem still has a way to go to be fully equipped for, and ready to embrace, telehealth delivery as part of routine care. Our results reveal that telehealth was not able to bridge the significant reduction in overall dietetics service utilisation during the onset of COVID-19 and the associated public health mitigation efforts, with an estimated 25%

reduction in total (including telehealth) dietetic care observed during the second quarter of 2020 compared to the same time in 2019. This is less than the 37% reduction in total health service utilisation reported in a recent systematic review of 81 studies reported across 10 countries.[5] This review found the greatest reduction in healthcare utilisation between February and May 2020 to be all healthcare visits to a professional, which observed a median 42% reduction.[5] These results show just how influential telehealth has been in Australian primary care during this time, without which the reduction in people accessing non-hospital services may have been far greater.[11]

The Dietitians Australia position statement on telehealth calls for broader funding and eligibility for dietitians to provide the same high-quality care they deliver in clinic rooms, remotely via telehealth.[6] It has been shown that dietetic programs delivered via telehealth are a responsive and cost-effective alternative or complement to traditional in-person delivery of dietetics services, leading to comparative outcomes as observed in face-to-face care, when delivered in clinics, the community or in patients' homes.[6] Telehealth and digital health more broadly allow dietitians to deliver high-quality medical nutrition therapy in novel and efficient ways which improve patient care.[20] It is known that Australians are more embracing than ever of telehealth[21] and a survey of registered dietitians during 2020 revealed them to likewise be highly accepting and embracing alternatives to in-person clinic and even inpatient visits.[22] The provision of specialist allied health services like dietetics using telehealth has other positive impacts for patients and clinicians beyond clinical benefits. For example, telehealth visits have given dietitians the opportunity for broader assessment, such as the ability to observe and assess a patient's home environment (such as refrigerators and pantries), allowing for a more comprehensive nutrition assessment.[22] Telehealth has many extra-clinical benefits like reducing travel for patients and clinicians, reducing the time away from usual activities for patients which minimises societal productivity losses, and increasing the accessibility of services for patients.[23,24]

Our study has important limitations to consider. This study used publicly available MBS dietetic activity and costs data. These data, therefore, cannot determine the clinical effectiveness of publicly funded telehealth-delivered dietetics services which could not be explored and should be a focus area for future research. Given the aggregate national nature of the data being used the generalisability to local areas and specific population groups is limited. The provision of in-person dietetics services requires a local dietitian and therefore these services are more likely to have occurred in metropolitan or high-population areas with actively referring general practitioners. Similarly, telehealth uptake requires both clinician and patient willingness in order for a consult to be conducted. Whilst these modalities may increase the accessibility of services for rural and remote individuals, it is not possible to determine the location of those who received services from the available MBS data. To provide an estimate of dietetics services only, it was assumed that 15% (10%–20%) of the broad allied health item numbers were claimed by dietitians. Whilst varying this number from 10% to 20% did not have a large impact on the totals provided, the assumption should be acknowledged. The costs described in the study are only those borne by Medicare and do not include out-of-pocket costs borne by patients or gap payments covered by private health insurers. Finally, the data presented here only represent publicly funded dietetics services, since many dietetics services are privately funded, the estimates here do not represent all dietetics services offered in Australia during 2019–2021.

The provision of dietetics services in Australia and their associated cost has remained relatively constant, aside from the initial onset of the coronavirus pandemic. In March–June 2020, there was a 25% reduction in total dietetics services, which was paralleled by an 18% increase in telehealth-delivered dietetics services. Despite the introduction of new MBS items for videoconference, phone, eating disorder and residential aged care facility dietetics services over this time, the uptake and cost of Medicare claim reimbursements were similar across all quarters except the second quarter of 2020 which coincided with the pandemic onset. The relatively unchanged pattern in MBS claims does, however, suggest that telehealth may not be reaching the people who likely need dietetic care the most, and therefore, future research, advocacy and promotion are needed to ensure that telehealth improves healthcare access and lives up to its promise. These reliable data should give governments and decision makers assurance that telehealth item numbers for dietetics services are a sustainable function of Medicare, and these item numbers could become a permanent fixture of the MBS to support service continuity and better health access.

AUTHOR CONTRIBUTIONS

JTK, AA, CS and LB contributed to the conception and design of this paper. CS extracted the data. JTK interpreted the data and drafted the manuscript. All authors contributed to revisions of the manuscript and read and approved the final version.

CONFLICT OF INTEREST

All the authors have no conflicts of interest to declare.

DATA AVAILABILITY STATEMENT

Data pertaining to this study are freely available on the Australian Government Medicare website.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

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ORIGINAL RESEARCH

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#Healthpromotion: A qualitative exploration of how dietitians can use social media to positively influence women aged 18–35 years

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Abstract

Aims: To understand how young adult women use social media, including which nutrition and health-related content they prefer to view and why. Findings are intended to support dietitians to use social media more effectively for health promotion to reach, educate and positively influence young adult women.

Methods: Qualitative research was conducted through semi-structured interviews involving 10 women aged 18–35 years via Zoom videoconferencing. The interviews were recorded, transcribed verbatim and analysed using an interpretative phenomenological approach.

Results: Young adult women use social media daily to view a wide variety of content, including nutrition and health-related content. Three themes were identified: authenticity, engaging content, and affecting trust through selling products.

Conclusion: To effectively use social media for health promotion, dietitians need to share their authentic voice while maintaining professional standards. Recommendations for effective social media engagement include using engaging content, infographics, and videos with closed captions. More research is needed to assess whether health promotion deployed via social media is effective at increasing nutrition knowledge, improving health literacy, and producing behaviour change.

KEYWORDS

dietitians, health promotion, qualitative research, social media, young adult, women

1 | INTRODUCTION

According to a report published in 2022,[1] nearly 60% of the world's population are using internet-based social networking applications ('apps') including Facebook, Instagram and TikTok to facilitate the creation of, and engagement with, user generated content. Collectively, these apps are commonly referred to as 'social media',

a powerful medium that has significantly altered the way people generate, communicate and consume information.[2,3]

From a public health perspective, social media presents novel, low-cost opportunities to reach, educate, and positively influence many people, including young adult women (18–35 years) who represent one of the largest, most engaged social media populations in the world.[1] Although research indicates that Facebook can be used to bolster health promotion targeting improved health literacy and dietary behaviours among women >18 years,[4–6] less is known about the feasibility of Instagram and TikTok. This is concerning, given both apps continue to grow in popularity among young adult women[7,8] and despite increasing scrutiny about their inadvertent cultivation of dangerous diet cultures.[9–11] Moreover, a growing number of unqualified, non-health professional, social media 'influencers' propagate erroneous nutrition and health-related information via this medium.[12–15] Although Instagram and TikTok have made efforts to curtail COVID-19 and vaccine misinformation,[16,17] nothing has been done to attenuate nutrition misinformation. Consequently, the health and well-being of social media users, including young adult women, is at high risk.[18,19]

A more credible and influential nutrition presence on social media is warranted to support mitigation of nutrition and health-related misinformation. Accredited Practising Dietitians are credentialled nutrition experts who provide credible, evidence-based information that can support people to improve their food and health literacy.[20] Research indicates that one of the main barriers to social media use among dietitians is a lack of knowledge about how to use it effectively for health promotion.[21] Moreover, a review of the literature uncovered a dearth of research exploring the natural social media practices and preferences of women between 18–35 years. This intelligence is crucial to the development of social media content that reaches, resonates, thus, is utilised by this population. Therefore, the aim of this study was to explore the type/s of social media content, including nutrition and health-related content, that young adult women (18–35 years) prefer to view and why.

2 | METHODS

Qualitative research is used to gain an understanding of an individual's underlying motivations, actions and thoughts.[22] The researchers consider reality to be socially constructed, thus, aim to produce subjective findings through a process of inductive reasoning. Instead of generating a series of hypotheses, the research presented here has been guided by a semi-structured interview guide that focuses on the examination of experience which suggests a phenomenological course of inquiry is appropriate. Interpretative phenomenological analysis (IPA) is rooted in phenomenology, that is, it is concerned with individuals' lived experience and how they make sense of that experience.[23]

This paper is reported according to the Standards for Reporting Qualitative Research.[24] Following ethical approval from the University of Canberra Human Research Ethics Committee (UC HREC-9195), women were purposively recruited via advertisements displayed on campus noticeboards and social media apps including Facebook and Instagram. Purposive sampling requires that individuals are deliberately selected with an explicit purpose in mind, namely, to address the research aim and because they are rich sources of data in relation to this.[25] To be eligible for inclusion, women were required to be English speaking, aged between 18 and 35 years, and users of at least one social media app, for example, Facebook, Instagram or TikTok. Women could be internationally located, however, they had to have access to a computer (or smartphone) with consistent internet connection and Zoom videoconferencing.[26] Participants provided signed informed consent prior to interviews.

Ten women volunteered to take part in the project, with an average age of 27.2 years (Table 1). Just over half of the women recruited were tertiary educated ($n = 6$). One-to-one interviews were conducted via Zoom (Zoom Video Communications Inc.), between the primary researcher and each participant, over 8 weeks during June and July 2021. Participants elected interview times that were convenient for them. Interviews ranged from approximately 60–100 min in length. A semi-structured interview guide was developed based upon a review of the published literature (see Online Supplementary Material S1). This was piloted before the main interviews took place to allow the primary researcher to test the interview questions and gain practice in interviewing. The majority of questions were kept deliberately open, allowing participants to talk at length, without judgement. A faciliatory interview style that included the use of verbal and non-verbal cues was employed. An iterative approach was used to allow unanticipated lines of conversation to be explored. Each interview was audio recorded and transcribed verbatim, then entered into a word processing document for analysis. In total, 10 interviews were conducted.

Data analysis was guided by Smith et al.'s IPA protocol.[23] Step 1 involved full data immersion via reading/re-reading the transcript and listening/re-listening to the audio recording which increased opportunities for new insights to be made. Distinctive phrases and emotional

TABLE 1 Participant demographical information for ten women who participated in the study

Participants	Age	Country of residence	Ethnicity	Social media app/s used most frequently	Years of social media use	Education level
Student dietitian	23	Australia	Italian	Facebook, Instagram, TikTok	11	Tertiary educated
Entertainer (actor)	18	United Kingdom	Asian	Facebook, Instagram, TikTok	7	Non-tertiary educated
Artist	26	United States of America	Hispanic	Instagram	10	Non-tertiary educated
Marketing/Communication specialist. Social media expertise.	29	United Kingdom	Caucasian	Facebook, Instagram, TikTok	15	Tertiary educated
Public health nutritionist	34	Australia	Caucasian	Facebook, Instagram	15	Tertiary educated
Student dietitian	21	Australia	Asian	Facebook, Instagram, YouTube	11	Tertiary educated
Marketing/Communication specialist. Social media expertise.	31	United States of America	Caucasian	Facebook, Instagram, Twitter	15	Non-tertiary educated
Stay at home mum	30	United Kingdom	African American	Facebook, Instagram, TikTok	10	Non-tertiary educated
Business development executive	31	Australia	Caucasian	Facebook, Instagram	14	Tertiary educated
Marketing/Communication specialist. Social media expertise.	29	United States of America	Caucasian	Facebook, Instagram	15	Tertiary educated

responses were highlighted. The primary researcher recorded observations and reflections, including comments associated with personal reflexivity, given this can affect participants' responses. Step 2 involved initial note taking, with attention paid to descriptive, linguistic and conceptual comments made by the participant. Notes were transformed into emerging themes via concise phrases, with data remaining grounded in the particularity of the participants' responses. Step 3 involved developing and clustering concise statements (emergent themes) to capture and reflect understanding. Initially, these were chronologically ordered, however, re-ordering took place to support identification of connections between identified themes. Step 4 introduced structure. Clusters of themes identified during Step 3 were named, grouped and tabulated to support clear depiction of the relationship between themes. Each participant's data set was approached in isolation to the other, to allow identification of new themes, prior to searching for patterns across all participant data sets. Once completed, a final cross analysis was conducted to support identification of commonalities and differences across all participant responses.

Ensuring trustworthiness throughout IPA is crucial to ensuring research acceptability and usefulness.[27,28] According to Guba,[29] four criteria, namely, credibility, transferability, dependability and confirmability can be employed to ensure research validity, generalisability, reliability and objectivity. To optimise credibility, participants were assured anonymity and the freedom to withdraw from the research at any time, without prejudice. The primary researcher used reflective journaling to identify perspective and personal biases. Data accuracy, collection and storage was assured via dependability and confirmability audits. Specifically, a supervisory panel regularly reviewed the primary researcher's field notes and reflective journaling against participant transcripts to ensure conclusions made were internally coherent. Data coding was regularly compared and reviewed among a supervisory panel. Member checking was used to test analysis with participants.

3 | RESULTS

Data analysis revealed three themes: authentic people are the most credible social media influencers; social media content must be engaging and easy to understand; selling on social media may dilute authenticity, diminish trust and turn participants away from social media content.

Theme 1: Authentic people are the most credible social media influencers. Specifically, participants preferred to follow 'genuine', 'sincere', 'raw', and 'real' people who were willing to show their 'true' self, as opposed to their best self via social media. According to participants, authentic people on social media were those who shared unedited photos and/or videos of themselves whereby their real skin tones and textures, as well as body shapes and size, can be seen. Similarly, authentic people were those who share openly about real-life experiences, both positive and negative. In this regard, the stripping away of pretence was paramount to authenticity for participants in this study. Namely, they were deterred by people who appeared too 'polished' or rehearsed, living an idyllic, unblemished existence.

> *I'm so sceptical of anyone who constantly shares perfect, heavily filtered images or videos of themselves in yoga poses, or making food you never actually see them eat... Also equally annoying are those people who share overly rehearsed videos, y'know, the ones where they dance to some random song while pointing to words on the screen to share information? Ugh, it's so cringy and inauthentic, I'm like: stop trying so hard!* (Participant 1)

All participants accessed nutrition and health-related information on social media. Most preferred this content to be created by tertiary educated health professionals including Accredited Practising Dietitians, given they are appropriately qualified to disseminate scientific information and provide expert advice. Conversely, participants expressed their disdain for non-health professionals including 'holistic health coaches', 'biohackers', personal trainers, and non-tertiary educated nutritionists who routinely shared inaccurate nutrition and health-related content on social media, thus, contributed to the spread of misinformation. In addition, several participants voiced their frustration about social media echo chambers perpetuated by inauthentic people who routinely shared nutrition and health-related content based on faulty logic. This includes people who encouraged others to adopt restrictive diets, consume specific ingredients to 'cleanse toxins' from their body, and/or forgo important medical treatments including evidence-based cancer therapies and COVID-19 vaccinations.

Despite a preference for credible social media content created by tertiary educated health professionals, participants followed a higher number of non-health professionals on social media. This indicates that while tertiary qualifications mattered when accessing nutrition and health-related information, overall, the personal attributes of people were more highly favoured. Specifically, the sharing of real-life stories and anecdotes was far more attractive and influential compared to the provision of educational content created by tertiary educated experts.

> *Sure, I love following her because she's an accredited dietitian who shares credible content, but I mainly follow because she's so real and honest ... she doesn't use filters or facetune to alter her face or body. When she has acne, she doesn't hide it in her videos. She doesn't edit out her cellulite and stretch marks either which makes me feel good about myself and my body.* (Participant 2)

Notably, participants were not motivated to follow someone based on the number of social media followers they possessed, given follower numbers did not determine a person's authenticity. In addition, most participants acknowledged that followers can be amassed in inauthentic ways including via buying 'fake' followers. Moreover, several participants voiced their distrust of people who possessed significantly large followings, associating this with increased disconnectedness and inauthenticity.

It was also identified that diversity, inclusivity, and transparency were important for authenticity. This involved more than declaring information sources and sharing unfiltered imagery, rather, it required a deeper level of transparency that involves an awareness of culture, experience, background, and representation. Participant 3 spoke about 'scientific racism' and warned: 'If you're representing one type of people with the information you're sharing, then you're not doing a service to all of the people'.

Theme 2: Social media content must be engaging and easy to understand. All participants reported that accessing social media had become a part of their daily routine, with many acknowledging that it had become an obsession.

> *...It's such a time suck ... it's designed to pull you in. The scrolling is really easy, the algorithm is watching your every move so that recommendations are super accurate, it fuels the addiction to the content ... it's a slippery slope.* (Participant 4)

Although participants viewed social media as a useful source of nutrition and health-related information, this was not their primary reason for using it. Rather, participants generally accessed social media to 'zone out' from everyday life; try new recipes; learn about different

cultures and their foods; communicate with friends and/or likeminded people; and stay abreast of current affairs.

Social media characteristics that resonated the most among participants included content featuring infographics, given they '*...highlight key points of information in fun and interesting ways*' (Participant 5). In addition, most participants preferred captions that were short and simple, given '*...a very simple message can be incredibly effective*' (Participant 6). Social media posts that simplified complex nutrition and health-related information were also highly valued. Colourful content was preferred over black and white content, and while there was no clear preference among participants for vibrant colours or muted tones, most preferred content that displayed a consistent look and feel. Video content was favoured more so than static post content, namely because participants found videos to be more interesting and less arduous ways to assimilate information. In addition, most participants preferred to access videos with closed captions, given this allowed them to view content in public places where listening to audio was not appropriate.

Participants with extensive social media experience highlighted the importance of sharing content regularly, given ongoing engagement is favoured, thus, rewarded by social media algorithms.

> *Posting consistently, several times a week, and encouraging your followers to like, comment on, share, and/or save your posts assists the algorithms to prioritise your content by pushing it to the top of your follower's feeds.* (Participant 7)

In addition, most participants reported that they regularly found new content of interest via searching for specific hashtags including '#recipes'.

Theme 3: Selling on social media may dilute authenticity, diminish trust, and turn participants away from social media content. Participants were deterred by direct selling, 'tagging' multiple brands, sharing affiliate links, featuring discount codes, and/or displaying sponsored '#ads'.

> *I used to really enjoy following this fitness influencer, but as soon as she reached 100,000 followers, her ego ballooned, she stopped sharing free content ... Everything now has a price, everything is a sales pitch with an affiliate link. I lost trust in anything she said, so I unfollowed her.* (Participant 8)

The selling of nutrition and health-related products was a significant deterrent. Participants spoke negatively of content providers who used health content as a vehicle to sell products.

> *There are so many people on social media who mention they've got this health problem that has been occurring – on Monday, they'll mention that it's been a detriment to their life. On Wednesday they'll say they've done some research, they think they found something that they might share with their followers, but they want to try it for a bit longer because they only want to share things that are, y'know, worth sharing because they really value the trust their followers have in them. Two days later, there they are saying: 'Here are the products that work! Use my discount code, it's an affiliate link, but y'know, it really worked for me, it fixed my health problem' ... It's the same pattern every single time.* (Participant 9)

Selling and product endorsement made participants question the authenticity of content.

> *You can't fault someone for talking about something and getting paid an exorbitant amount of money for it, it is a business after all, but, honestly, I'm not a big fan of the product endorsements and the way they've evolved on social media because you never really know what's genuine.* (Participant 4)

4 | DISCUSSION

Social media presents dynamic, low-cost opportunities for health promotion to increase young adult women's food and health literacy.[30] The aim of this research was to use IPA[23] to develop a robust understanding of how young adult women 18–35 years use social media in free living situations, including the type/s of nutrition and health-related content they prefer to view and why. Three themes were identified. The first theme reflected participants' preference for credible social media content delivered by people who are genuine. The second theme captured characteristics that support the design and delivery of high-quality nutrition and health-related content that gets noticed within the crowded social media space. The third theme encapsulated young adult women's distrust of product endorsements, especially the selling of nutrition and health-related products via social media.

The strongest finding from this research was that young adult women seek social media content created by 'real' people who are not afraid to be themselves. Conversely, participants disliked overly produced content created by highly polished people who portray unrealistic lifestyles. In addition, while participants indicated their preference for credible, evidence-based nutrition and health-related information shared by qualified health professionals such as Accredited Practising Dietitians, they also turned to social media for entertainment, escape, inspiration, and connection with others. These findings are congruent with survey research commissioned by Instagram involving 21 000 respondents (13–64 years) from 13 countries who indicated their preference for entertaining (55%), authentic (53%), creative (53%) and informative (51%) social media content.[31] Moreover, just 36% of respondents indicated a preference for beautifully produced content, whist only 27% indicated a preference for content endorsed by popular social media influencers.[31]

A number of sources highlight the importance of authenticity and trust when health professionals engage in social media.[19,21,32] Some authors warn that blurred boundaries between personal and professional use of social media may cause loss of trust from clients, thus, recommend a separation of personal and professional activity where possible.[21,33,34] Other authors advocate that health professionals should not be afraid to be themselves on social media, given the only way to create meaningful relationships is to be genuine.[19,32] Ultimately, dietitians need to find a balance between maintaining professional standards while being themselves, and sharing their authentic voice.[19,32]

To foster authentic connection, it is recommended that dietitians share original content created themselves, using their unique voice. While outsourcing content creation to a social media agency may seem like a professional and time-saving tactic, it risks misalignment of vision, goals, and personality that are central to authenticity.[35] Content focusing on the practical implementation of health advice is more likely to appeal than content that is overtly educational. For example, sharing health-supportive cooking tips and evidence-based health 'hacks'[36] are good options for drawing attention to nutrition and health-related education. To support increased visibility of content, dietitians may consider using hashtags, given they extend content reach beyond existing followers by allowing content to be categorised, thus, discoverable via in-app searches. Any word or phrase with a '#' placed in front of it can be turned into a hashtag, for example, '#nutrition'. Dietitians may also consider connecting regularly with their audience, for example, via Instagram Live[37] to discuss trending health topics with respected colleagues who also possess a social media presence. A high amount of incorrect and potentially dangerous nutrition and health-related misinformation is perpetuated via social media by non-health professionals.[12–15,38,39] Thus, it is recommended dietitians share regular 'myth busting' posts and/or videos that identify and correct false or misleading health information, given their ethical obligation to do so.[40] In addition, to attenuate existing racial, social, and gender-related disparities, content shared via social media must remain inclusive of all race, ethnicities, socioeconomic status and genders.[41] Inclusivity is crucial to authenticity, given it supports a reduction of existing barriers to health care and information created by ignorance, prejudice and misunderstanding.[42]

Participants in this study were sceptical of social media content connected with endorsing and/or selling nutrition and health-related products. This presents an interesting conundrum, given endorsement and/or selling of evidence-based health-supportive products is arguably necessary for some private practice dietitians trying to earn a living. Thus, they are encouraged to consider the cost versus benefits of selling and/or endorsing products via social media. In addition, dietitians are recommended to seek out advice from their governing body/bodies and regulatory authorities to ensure they do not breach professional codes of conduct and laws pertaining to social media use. For example, Australian dietitians should consult the Therapeutic Goods Advertising Code 2021[43] to ensure adherence to legislative requirements when/if posting about therapeutic goods that implicate public health interests. Furthermore, Dietitians Australia provides guidelines applicable to all health professionals considering endorsement and/or selling of products including books and/or supplements.[44] These include avoiding endorsement and/or selling of products that: are part of a 'pyramid selling' enterprise and/or multi-level marketing scheme; do not possess a strong evidence base; and are outside of the health professional's scope of practice.[44]

Participants in this study used social media for many reasons. Dietitians looking to use it for health promotion need to understand how to craft high-quality content that gains and sustains young adult women's attention. Specific characteristics that appealed to participants the most included use of colour, as well as accounts that possess a consistent look and feel. Information shared via static posts as well as videos were desirable, however, video content must be captioned to ensure users can view and understand content without using audio in public places. Participants viewed the use of filters and/or applications that alter facial features and body shape as inauthentic, thus, they should be avoided. Graphical depictions of information were preferred. Given health literacy is an important determinant of health,[45] all social media content should remain jargon-free, thus, easy to understand among people with low individual health literacy.[46]

Social media training is also recommended to ensure best practice, expert use of the social media app/s chosen.

In conclusion, this study provides good insight into the social media practices and preferences of young adult women aged 18–35 years. Participants did interact with nutrition and health-related content on social media. In addition, many indicated their preference to learn more about nutrition and health via social media content shared by qualified health professionals including Accredited Practising Dietitians. The provision of such information via social media is more likely to have impact if delivered in authentic, entertaining and well-produced ways, given this will support content to stand out in a crowded space.

There is currently a lack of academic research about young adult women's free living social media practices and preferences. This small, qualitative investigation provides insight into the views and practices of women aged 18–35 y who regularly use social media. As with all qualitative investigations, this research provides deep information about a small number of individuals. Additional and different research is needed to see if the views of participants in this study match broader societal views. This study was implemented according to best practice in qualitative research,[24] however, it must be acknowledged that the primary researcher was a novice interviewer. In hindsight, some questions would have been modified to prompt deeper consideration of issues such as contributors to authenticity. In addition, three participants possessed marketing/communication/social media expertise; two were student dietitians; and one was a public health nutritionist. Given their heightened interest in social media and/or health promotion, this may have impacted results. With that said, information provided by these participants adds rich insight, thus further value to the results and discussion presented.

The findings from this study can be used to inform dietitians how to attract young adult women to their social media content. More research is needed to assess whether nutrition and health-related content accessed via social media is effective at changing young adult women's nutrition and health-related behaviours. In addition, it would be interesting for future research to investigate different age ranges and genders to assess whether social media is used differently, or if use changes over time, as people age.

AUTHOR CONTRIBUTIONS

MM and DS planned the research. DS (the primary researcher) collected and analysed all data with support from MM and CK-A. DS prepared the final manuscript with support from MM and CK-A.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

Research data are not shared.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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REVIEW

A review of the growth and development of Australian practice nursing: Insights for the dietetic workforce

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Abstract

Aim: The aim of this scoping review was to provide an overview of the development of practice nurses, and the learnings that could be applied to improve the profile of dietetics practice in primary care.

Methods: A scoping review synthesising peer-reviewed and other literature relevant to the development of Australian practice nurses was conducted. Structured searches using keywords 'general practice', 'nurse' and 'Australia' were conducted in PubMed and Google Scholar in June 2021. Key government websites, Department of Health and Services Australia, were searched to identify grey literature. One reviewer screened the titles and abstracts against inclusion criteria; two reviewers conducted full-text screening independently. Data on the evolution of practice nursing were extracted based on its interest and transferability to the dietetics workforce.

Results: A total of 102 results (82 peer-reviewed and 20 other literature) were included in the review. Key drivers for practice nurse role development in Australia were government funding, practice nurse practice standards, cost–benefit analyses of practice nurses, career and education opportunities, general practitioner and patient perspectives of practice nurses and, individual, community and local needs.

Conclusions: The practice nurse role has grown and strengthened and there are three key learnings that could be translated to strengthen the dietetics workforce in primary care. (1) Use and expansion of government funding, (2) furthering post-tertiary education and career opportunities, including dietetic primary care practice standards and (3) targeting underserviced areas such as those that are rural and remote and building positive relationships with other stakeholders including practice nurses, general practitioners, patients and the broader primary care team.

KEYWORDS

dietitians, general practice, nurses, primary health care, private practice, review

1 | INTRODUCTION

The Australian dietetics workforce has experienced unparalleled growth over the past decade. Membership of the professional association has increased more than sevenfold, expanding from 1049 in 1991, to 6811 members in 2016,[1] and 7873 members in 2021.[2] Similarly, available data suggests the number of dietitians employed in the healthcare sector is growing, with 2800 dietitians employed in 2011 compared with 1900 dietitians 5 years earlier.[3] Whilst hospitals are still the predominant work area for Australian dietitians (36%), Dietitians Australia information suggests that private practice is now the second most common area of work (31%).[1] Private practice dietitians are essentially primary health care workers, although some may also consult to private hospitals and industry.

Dietitians working in private practice are at the forefront of providing evidence-based, tailored nutrition education and counselling to patients in primary care.[4] They provide particular benefit in promoting non-drug interventions for the prevention and management of chronic disease. As private practitioners, dietitians take the role of both business manager and health professional and face challenges to establishing and operating within the private practice sector.[5] The challenges identified are predominantly focused on business operations including administration, bookkeeping, marketing, establishing referral pathways and retaining clientele.[6] These challenges are particularly relevant for new graduates, given that private practice is not widely included in the curriculum nor commonly used as a placement setting in tertiary nutrition and dietetic programs.[7] Thus, there is a strong need for additional and continual professional development in management and business operations to prepare dietitians for private practice.[6]

Collaboration between dietitians and other primary healthcare professionals is key to overcoming the challenge of establishing and maintaining strong referral relationships. Patient referrals for dietitians working in private practice are mainly sourced from general practitioners (GPs).[6] Dietitians must then create and build professional networks with GPs and members of general practice teams to grow referrals and develop collaborative working relationships. Co-location and referral-only offsite collaboration, are the most prominent models of collaboration between private practice dietitians and general practice teams.[8] In addition, shared electronic health records between general practice and allied health professionals is an emerging model of collaboration in Australian primary health.[9]

Practice nurses are vital members of the general practice team. In Australia, practice nurses have become an integral part of patient care in the primary health setting,[10] and primarily work alongside GPs to provide comprehensive medical and nursing services for patients.[11] In just over a decade, the number of practice nurses employed in Australia has nearly quadrupled from ~3200 practice nurses in 2003–2004 to over 12 000 in 2015.[12]

The practice nurse is a relatively new career pathway for Australian nurses compared with other countries with similar health care systems. Comparatively, dietitians in Australia have been recognised since 1929,[13] with a limited number of Medicare Benefits Scheme (MBS) items introduced for primary care dietetics around the same time similar items were created for the practice nurse role in the form of wound care and pap smear item numbers.[14] In the United Kingdom practice nurses have worked in general practice since 1966, and they have been recognised in New Zealand since 1970.[15] In both the United Kingdom and New Zealand, practice nurses have clearly defined roles and job descriptions and are an integral part of patient care in the primary care team.[16] By comparison, Australian practice nurses have voiced frustration at the lack of progress in the development and definition of a clear role description and career pathways,[16] with the development of practice nursing in Australian general practice referred to as *ad hoc*.[17] Despite this, the growth of the practice nurse workforce demonstrates a successful increase in opportunities for nurses in the primary care setting.

Whilst the development of private practice dietetics has evolved as a result of workforce expansion and government policy, much of the work of dietitians in this setting fluctuates and is part time.[6] The Australian government has implemented several schemes and funding incentives which have impacted both private dietetic practices and practice nurse roles. MBS item numbers for practice nurses and rebates for allied health professionals as part of the Strengthening Medicare package, entitled Enhanced Primary Care, were initially implemented in 2004.[14] Additional item numbers for practice nurses and allied health professionals were implemented in the chronic disease management initiative in general practice in 2005.[14] The chronic disease management item numbers opened up opportunities for dietetics to be better utilised in primary care to address the growing prevalence of chronic disease.[18,19] Additionally, the Practice Nurse Incentive Program, now known as the Workforce Incentive Program, was initiated in 2012 (coinciding with the rescinding of other practice nurse MBS item numbers), and has also enabled practice nurses, Aboriginal and Torres Strait Islander health workers, and allied health professionals to achieve a higher presence in Australian primary care.[20] Despite the Australian government

intention for funding to better support and involve the dietetics workforce in primary care, dietitians still arguably go largely unrecognised as frontline primary care workers compared with their nursing colleagues.

Private practice dietitians who rely on general practice referrals may learn from their nursing colleagues and the journey of practice nurses as they became embedded in Australian primary care. The achievement of practice nurse role development when compared with the development of the dietitian's role in primary care represents remarkable success in terms of role expansion and growth. To provide an overview of the development of practice nurses, and the learnings that could be applied to improve the profile of dietetics practice in primary care, this scoping review aimed to synthesise peer-reviewed and other literature relevant to the development of Australian practice nurses.

2 | METHODS

A scoping review was undertaken.[21,22] A structured search of grey and peer-reviewed literature on practice nurses in Australia was undertaken to answer the broad research question: How has the practice nurse role evolved in Australia? A preliminary search returned a key paper from 2007,[15] which the research team used to construct key areas of practice nurse workforce development and sustainability. These key areas were also evident from the titles of other papers returned in the preliminary search and were used as inclusion criteria: government funding and policy, practice nurse professional practice standards, cost–benefit analyses of practice nurses, career and education opportunities, GP perspectives on practice nurses, patient perspectives on practice nurses, and consideration of individual, community and local needs. To efficiently synthesise included papers and to effectively summarise implications for dietetics, these key areas were further collapsed into three categories for data analysis: government funding support, the role of professional organisations, and recognition of local community needs.

All searches were executed on 15 June 2020 and further updated on 24 June 2021. PubMed was used as the primary database to identify peer-reviewed literature, supplemented by searches on Google Scholar, plus selective grey literature searches on Australian Government websites: Department of Health and Services Australia. In line with the leading grey literature search tool kit, produced by the Canadian Agency for Drugs and Technology in Health which recommends reviewing the first 50–100 results retrieved in online searches to ensure the most relevant results, only the first 5 pages (government websites) or 10 pages (Google Scholar) resulting from grey literature searching were screened.[23] Databases, keywords and number of results screened are outlined in Table 1. Different search strategies were used for grey literature searching to produce the most relevant results to meet the aim of the research.

TABLE 1 Keywords searched for database and grey literature sites for relevant reports on practice nurses in Australia

Database	Keywords searched	Number of results screened
PubMed (includes MEDLINE, and other biomedical citations from life science journals and online books).	'nurse' AND 'general practice' AND 'Australia'	All results screened
Google Scholar	'nurse' AND 'general practice' AND 'Australia'	First 10 pages including 100 results (in first[a] and second search[b]) Only 6 additional results returned in second search.
Department of Health https://www.health.gov.au/	'practice nurse'	First 5 pages including 50 results (both searches[a,b])
Department of Human Services https://www.humanservices.gov.au/ Note that this website changed to Services Australia; https://www.servicesaustralia.gov.au/ on 1 February 2020	'practice nurse'	First 5 pages including 50 results (both searches[a,b])

[a]First search conducted on 15 June 2020.
[b]Second search conducted on 24 June 2021.

Peer-reviewed literature was identified through a search of PubMed as a primary source of data and Google Scholar as an additional source. Google Scholar was used in addition to PubMed as it was predicted that not all literature on the development of the practice nurse role in Australia would be published in scientific journals. To avoid personalised results in Google Scholar, accounts linked to Google were logged off prior to the search.[24] All search results from PubMed were included. However,

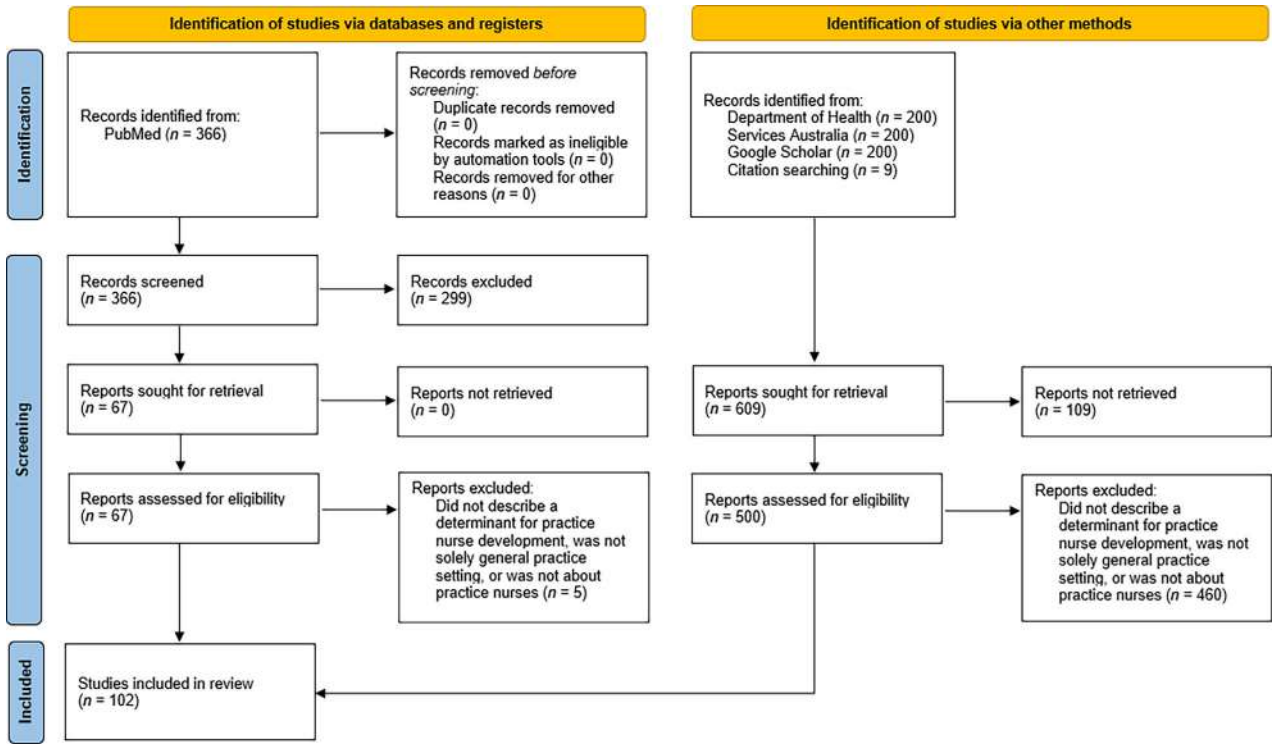

FIGURE 1 PRISMA flow diagram of study selection for a scoping review of Australian practice nurse role development.

due to the large search results from Google Scholar (>40 000), only the first 100 results were screened.[23]

Grey literature, including government documentation, policies and standards, was identified either through the Google Scholar search or handsearching of included studies which identified key sources for practice nurse role development. Further searches were conducted directly using the search tools on Australian Government websites: Department of Health and Services Australia.

Peer-reviewed literature was exported and screened using Endnote,[25] and grey literature were screened by taking 'screenshots' of sites and screened in Microsoft Word. After duplicates were removed, one reviewer screened the titles and abstracts recovered in the search. The full text of reports that were not excluded at title and abstract stage were then scrutinised against the inclusion criteria independently by two researchers. To be included, papers had to be reported as a full paper (any peer-reviewed study, Government, or professional body report, commentary, or opinion piece) focused on development and evolution of practice nursing in Australia. Following full text screening, further searching of the reference lists of included studies was undertaken to identify additional key literature. No language or time restrictions were set. Studies were excluded if they were reported in abstract format only, focused solely on nurse practitioners, and/or reported on practice nurses in a country other than Australia.

Data on the development and evolution of practice nursing was extracted from included studies into Microsoft Word by one reviewer, based on interest and transferability to dietetics and the private practice context. Extracted data was summarised narratively under the relevant categories, and further identified as a driver (directly influencing role development) or contributor (indirectly influencing role development). In line with scoping review methodology, quality appraisal of papers was not conducted as the aim was to provide an overview of the current literature on practice nurse development, and not to appraise the quality.

3 | RESULTS

Following de-duplication, a total of 857 results were identified in the search (Figure 1, PRISMA flow diagram).[26] At title and abstract stage, 682 papers were excluded, leaving 175 for full text review, during which a further 82 were excluded. The reference lists of the remaining 93 articles including grey literature and peer-reviewed studies were scrutinised by title to identify an additional nine articles including three peer-reviewed research

TABLE 2 Included peer-reviewed and grey literature reporting on the practice nurse role development in Australian general practice

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
Peer-reviewed Literature ($n = 82$)						
Australia's first transition to professional practice in primary care program for graduate registered nurses: A pilot study	Aggar et al.[27]	Mixed methods; longitudinal exploratory study Questionnaire and interviews pilot study	RNs (graduate $n = 4$, preceptors $n = 7$) Data collected 3-, 6- and 12-months post commencement of transition program. Aim: To determine whether a transition to professional practice program led to competent practice nurse graduates	• With adequate support graduate nurses can transition into PN roles as a positive nursing workforce development strategy • Nurses were deemed as competent post-program • Relationships between preceptor and graduate nurse were positive and key to graduate nurse competency/development • Increasing prevalence of chronic illness and multimorbidity = implications for nursing workforce development	Career and education opportunities (individual, community and local needs)	Professional placements in private and general practice for student dietitians may assist with transition into this area of practice post-graduation.
Cross-sectional survey of older patients' views regarding multidisciplinary care for chronic conditions in general practice	Bonney et al.[28]	Quantitative; cross-sectional study	272 older patients (>60 years) Questionnaires on acceptance of other health professionals in CDM care. Aim: To explore conditions under which older patients would accept having health professional other than their GP (such as PN) involved in their CDM care	• Some scepticism by participants • More accepting of PN than other professionals • However, felt better when GP was also involved in 'shared continuity'	Patient perspectives of PNs (individual, community and local needs)	Exploration of patient views on the inclusion of the dietitian in multidisciplinary care for chronic conditions is needed.
A qualitative study of patient experiences of Type 2 Diabetes care delivered comparatively by General Practice Nurses and Medical Practitioners	Boyle et al.[29]	Qualitative; interviews, interpretive study	10 patients from a single GP practice Semi-structured interviews Aim: To explore patient experiences of T2DM care delivered by PNs in collaboration with their GP.	• Patients saw PN consultation as a clinical assessment for their GP • Expressed ongoing challenges living with T2DM and need for additional information and advice • Patients recommended this general practice to their friends and family with T2DM as they saw benefit in the care received	Patient perspectives of PNs	Exploration of patient views on inclusion of the dietitian in T2DM management compared with other professionals is needed

(Continues)

TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
				• Patient expectations of PN care is variable and depends on their condition and their experiences with a PN →related to the *ad hoc* nature of PN development		
Ascendancy with a capital A: The practice nurse and short general practice consultations.	Britt et al.[30]	Other; commentary report	Analysis of Medicare item claims for PNs and short (<15 min) general practice consultations.	• Increased use of PNs in short level 'A' consultations where 2/3 s of procedures, such as dressings, excisions and incisions, within these consultations were conducted by the PN • Delegation of 'straight-forward' tasks to the PN enabled GPs to see more complex patients • Available funds through Medicare rebates for GP activities taken on by PN	Cost–benefit of PN role (government funding)	Delegation of nutrition-related education and interventions can be conducted by dietitian through use of allied health item numbers.
Cervical screening in general practice—strategies for improving participation	Byrnes et al.[31]	Quantitative; audit	Electronic record audit on pap smear occurrence in 1500 females (18–69 y). Aim: To assess the effect on cervical screening rates in one small general practice	• Patients can choose to have pap smear done by PN • PNs conducting pap smears can reduce workload of GPs	Individual, community and local needs	Re-allocation of nutrition-related interventions to dietitians could reduce GP workload and enhance care
New graduate employment in general practice: Perceptions of final-year nursing students	Calma et al. 2021[32]	Qualitative; interviews, descriptive study	16 final-year nursing students from 5 universities Interviews Aim: To investigate perceptions of final-year nursing students regarding general practice nursing as a new graduate career path.	• Four themes: (1) General practice is not a priority career path (2) Opportunities for skills development and consolidation (3) Perceptions of employment conditions (4) Transition support is limited	Career and education opportunities	Support of student dietitians in private and general practice settings could enhance their experiences when entering the workplace.
Australian practice nurses' perceptions of their role and competency to provide nutrition care to patients living with chronic disease	Cass et al.[33]	Qualitative; interviews	20 PNs Interviews Aim: To investigate PNs' perceptions of their role and competency to provide nutrition care to patients living with	• Four themes: (1) Role of PNs and nutrition care (2) Professional boundaries of PNs for nutrition care provision (3) Competencies required for	Individual, community and local needs	Opportunity for dietitians to fulfil nutrition education and care needs.

TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
			chronic disease in Australia.	effective nutrition care (4) Nutrition education of PNs • Lack of accessibility and availability of nutrition education for PNs		
Mental health nurses employed in Australian general practice: Dimensions of time and space	Chamberlain-Salaun et al.[34]	Qualitative; interviews, descriptive exploratory study	7 GPs and 2 MHPNs Semi-structured interviews Aim: To explore how people living with mental illness are supported in Australian general practice.	• MHPNs are vital in the care and support of people with mental illness • 2 key themes: Dimensions of time and space • MHPNs were more flexible in time and space compared with GPs who conducted MHCP • Consult spaces that were free from stigma, such as consults conducted in their homes, were more open and comfortable to patients	Government funding (individual, community and local needs)	Dietitians with mental health training and education are needed to support the growing cases of mental illness.
A tool to evaluate patients' experiences of nursing care in Australian general practice: Development of the Patient Enablement and Satisfaction Survey (PESS)	Desborough et al.[35]	Mixed methods; report of survey development and focus groups and interviews to refine survey	General practices PESS survey development Validity was obtained through focus groups and interviews with patients and PNs Reliability was gained through test–retest study Aim: To develop a survey to evaluate patient satisfaction and enablement of PN care	• Comprised of 20 questions (15 patient satisfaction, 5 enablement) • Validity of survey: Two focus groups with four and then six patients. Focus groups 30–60 min. In-depth individual interviews were conducted with 4 patients. Patients described thought processes in answering draft survey questions	Patient perspectives of PNs	A tool to evaluate patients' experiences of care by a dietitian could be developed.
Impact of nursing care in Australian general practice on the quality of care: A pilot of the Patient Enablement and Satisfaction Survey (PESS)	Desborough et al.[36]	Quantitative; pilot of PESS	Two general practices Pilot of PESS Aim: To evaluate two aspects of quality of care in PN in general practice—patients were attending nurse-led general and chronic-disease clinics	• Comparison of CDM patient's vs. 'general clinic' patients = CDM patient had higher enablement scores with PN • All patients reported satisfaction with PN care • Patients who attended the clinic for influenza vaccinations were least satisfied—related to the	Patient perspectives of PNs	As above

(Continues)

TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
				out-of-pocket expense of this clinic compared with the no charge of the CDM clinic		
The impact of general practice nursing care on patient satisfaction and enablement in Australia: A mixed methods study	Desborough et al.[37]	Mixed methods; cross-sectional survey and interviews	678 patients were surveyed (42% response rate). Examined a cross-section of patients from PESS survey 48 interviews with 16 PNs, 23 patients and 9 practice managers 21 general practices Aim: To explore patient satisfaction and enablement with general practices in the ACT	• Longer PN consults = greater patient satisfaction • Consults with a well-known PN by patient = greater patient satisfaction • Expanded roles of PNs = higher quality patient outcomes achieved	Patient perspectives of PNs	Dietitians could also provide more time to patients in consultations than GPs, and encourage patient to return for continuity.
Developing a positive patient experience with nurses in general practice: An integrated model of patient satisfaction and enablement	Desborough et al.[38]	Mixed methods; cross-sectional interviews	Study used data from Desborough et al.[37] Aim: To develop a conceptual model that provides a comprehensive understanding of the structures and processes underpinning patient enablement and satisfaction in general practice nurse consultations	• Patient and PN therapeutic relationship is at the core of the integrated model and includes 'Triggering a Partnership' and 'Tailoring care' • Builds on the results from the three previous Desborough publications[35,36,37] • Authors recommend the use of the model in education and training for PNs	Patient perspectives of PNs	Dietitians should also focus on building strong therapeutic relationships with patients.
A nurse led model of chronic disease care—An interim report	Eley et al.[39]	Qualitative; interviews	Three general practices (1 urban and 1 regional Queensland and 1 rural Victorian). 8 GPs, 3 practice managers and 5 PNs Interviews—included questions focusing on the collaborative model of care of a project[39] Aim: To explore the perceptions of practice	• Practice staff expressed that patient self-responsibility was a key part of the new chronic disease management model • Mixed patient responses —some had a keen involvement in this newer model of care, others were content with the usual number of reviews and lacked interest in attending the clinic more often	Individual, community and local needs	Potential research area to look into where dietitian is the lead in chronic disease care.

TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
			staff on the impact of a nurse-led model of care for chronic conditions in general practice			
Outcomes and opportunities: A nurse-led model of chronic disease management in Australian general practice	Eley et al.[40]	Mixed methods; cross-sectional questionnaire and interviews	Randomisation of adults with T2DM, HTN or IHD into PN-led ($n = 136$) or usual GP-led care ($n = 135$). Self-reported QoL and perceptions of the new model of care—patients and GP. Aim: To evaluate a nurse-led model of chronic disease management	• Both groups experienced a decrease in QoL • PN-led model was acceptable and feasible by GPs and patients • GPs expressed that the PN-led model freed up some of their time • PNs were also able to spend more time counselling patients • Patient interviews identified that PNs are drivers in patient self-management and confidence	Individual, community and local needs (patient perspectives of PNs and GP perspectives of PNs)	Dietitians play a large role in chronic disease prevention and management.
A self-reported survey on the confidence levels and motivation of New South Wales practice nurses on conducting advance-care planning (ACP) initiatives in the general-practice setting	Fan and Rhee[41]	Quantitative; cross-sectional online survey	147 completed surveys Aim: To understand the beliefs, attitudes, perceptions, confidence, training and educational needs of NSW PNs with regards to involvement in ACP.	• PNs overall positive about their ACP role • Relationship with the patient improved PNs' confidence with ACP • ACP is key for when individuals are unable to decide on medical care • GPs usually conduct ACP—but uptake is limited, thus PNs can fill this gap	Individual, community and local needs (career and education opportunities)	Potential gap in care that dietitians could help to fill.
Building chronic disease management capacity in General Practice: The South Australian GP Plus Practice Nurse Initiative	Fuller et al.[42]	Qualitative; secondary analysis of focus group reports	South Australia GP Plus Practice Nurse Initiative delivered 2007–2010 to recruit and train 157 PNs in 147 general practices in Adelaide. Secondary analysis of qualitative data from the Initiative evaluation report. Aim: To establish what is needed to support the	• Newer PNs to general practice faced greater challenges in their new role • The initiative offered support and development of the new roles • Just over 50% of practices employed the PN beyond the initiative program. • The initiative funded the employment of the PN during the program	Career and education opportunities (government funding)	Dietitians could assist in building chronic disease management capacity in general practice and utilise the WIP

(Continues)

TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
			development of the CDM role of PNs			
Mentoring for nurses in general practice: An Australian study	Gibson and Heartfield[43]	Qualitative; focus groups and case studies	121 Divisions of General Practice, used to sample key reps from urban, rural and remote locations to participate ($n = 201$) in focus groups and case studies Aim: Several aims around mentoring of PNs, including issues, approaches and transferability.	• Seven Core Areas: (1) 'role confusion and the diversity of practice nursing', (2) 'the lack of a defined career pathway for practice nurses', (3) 'professional isolation', (4) 'the need fo general practitioner support', (5) 'expectations of mentoring', (6) 'resourcing and infrastructure', (7) 'role, skills and qualities of mentors'	Career and education opportunities (GP perspectives of PNs and government funding)	Mentoring and/or supervision for dietitians in private practice where support is scarce.
The provision of dementia care in general practice: Practice nurse perceptions of their role	Gibson et al.[44]	Qualitative; focus groups	36 PNs 8 focus groups Aim: To identify the role of primary care nurse in dementia care provision.	• Themes: *sub-themes* • Theme 1: Personal attributes of the PN: *Knowing the person*, *Overcoming stigma* • Theme 2: Professional attributes of the PN role: *Providing holistic care*, *Knowing what to do* • Theme 3: The context of practice: *Team culture*, *Working in the system*	Individual, community and local needs (government funding)	Further exploration of the role of dietitians in dementia care is warranted.
A transition program to primary health care for new graduate nurses: A strategy towards building a sustainable primary health care nurse workforce?	Gordon et al.[45]	Other; debate article	Discusses the PN workforce dilemma currently facing Australian policy makers and presents the potential merits of a New Graduate Transition to Primary Health Care Program.	• Models the transition program off the current acute care programs, and the primary health care programs seen in other countries such as Scotland, NZ and the US • Paper proposes program design, implementation and evaluation	Career and education opportunities	New graduate transition program for dietitians
Practice nurse involvement in primary care depression management: An observational cost-effectiveness analysis	Gray et al.[46]	Quantitative observational cost-effective analysis retrospective case study	Nine low ($n = 6$) or high ($n = 3$) PN-involved general practices with $n =$ 208 patients. Depression case study as part of the Primary Care	• Assignment of low or high model of care based on level of nurse involvement • High level model of care was more expensive	Cost–benefit of PNs	Mental health training and education for dietitians

TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
			Services Improvement Project Aim: To assess the cost-effectiveness of alternative models of PN involvement in the management of diabetes.	• No significant differences were seen in depression measured between models • Any level (low or high) of nurse involvement improves depressive symptoms		
A risk-adjusted economic evaluation of alternative models of involvement of practice nurses in management of type 2 diabetes.	Haji Ali Afzali et al.[47]	Quantitative; cost-effective analysis	T2DM patients in low ($n = 108$) or high ($n = 231$) PN-involved GP practices. Aim: To determine the cost-effectiveness of alternative models of PN involvement in the management of T2DM within primary care.	• Focus on collaborative models of care where PNs are a key component: low-level vs. high-level of involvement of PNs • Total cost difference between models of care was not statistically significant • High-level of PN involvement model showed better health outcomes including larger reductions in HbA1c	Cost–benefit of PNs	Risk-adjusted economic evaluation of dietitians in T2DM management
Practice nurse involvement in general practice clinical care: Policy and funding issues needs resolution	Haji Ali Afzali et al.[48]	Quantitative; cost-effective analysis	Draws on results from the Primary Care Services Improvement Project, a 3-year observational study Aim: To discuss limitations of current funding and policy of enhancing PN role in chronic disease management	• Highlights need for collaborative care models • Growing body of evidence that PN involvement in chronic disease management is cost-effective • Government funding aimed to increase PN numbers and expand their role • Highlights Government's recognition of PNs as valuable	Government funding (cost–benefit of PNs)	Financial incentives to dietitians for professional development in chornic desease management in primary care
Nursing in Australian general practice: Directions and perspectives	Halcomb et al.[11]	Narrative review	A non-systematic literature review Aim: To identify barriers and facilitators of the implementation of PN role in Australia and identify directions for future policy development and research	• Limitations of reimbursement of services provided by PNs not directly supervised by GPs • GPs are unclear about the economic and patient outcome benefits of employing a PN • PNs feel isolated • Varying levels of GP support for further education and training • Patients view PNs overall as amicable, ethical and	Government funding (career and education opportunities, GP perspectives of PNs and patient perspectives of PNs)	Dietitians Australia to assist dietitians working in private and general practice to clearly define and disseminate their role and tailor to local needs

(Continues)

TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
				trustworthy, that PNs enhance GP practice, not substitute it • Growth of PNs has been influenced by change in health care needs, shortage of GPs in rural areas and increasing workloads of GPs country wide • PNs roles are mostly developed from the individual PN dependent on factors such as local needs, individual practice structures and demands, and their own skills and confidence • PN roles have shifted from taking over tasks from GPs to be more autonomous		
Exploring the development of Australian general practice nursing: Where we have come from and where to from here?	Halcomb et al.[49]	Qualitative; content analysis	150 free papers from 2006 and 2007 RCNA National General Practice Nurses conference. Content Analysis of Conference Proceedings Aim: To explore and document the evolution of scholarship and professional development in Australian general practice nursing.	• Conference papers expressed the educational needs and continuing professional development and postgraduate study options for PNs • PN roles are moving towards more specialist areas—including mental health, and chronic disease management considering the increasing individual and community needs in these areas.	Career and education opportunities (individual, community and local needs)	Dietitians Australia plays a key role in supporting evidence-based practice, professional development and professional practice standards for dietitians working in primary care and general practices
Nurses in Australian general practice: Implications for chronic disease management	Halcomb et al.[50]	Quantitative; descriptive national postal survey (part of a mixed methods study)	284 PNs completed a postal survey Three sections: (1) participant demographics, employment and workplace characteristics, (2) barriers and facilitators to role expansion and issues in practice, (3) clinical role. Aim: To describe the demographic and employment	• All participants were female, 99% were RNs • Three levels of clinical skills (I: core clinical skills, II: advanced practice skills, III: expanded nursing skills) • ~84% respondents undertook core clinical skills and felt these tasks were appropriate • ~1/5 of respondents were conducting level II advanced clinical skills, that is, antenatal/ postnatal checks, ordering	Government funding (GP perspectives of PNs)	Need for identification of the barriers to practice for dietitians in the primary care and general practice setting

TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
			characteristics of Australian PNs and explore the relationship between these characteristics and the nurses' role.	diagnostic testing, infant development assessment, etc. • ~87% of respondents were conducting level III expanded nursing skills which included chronic disease management, counselling and prevention education • Barriers to PN role expansion were legal and funding issues, and GP attitudes		
Professional development needs of general practice nurses	Halcomb et al.[51]	Quantitative; descriptive survey	231 PNs Survey was developed using 4 competency standards for PNs: Professional practice, provision of clinical care, management of clinical care systems and collaborative practice. Aim: To identify the educational and professional development needs of NSW PNs	• Three top priority education topics expressed by PNs: Wound care, diabetes and immunisation. • 1/5 patients expressed interest in attending a PN orientation program. • Just >50% of PNs expressed a desire to network with allied health services in general practice • PNs expressed wanting education and training to be delivered during the work week.	Career and education opportunities	Exploration of the professional development needs of private primary care and general practice dietitians
Uptake of Medicare chronic disease items in Australia by general practice nurses and Aboriginal health workers	Halcomb et al.[52]	Quantitative; descriptive analysis	MBS Item 10997 data was extracted from July 2007 to December 2009 from Medicare Statistics Australia.	• 376 201 claims of the 10997-item number in 2 years since introduction • Increase in claims related to the increased number of eligible practitioners to claim the item number. • Expansion of item numbers to be claimed by PNs was linked with a growth in chronic disease services performed by PNs—shaping the PN role	Government funding	Evaluation of cost-effectiveness and patient outcomes of dietitian interventions in chronic disease is needed
Practice nurses' experiences of mentoring	Halcomb et al.[53]	Qualitative; interviews	12 PNs who had supervised general practice nursing students on placement.	• Themes: (1) Promoting practice nursing: We really need to get students in, (2) Mentoring future	Career and education opportunities	General practice/private practice placements for student dietitians could

(Continues)

TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
undergraduate nursing students in Australian general practice			Structured telephone interviews Aim: To explore the experiences of PNs mentoring undergraduate students on clinical placements within the general practice setting.	co-workers: Patients and reassurance, and (3) Reciprocity in learning: It is a bit of a two-way street • Mutual benefit to PN and nursing student was gained through general practice placement supervision		provide mutual benefit to both dietitians and students—further research required
Culturally and linguistically diverse general practitioners' utilisation of practice nurses	Halcomb et al.[54]	Qualitative; descriptive interviews	48 Culturally and linguistically diverse GPs working as sole practitioners. Semi-structured interviews Aim: To explore diverse GPs' perceptions of the PN role and identify barriers and facilitators to employing PNs in their practice.	• 73% of GPs agreed that PNs could perform vital sign measurements or spirometry • Key barriers to employing a PN—lack of space/equipment, legal implications, lack of a specific job description, and language issues	GP perspectives of PNs	Dietitians should be aware that cultural and language barriers may be experienced when working with GPs from diverse backgrounds. Opportunities for dietitians with cultural and/or linguistic diversity may exist with GPs from similar backgrounds.
The evolution of nursing in Australian general practice: A comparative analysis of workforce surveys 10 years on	Halcomb et al.[16]	Quantitative; descriptive survey	284 nurses (1 male) employed in general practice completed first survey (2003–2004). 235 nurses (8 males) completed second survey (2009–2010). Not the same cohort. Rural, inner city, and remote practices included. Aim: To describe the current demographic and employment characteristics of PNs, and explore trends in changes to their role over time.	• Range of roles and tasks surveyed including vital signs measurement, physical assessment, counselling, case-management/co-ordination • More participants in second survey conducted more complex nursing roles (follow-up of pathology results, physical assessment, and disease-specific education) • Decreased optimism of participants for the future of PN role • PNs want further training and education • Progress in achieving true role development is slow	Career and education opportunities	Focus on education and training of general and private practice dietitians

TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
				• Lack of clear career pathway • Higher degree education (such as masters or postgrad certificates) is available although uptake is variable and there are many barriers, that is, cost and lack of time		
Process evaluation of a practice nurse-led smoking cessation trial in Australian general practice: Views of general practitioners and practice nurses	Halcomb et al.[55]	Qualitative; interviews, process evaluation of 'QUIT with PN' arm of the 'Quit in General Practice' trial.	GPs ($n = 22$) and PNs ($n = 15$) involved in 'QUIT with PN' Semi-structured telephone interviews Aim: To perform a process evaluation of a PN-led smoking cessation intervention being tested in a randomised controlled trial in Australian general practice.	• Overall positive view of QUIT with PN intervention • Adequate training of PNs = increased confidence of PNs with smoking cessation counselling • Collaboration between PN and GP through this intervention was not as strong or readily enacted as intended	Individual, community and local needs (career and education opportunities and GP perspectives)	Dietitians should focus on seeing GPs and PNs as a collaborative team rather than solo practitioners
The development of professional practice standards for Australian general practice nurses	Halcomb et al.[17]	Mixed methods; concurrent survey, focus groups and consultation with experts.	Two online surveys (1st $n = 203$, 2nd $n = 262$), and 14 focus groups (>200) of RN and EN PNs, and consultations with key experts. Aim: To explore the current role of general PNs and the scope of nursing practice to inform the development of national professional practice standards for Australian general PNs	• 22 practice standards were developed • 4 domains of practice standards: (1) Professional Practice, (2) Nursing Care, (3) General Practice Environment and (4) Collaborative Practice • Standards for RNs and ENs were described separately	PN practice standards	National professional practice standards are needed to support the growing dietetics primary care workforce
Exploring job satisfaction and turnover intentions among general practice nurses in an Australian Primary Health Network	Halcomb et al.[56]	Quantitative; descriptive survey	90 PNs Survey to measure PN demographics, employment status, role, workplace supports and performance appraisals.	• Higher job satisfaction was related to: having a support person that is a nurse leader or manager, feeling they are using their training and knowledge to	Career and education opportunities (individual, community and local needs)	Exploration of job satisfaction of general and private practice dietitians needed, and targeting areas that the workforce are least satisfied with

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TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
			Aim: To explore the job satisfaction and turnover intentions of general PNs and examine factors that influence job satisfaction and turnover intention.	full potential, not feeling isolated and having a mentor • ~45% felt they were unsure if they would remain working as a PN		
Advanced training for primary care and general practice nurses: Enablers and outcomes of postgraduate education	Hallinan et al.[57]	Quantitative; descriptive cross-sectional questionnaire	100 PNs who are current and past students of postgraduate studies of primary care nursing. Aim: To understand enablers to participation in postgraduate education for PNs and to explore how postgraduate education has advanced their practice.	• 99% reported opportunities to expand scope of practice by completing postgraduate studies • Respondents reported increased potential to provide more preventive and chronic disease services since postgraduate studies. • Improved work satisfaction and practice autonomy by PNs	Career and education opportunities	Increased access to postgraduate education opportunities for dietitians may benefit the growth of primary care dietetics practice
Mental Health Nurse Incentive Program: Facilitating physical health care for people with mental illness?	Happell et al.[58]	Quantitative; descriptive survey	38 PNs involved in the MHNIP participated in national survey Aim: To identify the views of PNs working within the MHNIP about their level of attention to the physical health of people with severe mental illness, and which aspects might foster collaborative and comprehensive care.	• MHNIP improved mental and physical healthcare • Collaboration between PNs and GPs improved through the MHNIP • Consumers of service had good access to physical and mental healthcare services • Nurses could develop their physical clinical skills	Government funding	Mental health training and education for dietitians
Review and analysis of the Mental Health Nurse Incentive Program	Happell et al.[59]	Systematic review	Included any literature on the MHNIP including government, professional organisation and peer reviewed. Aim: To review and synthesise research on the MHNIP to ascertain the benefits and limitations of this initiative for people	• 17 reports of primary research data were included • Program was successful in the objective of increased access to primary mental health care • Positive feedback from stakeholders • Room for improvement—inequities of access for people with mental illness	Government funding (individual, community and local needs)	Increased consumer involvement in evaluation of dietitian services would be of benefit

TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
			with mental illness, general practitioners, mental health nurses and the wider community.			
Reflections on the history of general practice in Australia	Harris and Zwar[19]	Narrative review	General Practice in Australia (including PNs) Aim: To examine the transformation of, and trends in, Australian general practice through the lens of medical generalism as it has developed over the past 100 years.	• 2002—introduction of PN funding initiatives (initially just item numbers but later developed into the PNIP) • 2004—specific Medicare item numbers covering provision of vaccinations and wound management by PNs • 2007—2/3 of practices employed PNs vs. 1/3 in 1990 • 2012—Medicare rebates were mostly replaced by the PNIP—provides funding for employment of PNs in practices and seeks to encourage PN role expansion	Government funding	Evaluations of general practice should include evaluating dietitians funded through Medicare item numbers
Potential roles for practice nurses in preventive care for young people—a qualitative study	Hart et al.[60]	Qualitative; interviews	17 health and community professionals and 12 PNs interviewed. Aims: (1) to provide information on acceptable roles for PNs, barriers and facilitators to performing these roles, and whether existing programs for training GPs in adolescent healthcare could be adapted for training PNs. (2) to explore PNs' and key informants' views on a linkage role between the general practice and other youth services provided by nurses.	Four themes (sub-themes): • Perceived current health issues for young people, • Barriers to young people accessing healthcare (confidentiality, accessibility), • Facilitators and barriers to optimal care by the practice nurse ('youth friendly' environment, communication skills, confidence, training, remuneration), • The role of the practice nurse in the care of young people (linkage roles and outreach, health promotion)	Individual, community and local needs	Dietitians could help engage younger populations in their healthcare

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TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
Mentoring for nurses in general practice: National issues and challenges	Heartfield and Gibson[61]	Qualitative; focus groups	Key stakeholders and informants discussed issues surrounding the development of a mentoring framework for PNs via teleconference that was audiotaped, transcribed and subject to content and thematic analysis. Aim: To identify national issues impacting on the development of a mentoring framework for nurses in general practice in Australia.	Four key themes (issues): (1) Choice—about scope, purpose, context and mentoring roles (2) Relationships—included building new and existing. Mentoring occurred at different stages of work life. (3) Structures—including existing networks and structures. Promote formal programs and facilitate ethical practice and continual education. (4) Resources—a culture that values mentoring, and providing technology to support communication	Career and education opportunities	Mentoring framework could be applied to provide support and guidance of dietitians throughout their careers
Australian consumers' expectations for expanded nursing roles in general practice—choice not gatekeeping	Hegney et al.[62]	Qualitative; discussion paper reporting two qualitative studies focus groups	Study 1—170 patients from 6 Australian states and territories Study 2—106 patients from Queensland Focus groups Aim: To explore patient perspectives and expectations for PN roles in general practice	• PNs should not act as the gatekeeper for, or replace, the GP and vice versa • PN's main role was to enhance GP's care • Consumers want to be able to book with the PN directly, and not have to also see the GP	Patient perspectives of PNs	Exploring patients' perspectives of dietitians and nutrition services is warranted
Practice nursing in rural Australia	Hegney[63]	Integrated review	All articles that provided commentary of the PN role in rural areas were included Aim: To explore the existing literature describing the work of practice nurses in rural Australia and the perceptions of consumers	• The more remote the location, the more likely that patients perceived the PN to be directly supervised by the doctor • Rural PNs are more likely to have a specialist role within the practice, for example women's health, to work alone and, to undertake emergency and triage roles • In small, rural communities the PN is well known therefore patients may have a stronger relationship with the PN and	Patient perspectives of PNs (individual, community and local needs)	Dietitians may be more autonomous in rural and remote communities

TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
				higher levels of personalised care		
An overview of the general practice nurse workforce in Australia, 2012–2015	Heywood and Laurence[64]	Quantitative; descriptive survey	Survey data from the 2012–2015 Australia Health Practitioner Registration Agency Aim: To describe the profile of the PN workforce and to explore how it differs from the non-GPN nursing workforce, and if this workforce is changing over time.	• 2015 = 12 746 PNs • Compared with the overall nursing workforce, PNs are female (97%), older, and more likely to work part-time (65%), 80% are RNs • Compared with 2012, 2015 PNs are younger • Discussion highlights that nursing placements in general practice are recent and may be a beneficial strategy to recruiting PNs to the workforce	Career and education opportunities	Recruitment and retainment strategies should be considered to support needs of dietetics workforce
A training program for primary health care nurses on timely diagnosis and management of dementia in general practice: An evaluation study	Islam et al.[65]	Quantitative; descriptive survey	PNs ($n = 1290$) surveyed at 3 time points during a training program about dementia diagnosis and management (pre, immediately post, and 6 months-post) Aim: To evaluate a training program for PNs by assessing change in current practice and future intention; and their knowledge, confidence and perceived importance about dementia diagnosis and management.	• Trained participants reported higher levels in all four aspects of dementia diagnosis and management outlined in the study aim • An ageing population increases the demand for diagnosis and management of dementia, and nurses can lead in practice changes to improve dementia care, thus training in this area would be useful	Individual, community and local needs (career and education opportunities)	Dietitians need to adapt practice to the health needs of their patients and communities
Farewell to the handmaiden? Profile of nurses in Australian general practice in 2007	Joyce and Piterman[66]	Quantitative; descriptive cross-sectional survey	104 PNs (RNs and ENs) responded to the survey. Aim: To describe the characteristics of nurses working in Australian general practice, including their backgrounds, working environments, tasks and duties.	• 1/6 respondents had completed or were undertaking postgraduate studies in practice nursing • Some nurses in the survey reported being paid as little as $18/h	Government funding (career and education opportunities)	Career frameworks for dietitians could improve dietetics practice in primary care

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TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
				• The catalyst to the increase in number of PNs and the tasks undertaken by PNs was the PIP		
The work of nurses in Australian general practice: A national survey	Joyce and Piterman[67]	Quantitative; descriptive cross-sectional survey	108 nurses (RNs and ENs) responded , 104 returned completed surveys. Reports data from the Practice Nurse Work Survey Aim: To describe the nature of Australian practice nurses' clinical work, including patient's reasons for consultation, patient characteristics, and the actions taken by PNs.	• Clear influence of funding and organisational arrangements • Broad variety of tasks involved in PN role include immunisation, general check-ups, and chronic disease-related tasks and span across screening and preventative through to management and monitoring • Replacement of the single incentive payment funding stream with the PNIP opened the PN workforce to broader and more flexible roles	Government funding	Dietitians should focus on a team-based approach to health prevention and should consider training in general clinical tasks such as vaccinations and general health checks
Practice nurses in Australia: Current issues and future directions	Keleher et al.[68]	Other; professional opinion article	PNs in Australia	• 2007, ~60% of practices employ PNs • Lack of critical evidence looking at PN models or practice outcomes • Some ambivalence to accept PN as a specialty and progression of the practice • Government incentives to support expansion of PNs are not consistently based on strong evidence about effectiveness, outcomes, or efficiencies • The NiGP initiative explicitly looks at the PNs tasks that directly relieve GPs work pressure (i.e., vaccines, wound management, etc.) • CDMs and TCAs are collaborative practice models where the PN can practice autonomously from the GP and see a patient in their complete	Government funding (career and education opportunities and individual, community and local needs)	Need to track the development of the dietetics workforce in this area Translational education program for dietitians wishing to move from hospital setting to private and general practice may be needed.

TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
				episode of care. However, aiding GPs is still part of their role • Influences on the PN's role (in a specific medical centre) are the professional characteristics of the PN (RN or EN), the business orientation of the practice, and the physical and social health needs of the patients/local demographics • Isolated PNs are at risk of stepping outside their scope of practice • As most PNs are >40 years and likely came from hospital backgrounds—a transitional education/training program may be required for effective transition into PN		
Health promotion by primary care nurses in Australian general practice	Keleher and Parker[69]	Quantitative; descriptive survey	Survey of 54 PNs Aim: To investigate PN perceptions of current and potential roles in health promotion in general practice settings	• Health promotion occurred primarily in the downstream realm of disease prevention and health education • Nurses aspired to take on roles in more upstream work of partnerships and collaboration • Opportunities for health promotion were constrained by the general practice setting and education preparation • PNs had positive outlook that health promotion will become common practice	Career and education opportunities (individual, community and local needs)	Dietitians could support health promotion roles in their work in primary care
Nurse-led diabetes management in remote locations	Kirby et al.[70]	Mixed methods; interviews Cost–benefit analysis pilot study	21 patients from 1 town and 2 small townships in remote Australia. Chronic Disease Nurse (CDN) visited patients. Pre- and post-test patient interviews	• Significant reductions in HbA1c levels were seen post-CDN visits • Patient interviews: Trusted the nurse and saw advice as applicable and relatable to their individual case • Cost of CDN per 1% reduction in HbA1c level was $242.95	Individual, community and local needs (patient perspectives of PNs)	Support for dietitians working in remote settings; exploration of potential for dietitians to lead chronic disease care in remote areas; potential need for expanding scope

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TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
			Cost–benefit was also calculated Aim: To test the feasibility of providing a nurse-led annual cycle of diabetes care in a remote location and to explore the factors that patients indicated were important in diabetes self-management	• A CDN in remote settings benefits patients both physically and mentally		of practice in rural areas (and training for same)
Practice nurse chlamydia testing in Australian general practice: A qualitative study of benefits, barriers and facilitators	Lorch et al.[71]	Qualitative; interviews	23 PNs from the Australian Chlamydia Control Effectiveness Pilot (ACCEPt) Semi-structured interviews thematically analysed using conventional content analysis Aim: To explore the benefits, barriers and facilitators of PN chlamydia testing	Five domains: (1) PNs' current role in sexual health/chlamydia testing (2) Opinion around PN involvement in chlamydia testing (3) Benefits of PN involvement in chlamydia testing (4) Barriers to PN involvement in chlamydia testing (5) Facilitators to PN involvement in chlamydia testing	Individual, community and local needs	New initiatives for dietitians to expand into more generic primary care tasks such as vaccinations and blood pressure measurement, point-of-care testing and need for qualitative exploration to identify dietitians' perspectives
Understanding the process of patient satisfaction with nurse-led chronic disease management in general practice	Mahomed et al.[72]	Qualitative; interviews	38 patients with T2DM, IHD or HTN (47 interviews) Grounded theory study Aim: To understand patient satisfaction in relation to care provided by PNs	• The theory 'Navigating Care' was grounded in the data • Within that theory are themes (sub-themes): (1) Determining Care Need (Self-monitoring and Monitoring by health professionals) (2) Forming a relationship (Time, Communication, Continuity) (3) Having confidence (Trusting the model of care, trusting the role of nurse, evaluating the PN)	Patient perspectives of PNs	Further development and dissemination of the dietitian's role in the care of T2DM, IHD and HTN is needed
An integrative review of facilitators and barriers influencing collaboration and teamwork between	McInnes et al.[73]	Integrative review	Review of 11 papers (9 qualitative and 2 mixed methods) Aim: To identify facilitators and barriers influencing	• Three themes: (1) roles and responsibilities 2) respect, trust and communication	GP perspectives of PNs	Encourage dietitians to work closely with GPs and PNs to enhance collaborative practice

TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
general practitioners and nurses working in general practice			collaboration and teamwork between GPs and PNs.	(3) hierarchy, education and liability • PNs are involved in shared decision-making, goal setting and are equal to GPs		
Clinical placements in Australian general practice: (Part 1) the experiences of pre-registration nursing students	McInnes et al.[74]	Qualitative; (from a larger mixed methods project); interviews	15 pre-registration nursing students, post-placement in general practice Thematic analysis Aim: To explore the experiences of pre-registration nurses' experiences on general practice placements.	• Four themes: (1) Knowledge of the practice nurse role: I had very limited understanding (2) Quality of the learning experience: It was a fantastic placement (3) Support, belonging and mutual respect: I really felt part of the team (4) Employment prospects: I would really, really love to go to a general practice but...	Career and education opportunities	Placement in general practice and private practice settings could be an opportunity for student dietitians to gain exposure to these practice settings
The influence of funding models on collaboration in Australian general practice	McInnes et al.[75]	Qualitative; interviews	8 GPs and 14 PNs from 13 NSW general practices Aim: To explore ways that general practitioners and registered nurses work together to deliver clinical care	• This article reports on 1 of 3 themes (the other 2 are reported in the next 2 articles[76,77]) 'The influence of funding models on collaboration between GPs and GPRNs working in Australian general practices' • Four sub-themes: (1) The ethos of general practice—describing shared goals to sustain community health services (2) Diverging priorities—there are diverse perspectives to prioritising care and using resources (3) The potential for conflict—limitations to current funding models and pressure to nursing cost supplementation (4) Remuneration for expertise—issues regarding employer-employee	Government funding (GP perspectives of PNs)	Funding models can support collaboration between dietitians, GPs and PNs

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TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
				relationships and PN difficulty negotiating salaries		
A qualitative study of collaboration in general practice: Understanding the general practice nurse's role	McInnes et al.[76]	Qualitative; interviews	As above[75]	• Overarching theme 'Understanding the general practice registered nurses role' with three sub-themes: (1) The importance of role clarity, (2) The GPRNs' perception of their own identity, (3) Appreciating the GPRNs' expertise	GP perspectives of PNs	Dietitians could provide professional development opportunities for GPs and PNs, to enhance collaborative practice
Understanding collaboration in general practice: A qualitative study	McInnes et al.[77]	Qualitative; interviews	As above[75]	• Overarching theme 'Understanding collaboration in general practice', with 4 sub-themes: (1) Interpreting collaboration in general practice (2) Modes of communication (3) Facilitators to collaboration (4) Collaboration in practice • Collaboration and teamwork were described by participants as interchangeable • More structured environments enabled more effective collaboration	GP perspectives of PNs	Effective communication of the dietitian role to GPs and PNs can assist with collaborative practice
Experiences of registered nurses in a general practice-based new graduate program: A qualitative study	McInnes et al.[78]	Qualitative; interviews	Nine new graduate RNs and their mentors Aim: To explore the experiences of new graduate registered nurses and their registered nurse mentors in a new graduate program within Australian general practice.	• Four themes: (1) Preparation and Opportunities (pre-registration has influence on preparation for PN work) (2) Exceeding Expectations (patients' expectations were more than met by graduate nurses) (3) Program Challenges	Career and education opportunities (patient perspectives of PNs and GP perspectives of PNs)	Mentoring specific for new graduate dietitians in private practice is warranted

TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
				(challenges were expressed by both mentors and mentees. One challenge was around GP's understanding of the program) (4) Future Career Intentions (individuals who started the program felt more prepared and interested in pursuing a career as a PN)		
Is it time to include the practice nurse in integrated primary health care?	McKernon et al.[79]	Quantitative; descriptive survey	Sample of GPs ($n = 321$) in QLD and NSW participating in the DVA Preventive Care Trial. 52 GPs surveyed worked with a PN Aim: To investigate the current perceptions of Australian GPs' desire for, and impact of, shared care with PNs and other health professionals.	• Main role of PN was to do ECGs, dressings and triage • 70% of GPs identified cost as a barrier to employing a PN • 58% reported a lack of Medicare item number as a barrier to employing a PN	GP perspectives of PNs (government funding)	Understanding GPs views of dietitians working in general practice could provide insight into how dietitians can become more integrated
ARNM: Promoting nursing in general practice	Mcleod and Mills[80]	Other; professional opinion article	Discussion on general practice nursing	• Graduate nurses are underprepared for practice nursing • Recommendation to explore general practice placement for student nurses with PNs, in particular rural and remote areas	Career and education opportunities	General practice placements could improve entry to practice for dietitians
Expanding the role of practice nurses in Australia	Merrick et al.[81]	Narrative review	Aim: To examine the structural policy dimensions within which these changes are occurring and makes recommendations for future research on PNs	• Organisational structures, workforce supply, and Medicare funding impact the PN role • Structural changes of general practices, such as the move towards 'super clinics', and increasing number of GPs in one clinic may shift the PN to have to work with larger GP and multidisciplinary teams	Government funding	Dietitians' ability and preference to expand their role in general practice could be explored

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TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
				• Primary healthcare changes focus on PNs' ability to work autonomously and independently whilst remaining within scope of practice		
Nursing in general practice: Organisational possibilities for decision latitude, created skill, social support and identity derived from role	Merrick et al.[82]	Quantitative; descriptive survey	160 PNs (96.2% RN, 3.8% EN) NSW PNs surveyed using a 26-item online questionnaire. Aim: To describe the factors that support organisational opportunities for PN decision-making and skill development for nurses employed in general practice in NSW, Australia.	• Support from organisational structures improved PN work satisfaction and skills • Working collaboratively with GPs and other PNs led to higher influence of PNs over the workplace • Part-time or casual contracts provided barriers to PNs' work satisfaction and contribution to the general practice	Individual, community and local needs	Patient needs could shape dietetic practice; exploring organisational structures that support dietitians to work in the general practice setting is recommended.
Patient experiences of nurse-facilitated advance care planning in a general practice setting: A qualitative study	Miller et al.[83]	Qualitative; interviews	13 patients were interviewed Post-intervention of training and support to GPs and PNs on ACP Aim: To explore patients' perspectives of an ACP intervention designed to address common barriers to uptake in the general practice setting	• Six themes: (1) working through ideas (2) therapeutic relationship with nurses (3) significance of making wishes known (4) protecting family from burden (5) autonomy in decision-making (6) challenges of family communication • The patient–professional relationship, whether pre-existing or built within the ACP session, enabled the patient to trust and respect the PN to assist with ACP	Patient perspectives of PNs (career and education opportunities)	Understanding patient views of dietitians could help shape their role, or provide insights to better communicate dietitian role to patients
The changing role of practice nurses in	Mills and Fitzgerald[84]	Qualitative; interviews	Three RNs working in general practice Interviews	• Three themes: (1) nurses in general practice renegotiating their roles	GP perspectives of PNs (individual, community and local needs)	Research and advocacy should consider inclusion of GPs when considering

TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
Australia: An action research study			Aim: Originally aimed to report on the methods used to develop a new model of service delivery—'well women's clinics'. However, participants expressed key barriers to PN role expansion. The aim was changed to how participants addressed barriers to PN role expansion.	(2) identifying and negotiating gendered patterns of cervical screening (3) multidisciplinary collaboration and retention of practice nurses.		the ways that dietitians could be integrated in primary care
The place of knowledge and evidence in the context of Australian general practice nursing	Mills et al.[85]	Quantitative; descriptive survey	1800 Victorian PNs with a response from 590 surveys Aim: To ascertain the place of evidence and knowledge for practice in the context of Australian general practice nursing	• Key barrier: Limited time at work • 1/4 PNs felt that they lacked authority in the workplace to change practice • In-services and conferences were the most frequent modes of professional development and education	Career and education opportunities	There may be value in survey research specifically targeting private practice, primary care dietitians to inform professional development planning. Providing education and training within working hours to dietitians could be of value.
Collaborative care—the role of practice nurses	Morgan et al.[86]	Quantitative; feasibility study	332 patients Training workshops for PNs from 6 practices Aim: To evaluate training workshops to prepare PNs to use screening methods for co-morbid depression in T2DM and coronary heart disease.	• Patients could have both their physical and mental health needs addressed in their management • PNs were identified to have significant improvement in knowledge and confidence in screening and assessing depression in their CDM assessments	Individual, community and local needs (cost–benefit of PNs)	Dietitians could play a role in both physical and mental health care for primary care patients, with training.
The TrueBlue study: Is practice nurse-led collaborative care effective in the management of	Morgan et al.[87]	Quantitative; cluster-randomised intervention trial *protocol*	18 general practices (regional or remote) were randomly allocated to intervention or control.	• No findings—protocol	Individual, community and local needs (cost–benefit of PNs)	Further exploration of whether dietitians could play a role in both physical and mental

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TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
depression for patients with heart disease or diabetes?			Aim: To compare the clinical outcomes of our model of practice nurse-led collaborative care with usual care for patients with depression and T2DM or CHD.			health care for patients is worthy of research.
General practice and the management of chronic conditions: Where to now?	Newland and Zwar[88]	Other; professional article	Aim: To provide a practical overview of the use of the Medicare CDM item numbers.	• PN role in GPMP and TCA is clearer and more inclusive • PNs can assess the patient • Facilitates communication between patient, PN, GP and other health professions, such as allied health • Opportunity for PN to provide health education and counselling	Government funding	Dietitians could better collaborate with PNs to enhance patient care; this could in time lead to expanded funding opportunities.
The advent of mental health nurses in Australian general practice	Olasoji and Maude[89]	Narrative review	Describes the background and implementation of the Mental Health Nursing Incentive Program (MHNIP)	• Prior to the program, GPs needed and sought assistance to provide consumers with timely and accessible mental health care. • PNs could fulfil this need	Government funding	Training and support could be provided to enhance dietitians' skills and knowledge of mental health.
Practice nursing in Australia: A review of education and career pathways	Parker et al.[90]	Systematic review	9 databases searched. Aim: To establish the available evidence on education models and career pathways with a view to enhancing recruitment and retention of practice nurses in primary care in Australia	• Scope of practice for PNs complements that of the GP • High variation in tasks undertaken by PNs • No mandatory training beyond post-registration qualification • Post-graduate courses are available, uptake is low • Informal education is accessible through the practice – although not standardised across practices • Exposure to more acute care experiences and placements than primary care in nursing programs	Career and education opportunities (government funding)	Need to explore the career and education needs of dietitians in primary care settings including opportunities for role expansion.

TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
				• Comparison to UK and NZ—have more solid foundational education and career opportunities		
Primary care nursing workforce in Australia	Parker et al.[91]	Other; professional opinion article	Describes influences on the nursing workforce in primary care and makes recommendations on areas to focus to improve the growing future workforce.	• MBS and PNIP have attempted to build the PN workforce. However, lacking in systematic and integrated methods and need further work • Recommends that funding should focus on complex tasks rather than individual item numbers • Education should focus on quality assurance roles rather than individual clinical tasks • Undergraduate criteria should include encouragement to consider PN career pathway	Government funding (career and education opportunities)	A focus on enhancing the overall role of the dietitian in this setting could build the workforce in primary care.
The work, education and career pathways of nurses in Australian general practice	Parker et al.[92]	Quantitative; descriptive survey	58 PNs Aim: To examine the qualifications and educational preparation of PNs, their current enrolments in education programs, and their perspectives about post-registration education.	• 94% had access to educational opportunities • Range of barriers to using opportunities of further education • Respondents felt less well regarded than their acute care colleagues	Career and education opportunities	Dietitians Australia competency standards need to reflect the growth of dietitians in the primary care setting
General practice nursing education in Australia	Pascoe et al.[93]	Mixed methods; survey and focus groups	Three-part research project using qualitative and quantitative data collection methods. 'RACGP/RCNA NiGP Project' 1. Telephone survey of 222 PNs about current roles, qualifications and education experience and needs.	• Over 1/3 PNs in the telephone survey have no further formal education (beyond their initial nursing education) to support their PN role • Those who received further formal education had done so in areas of midwifery, immunisation, and maternal and child health	Career and education opportunities	Encouraging formal and non-formal education and professional development for dietitians

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Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
			2. 14 focus groups (97 GPs and 183 PNs) to explore the two profession's views, experiences and perceptions about nursing and education in general practice 3. Survey—to identify and map PNs formal and non-formal education opportunities Aim: To explore the education currently available for nursing in general practice.	• ~95% nurses had received non-formal education in the past 2 years • GPs and PNs expressed that current education for PNs is limited, largely non-formal, delivered within the practice setting, focused on National Health Priority Areas, more appropriate for RNs over ENs, and focused more on clinical tasks		
Nursing's contribution to general practice: General practitioners' and practice nurses' views	Patterson et al.[94]	Quantitative; descriptive survey	Two phases Phase 1: Telephone survey of 175 practices Phase 2: Mailed questionnaires (84 GPs and 37 PNs) Aim: To ascertain GPs' and PNs' views about the current and potential contribution of nursing to general practice.	• Nurses' contributions to the overall functioning of general practice • Nurses' contribution to preventive care and health promotion in general practice • Autonomous functioning for practice nurses	GP perspectives of PNs	Understanding the view of GPs on working with dietitians may inform efforts to increase their contributions in primary care
Collaborative practice between registered nurses and medical practitioners in Australian general practice: Moving from rhetoric to reality	Patterson and McMurray[95]	Narrative review	Aim: To present some of the known facilitative and hindering factors to collaborative practice and examine these in the context of the Australian general practice setting.	• PNs understanding the dynamics of their relationships with GPs to move to more collaborative in nature • Collaborative practice, although strongly encouraged, was seen as more of the exception than standard practice • Highlights the PN role moving from 'working for' to 'working with' the GP	GP perspectives of PNs	Collaborating with GPs and PNs could enhance dietetic practice in primary care.
Following the funding trail: Financing, nurses and teamwork in	Pearce et al.[96]	Mixed methods; multimethod study—interviews,	Interviews $n = 82$—PNs (36), Doctors (24) and managers (22)	• Participants expressed concerns that Government funding and remuneration narrowed PN	Government funding	Funding and initiatives to better support collaboration and

TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
Australian general practice		structured observation and case studies	Structured Observation = 51 h Aim: To examine the influence of funding structures on the role of the PN.	roles by limiting to tasks only directly funded. • 6% of fee-for-service funding was claimed by PN activities		teamwork in primary care should include dietitians
Clinical placements in general practice: Relationships between practice nurses and tertiary institutions	Peters et al.[97]	Qualitative; interviews	12 PNs Aim: To explore the perspectives of PNs who have experience in facilitating undergraduate clinical placements about the relationships between higher education institutions and nurses.	• Three themes (1) Appropriate preparation for placements: *They do not know what primary health really means* (2) Seeking greater consultation in the organisation of clinical placements: *They have got to do it one way for everyone* (3) Uncertainty and lack of support: *I had no contact with the university.*	Career and education opportunities	Universities and clinical supervisors need to be included in the implementation of primary care placements for student dietitians
Being strategic: Utilising consumer views to better promote an expanded role for nurses in Australian general practice	Price et al.[98]	Qualitative; discussion paper	Collation of two qualitative studies: • Consumer perceptions of nursing and nurses in general practice (Cheek et al., 2003) and; • Consumer perceptions of practice nursing (Hegney et al., 2004). Plus the General Practice Nursing in Australia report Aim: To identify and discuss the link between consumers' perceptions and expectations and health professionals' issues.	• Emphasis on the use of consumer perspectives to guide what and how services could be improved in general practice • GPs and PNs tend to focus on professional and structural tensions	Patient perspectives of PNs	Consulting with consumers/ patients to identify potential areas for better services, and to identify where dietitians could contribute more in the primary care setting
Brief interventions: Good in theory but weak in practice	Roche and Freeman[99]	Narrative review	Aim: To examine the role of GPs vs. the role of the PN in brief interventions for	• PNs are more cost-effective in health interventions (10%–42% less) than their GP counterparts	Cost–benefit of PNs (individual, community and local needs)	Cost-effectiveness or cost-analyses could benefit dietitians providing services in primary care

(Continues)

TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
			alcohol and drug-related problems.	• GP-led brief interventions for alcohol and drug-related problems have more barriers than PN-led interventions		
How general practice nurses view their expanding role	Senior[100]	Quantitative; exploratory descriptive questionnaire	22 PNs Questionnaire Aim: To explore the barriers and enablers that nurses working in general medical practice experience in relation to the Australian Government-driven expansion of their roles.	• 90% of respondents reported an expansion of their role since Government funding initiatives • Most of the nurses were the key drivers in the expansion of their role at the practice level • Key barriers to PN role expansion were lack of physical space in the practice and lack of time	Government funding (GP perspectives of PNs)	Government funding can support the expansion and development of the dietitian role
Wound care costs in general practice: A cross-sectional study	Whitlock[101]	Quantitative; cross-sectional study	18 general practices in QLD. Recorded data for every wound care episode within a 2-week period. Aim: To determine the cost of wound care in general practice by conducting an audit of current wound management practices.	• PNs were seen as a cost-effective way of managing wound care and dressings • General practices expressed that PNs had a reduced role in wound care since removal of Medicare item numbers for PNs conducting wound care	Cost–benefit of PNs (government funding)	Wound care is a potential area for dietitians to contribute through nutrition education and support
Working relationships between practice nurses and general practitioners in Australia: A critical analysis	Willis et al.[102]	Qualitative; interviews	9 PNs, 2 Nurse Practitioners and 10 GPs Aim: To identify the extent to which shared care existed in the workplace relationship, the form shared care took, and the factors which influenced it.	• Shared care did not exist in GP practices where interviews were held • GP and PNs had established constructive working relationships • GPs expressed desire for PN role to broaden • Medicare funding has enabled increase in PN taking on workloads originally done by the GP • Nursing salaries are not growing linearly with the growth of required tasks	GP perspectives of PNs (government funding)	Working relationships between GPs, PNs and dietitians should be encouraged and supported

TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
A nurse-led model of chronic disease management in general practice: Patients' perspectives	Young et al.[103]	Qualitative; interviews	10 patients with chronic conditions Second phase of a mixed method study Aim: To explore patients' perceptions of a nurse-led collaborative model of care trialled in 3 GP practices.	• Patients felt empowered by PN when they perceived to have a strong relationship with the PN • Three themes (1) Time (No time with GP, More time with PN) (2) Ambience (More relaxed, Better atmosphere, Encouraging) (3) Dimensions of PN role (Therapeutic relationship, Educational role, Clinical knowledge)	Patient perspectives of PNs	
Quit in General Practice: A cluster randomised trial of enhanced in-practice support for smoking cessation	Zwar et al.[104]	Quantitative; cluster randomised trial	Aim: To compare the 'Quit with PN' intervention against referral to a telephone Quitline service and 'usual care' as part of a three-armed randomised control trial.	• Highlights the importance of trials such as smoking cessation to advancing the PN role	Cost–Benefit of PNs	Identifying areas where dietitians can be a cost–benefit could help to support practice areas
Grey Literature (n = 20)						
Nursing in General Practice: A guide for the general practice team	Australian College of Nursing (ACN)[105]	Handbook	Developed to provide the general practice team with information on employing and supporting RNs and ENs in general practice. Update from the Nursing in General Practice Information Kit 2001 and 2005 version by Royal College of Nursing, Australia. Aim: To provide the general practice team with information on employing and supporting registered and enrolled nurses in general practice.	• Reflects the ongoing development of PNs' roles • Updates on the changes to available funding to support employment of PNs • Gives an outline of the PNIP, MBS item numbers for PNs and other funding opportunities for practices • Practice standards available are not required for PN registration but are a framework to support PN practice • PN roles include provision and coordination of clinical care, management of clinical care systems, collaborative practice and professional practice	Government funding; PN practice standards; career and education opportunities; individual, community and local needs	Developing a similar guide to outline the role of dietitians to the general practice team could be beneficial in role clarification and expansion

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TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
				• PNs can specialise within general practice: Immunisation services, mental health services, diabetes nurse educators, and sexual and reproductive health care		
Review of Australian Government Health Workforce Programs: 7.2 Nursing and Midwifery Retention	Australian Government Department of Health[106]	Government document	Describes government incentives and initiatives to improve workforce retention for nursing and midwifery careers	• Nursing and Allied Health Scholarship and Support Scheme (NAHSSS)—facilitates continued professional development of nurses (including PNs) and encourages pursuit of careers in settings of shortages • Nursing and Allied Health Rural Locum Scheme (NAHRLS)—enables rural nurses to take short-term leave from rural jobs for professional development • University Departments of Rural Health (UDRH)—provides postgraduate rural training services • Rural Health Continuing Education (RHCE) provides access to professional training and support in rural and remote areas for health professionals, including nurses • Also provides details on the NiGP and PNIP, and gives an example of the PNIP in action to improve the role of PNs	Career and education opportunities (government funding)	Government funding and initiatives to enhance the dietitian role in addressing nation's health priority areas. A similar document for dietitians could lead to role expansion and more dietitians in areas of shortage.
Questions and Answers on the Chronic Disease Management (CDM) items	Australian Government Department of Health[18]	Government Website	Provides answers to frequently asked questions regarding Chronic Disease Management Items Outlines PN involvement and how practices can claim relevant items	• PNs can assist with CDM items, however the GP must review and confirm the plan and see the patient • Item number 10997 can be claimed by practice for PN monitoring and supporting chronic disease patient	Government funding	Raising dietitian awareness of the PN role in CDM, and making information readily available to dietitians about claiming CDM items

TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
				• PNs can be part of the minimum of three members of the TCA team		
Stronger Rural Health Strategy from the Corporate Plan 2018–2019	Australian Government Department of Health[107]	Government Document	Aims to build a sustainable, high quality health workforce that is distributed across the country according to community need, particularly in rural and remote areas	• For the health workforce as a whole, however nurses in primary care settings are mentioned • Reviews and addresses the current education preparation for nurses • Focuses on strengthening the role of PNs • Expects growth of PNs across urban and rural areas	Individual, community and local needs (government funding, career and education opportunities)	Need to support the development of rural dietitians; general health workforce documents often apply to dietitians but are less visible to the profession
Practice Nurse Incentive Program (PNIP)	Australian Government Department of Health[20]	Government website/document	Provides incentives to practices supporting, expand and enhance PNs in general practice through funding.	• Initiative in 2012 • Supports eligible practices, Aboriginal Medical Services and Aboriginal Community Controlled Health Services • Offsets the cost of employing a PN, Aboriginal and Torres Strait Health Worker and Health Practitioner	Government funding	Enhancing the knowledge and awareness of the WIP to dietitians and how they can access the program
COVID-19 National Health Plan—Primary Care Package—MBS telehealth Services and Increased Practice Incentive Payments	Australian Government Department of Health[108]	Government document	Outlines the new temporary Medicare Benefits Schedule (MBS) which includes PN item numbers that have moved to include telehealth during COVID-19.	• Effective until 30 September 2020 • Enables health professionals, including PNs to provide healthcare services to individuals through telehealth to reduce risk of infection	Government funding (individual, community and local needs)	Ensuring dietetics practice aligns with the needs of communities they service; dietitians awareness of telehealth items
The role of health professionals and providers in the National Bowel Cancer Screening Program	Australian Government Department of Health[109]	Government website	Providers health professionals, including practice nurses, guidance on their roles in screening for bowel cancer.	• Outlines key roles the practice nurse will play in the screening • Mainly around encouraging and supporting patient participation in the program • Making appropriate referrals to GPs	Individual, community and local needs (government funding)	Need to identify national health programs that dietitians can support and be integrated into, to support role expansion
Practice Nurse Incentive Program (PNIP) Guidelines	Australian Government Department of	Government document	Outlines the purpose of PNIP and how a practice	• PNIP is delivered on behalf of the Department of Health and DVA	Government funding	Using the new WIP guidelines to enhance dietitian access to these

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TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
	Human Services. Medicare[110]		can apply. Includes all financial incentives. The who, what, when, where, why and how of the PNIP.	• Supports expansion and enhancement of nurses employed by GPs • Only in areas of 'greatest' need—rural and remote • Activities include preventative health and education programs, quality chronic disease management and care coordination and supported self-management • Must meet eligibility criteria including accreditation or registered for accreditation as per RACGP standards, must be eligible for PIP as well, employ GPs (full or part time), employ a PN or Aboriginal and Torres Strait Islander health worker and others. • 4 payments under PNIP: (1) incentive payments, (2) an accreditation assistance payment, (3) the DVA loading payments, (4) rural loading payments.		programs could expand the workforce
Education Guide—Practice Nurse items	Australian Government Services Australia[111]	Government Website	Outlines PN item numbers and how services provided by a PN on behalf of a medical practitioner are to be claimed	• Applicable to work conducted by an RN or EN • Item 10983—Telehealth patient-end clinical support • Item 10984—Telehealth patient-end clinical support at residential aged care facility • Item 10987—Health assessment follow-up • Item 10997—Chronic disease monitoring and support • Item 16400—Antenatal service	Government funding	Identifying how dietitians can access and appropriately utilise MBS item numbers to fund services will expand the workforce
Education guide—Aboriginal and Torres Strait Islander health	Australian Government	Government website	Provides information and guidance around Aboriginal and Torres	• Although PNs cannot directly claim the MBS item numbers,	Government funding	Identifying how dietitians could better play a role in 'Closing the gap' and

TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
assessments and follow up services	Services Australia[112]		Strait Islander health assessments to primary healthcare providers, including practice nurses	they can assist in conducting the health assessments • Health assessments including conducting examinations and assessments to determine health status and provide appropriate interventions, and follow up		using strength-based approaches to First Nations health may lead to workforce growth
Workforce Incentive Program (WIP)—Practice Stream	Australian Government Services Australia[113]	Government website	Provides incentive to practices to support, expand and enhance the sustainability and quality of the health workforce, particularly for rural and remote medical practices by providing initiatives including funding	• Update of the PNIP • Commenced 1 February 2020 • Provides an up-to-date rural definition to ensure initiatives and services are focusing on the implementation and sustainability of this program in rural and remote areas	Government funding	Encouraging dietitians to utilise incentives to enhance rural and remote practice may expand the workforce
General Practice Nurse National Survey Report	Australian Medicare Local Alliance (AML Alliance)[114]	Survey report	In conjunction with Australian Primary Health Care Research Institute (APHCRI) and Australian National University (ANU). National PN Survey Report first conducted in 2003, then repeated in 2005, 2007 and 2009. Survey focused on PNs (n=2161) and practice managers who employ PNs (n=809). 20% of general practices ($n = 1500$) were randomly selected across all states and territories. 701 nurses responded and 275 practice managers responded.	• Increasing numbers of PNs in general practice over the years (2007 = 7728, 2009 = 8914, 2012 = 10 693) • Most are part-time (working <34 h/wk) • 63.5% of Australian general practices employ a PN. On average, in practices that employ PNs there are 2.7 PNs • 6.5% of general practices employ >5 PNs. • GP:PNs = 2012 (1.78:1), 2009 (2.01:1) and 2007 (2.31:1) • 94.4% of practices were registered for the PIP • 89.1% of practices were registered for the PNIP • Four key task areas were investigated: Preventative, Coordination, Clinical and Administration	Government funding	Regular surveying of the dietetic workforce can help understand the development, and seek opportunities to enhance future practice, in primary care settings

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TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
Transition to Practice Program	Australian Primary Health Care Nurses Association (APNA)[115]	Non-government organisation website	Evidence-based framework to support the transition of nurses into primary healthcare for the first 12 months of practice.	• Education and training to support transition into primary health care • Mentoring by an experienced practice nurse • Evaluations of the program have shown nurses reporting an increase in confidence in their professional practice	Career and education opportunities	Identify and address how dietitians could be supported in their transition to practice in primary care
ANF Competency Standards for nurses in general practice	Australian Nursing Federation[116]	Practice standards	Practice standards for RNs and ENs working in general practice. Standards are to be used in workplaces, education settings and other professional environments. Has since been revised into the National Practice Standards for Nurses in General Practice (below).	• Separation of competencies for RNs and ENs • RNs have 15 competency standards, including: Professional and ethical practice, Professional practice, Collaborative practice • ENs have 10 competency standards, including the same but fewer standards as RNs but at an EN level of scope of practice.	PN practice standards	Developing practice and competency standards that are accessible and applicable to current and future practice for dietitians in primary care
National Practice Standards for Nurses in General Practice	Australian Nursing and Midwifery Federation[10]	Practice standards	Outlines the practice standards for RN and ENs working in general practice. Standards are addressed to PNs, general practice teams, and other key stakeholders.	• Four key domains: (1) Professional Practice, (2) Nursing Care, (3) General Practice Environment, (4) Collaborative Practice • Separated ENs, RNs and RN Advanced Practice competencies • Is a revision of the Australian Nursing Federation *Competency Standards for nurses in general practice*	PN practice standards	Need for a clear outline of dietitian roles in general practice so that existing competency standards can be applied in the primary care setting
Summary Data Report of the 2010–2011 Annual Survey of Divisions of General Practice	Carne et al.[12]	Report	Summary of the Divisions of General Practice activities in the 2010–11 Annual Survey of Divisions. Chapter 11, 'Practice Nurses'	• PN numbers are increasing compared with 2003–2004 ($n = 3255$), 2010–11 more than tripled ($n = 10\,759$) • Increase in professional development and education for PNs was seen from 2003–2004 to 2010–2011, mentoring and	Career and education opportunities (government funding)	Mentoring and support of dietitians working in primary care is needed to develop the workforce

TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
				clinical support to support practice nurses declined • Second to professional development/education/up-skilling for PNs, EPC support/ CDM items and Chronic Disease management are the activities where PNs are most engaged in general practice		
General Practice Nursing in Australia: Contemporary Professional and Practice Insights	Halcomb[117]	Book Chapter	Practice Nurses in Australia	• Provides an insight into the general practice nurse role and how it is influenced by the general practice environment including the GP • Outlines how to prepare to work in the general practice setting as a nurse and how to seek out employment	Government funding (career and education opportunities; GP perspectives of PNs)	Communicating the importance of the dietitian role in chronic disease management to other members of the team; focus on preparation of dietitians
Practice Nursing in Australia	Jolly[15]	Report social policy	-Practice nursing overseas -Practice nurses in Australia -Developing practice nursing -Future considerations	• Need for PNs = shortages of GPs, rising patient expectations, the ageing population and increase in chronic disease • PNs enhance quality of service, are cost-effective, employing a PN is less than medical practitioner and classified as a specialty • Government initiatives and primary care funding heavily influence the role of PNs. • GPs see PNs as viable tools in their practice and should be utilised in the development and description of the PN's role and education/training = less likely to be controversy or conflicts between professions • 2001–2002 NiGP implemented over 4 years. Provided financial incentives for GPs to employ PNs, rurally	Government funding (career and education opportunities; individual, community and local needs)	Enhae the role of dietitians in general practice through education and training. Encouraging GPs and PNs to work with dietitians Shift some focus from acute hospital dietetics practice to primary care for chronic disease management and prevention

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TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
				• 2005 NiGP was evaluated. Pre-NiGP 55% of practices had a PN, post-NiGP 71% • 2005/06 the Government provided further funding to continue NiGP for another 4 years. PIP also received additional funding • 2004—*Strengthening Medicare*—introduction of the MBS for PNs for immunisations and wound dressings on behalf of GPs • Jan 2005—MBS items for pap smear done by PNs was implemented in rural practices. In November 2006 this extended to urban areas • July 2005—CDM items were introduced for PNs with GPMP • 2005—RCNA developed national competency standards (funded by Department of Health), important framework to assist nurses (not just PNs) in practice and professional development • 2001—APNA was established—represents, supports and provides networking at local, state and national levels for PNs. 'PNs to be recognised as professional members of collaborative teams and to be seen as playing a key role in managing patient health'		

TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
				• Ongoing CPD points is voluntary for PNs through APNA • 2006—Australian Government increased number of undergraduate nursing courses to deal with staff shortage issues in many areas of nursing and not specifically PN • As of 2007 = little to no formal education to prepare and support PNs		
Educating the Nurse of the Future—Report of the Independent Review into Nursing Education	Schwartz[118]	Report disseminated by the Department of Health—including an updated review of nursing education since 2002.	Review of nursing education in Australia—including preparation for primary care	• Australian nursing education is of high standard in comparison to other countries • Recommends switching focus from nursing education in acute care settings to primary care, can assist in preparing nurses to practice in a range of workplaces and meet the Australian government's Stronger Rural Health Strategy • Other areas of nursing education improvement include further diversity in the workforce, fostering interprofessional collaboration, providing career pathways that are easy to navigate and ensuring nurses are adequately prepared for the workforce	Career and education opportunities	Entry level and post-entry level dietitian education should focus on enhancing roles in primary care
General Practice Nursing in Australia	Watts et al.[119]	Report by the RACGP and RCNA	General practice nursing in Australia presented to medical, nursing and allied health professions.	• General practice is an opportunity for GPs and PNs to collaborate to enhance the quality of care	Career and education opportunities	Create postgraduate education and training and make it more accessible to dietitians in practice

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TABLE 2 (Continued)

Title	Author, year	Type of paper/ study	Population/intervention/ scope	Key findings	Key driver (contributor)	Application to dietetics profession
			Collaboration between the RACGP and RCNA to explore the role of nurses working in Australian general practices and identify the educational needs to support the role.	• Provides a gap analysis to determine whether current education for PNs provides appropriate support for current and future practice. • PNs have a very diverse role and are unique depending on the practice they work in • PNs can have specialities and interests and these are influenced by their personal preferences and the practice needs • Education for PNs tends to focus on National Health Priority areas • Education accessibility varies		

Abbreviations: ACP, Advanced Care Planning; ANF, Australian Nursing Federation; ANU, Australian National University; APHCRI, Australian Primary Health Care Research Institute; APNA, Australian Practice Nurses Association; ARNM, Australian Rural Nurses and Midwives; CALD, Culturally and Linguistically Diverse; CDM, Chronic Disease Management; CDN, Chronic Disease Nurse; DVA, Department of Veterans Affairs; EN, Enrolled Nurse; EPC, Enhanced Primary Care; GP, General Practitioner; GPMP, General Practitioner Management Plan; GPRN, General Practice Registered Nurse; HTN, Hypertension; IHD, Ischaemic Heart Disease; MBS, Medicare Benefits Schedule; MHCP, Mental Health Care Plan; MHNIP, Mental Health Nursing Incentive Program; MHPN, Mental Health Practice Nurse; NAHRLS, Nursing and Allied Health Rural Locum Scheme; NAHSSS, Nursing and Allied Health Scholarship and Support Scheme; NiGP, Nursing in General Practice; PESS, Patient Enablement and Satisfaction Survey; PIP, Practice Incentive Program; PN, Practice Nurse; PNIP, Practice Nurse Incentive Program; QoL, Quality of Life; RACGP, Royal Australian College of General Practitioners; RCNA, Royal College of Nursing, Australia; RHCE, Rural Health Continuing Education; RN, Registered Nurse; T2DM, Type 2 Diabetes Mellitus; TCA, Team Care Arrangement; UDRH, University Departments of Rural Health; WIP, Workplace Incentive Program.

studies and six grey literature sources. The final papers included in the review totalled 102, comprising 82 peer-reviewed articles and 20 grey literature results including government documents and websites ($n = 10$), reports ($n = 6$), practice standards ($n = 2$), practice handbook ($n = 1$) and a book chapter ($n = 1$). Peer-reviewed literature consisted of a broad range of scientific papers including review articles ($n = 10$), quantitative ($n = 29$), qualitative ($n = 28$) and mixed method ($n = 9$) studies and other articles ($n = 6$) including professional opinion articles and commentary reports. Table 2 provides details of the 102 papers included in this review that describe practice nurse development in Australian general practice, and their application to the dietetics profession.

Of the included studies, the earliest paper to explore practice nurse involvement in general practice was published in 1999, and all papers were in English. As with the development of the practice nurse role, the research outputs and publications have grown substantially over 22 years. Figure 2 demonstrates the number of publications in the peer-reviewed scientific literature describing practice nurse role development per year.

A timeline was constructed (Figure 3) to illustrate key contributions to practice nurse workforce development including government funding and initiatives, practice nurse bodies and associations' reports and competency standards, surveys o growth of the role, and future implications.

From the literature identified, the influence of the growth and development of the practice nurse role and workforce encompassed: Category 1: Government Funding Support, encompassing government funding initiatives that furthered the development of the role; Category 2: The Role of Professional Associations, encompassing Practice Nurse Practice Standards, Cost–Benefit of Practice Nurses and Career and Education Opportunities; and Category 3: Recognition of Local Community Needs, encompassing GP and Patient Perspectives of Practice Nurses and, Individual, Community and Local Needs. These are summarised in Table 2 and described narratively in the text following.

Government funding: Of the 102 papers included, 29 were related to government funding as a key driver to practice nurse role development, such as specific MBS item numbers claimable by medical practices for tasks fulfilled by a practice nurse,[15,19,52,66,68,91,96,100,108,111] funding for the creation of practice standards,[105] education and professional development funding,[48] and programs designed to empower the primary care workforce as a whole, where practice nurses play a vital role including the Workforce Incentive Program,[113] formerly Practice Nurse Incentive Program,[11,20,75,110,113] Mental Health Nurse Incentive Program,[34,58,59,89] Chronic Disease Management,[18,50,88,100,117] GP 'Super Clinics'[81] and the 'Close the Gap' initiatives.[112] A further 12 papers related government funding as a contributor to, but not the main driver of, practice nurse role development. These contributors included, funding initiatives to support the overall nursing and midwifery education and workforce,[12,43,90,106,107] GP-item numbers completed by a practice nurse,[25,42,44,79,101,102] and national health programs, such as the National Bowel Cancer Screening Program.[109]

Practice Nurse Practice Standards: Practice standards aim to provide practice nurses and their colleagues an outline of key roles and their scope of practice to enhance care. Two practice nurse practice standards were identified, one from the Australian Nursing Federation in 2005,[116] and the other from the Australian Nursing and Midwifery Federation in 2014 which was an update from the Australian Nursing Federation's 2005 practice standards.[10] The development of the Australian Nursing and Midwifery Federation practice standards were described in the peer-reviewed scientific literature by Halcomb and colleagues in 2017.[17] Another piece of grey literature 'Nursing in General Practice: a guide for the general practice team' by the Australian College of Nursing in 2015 outlined the importance of the practice standards.[105]

Cost–Benefit of Practice Nurses: Six papers described the cost–benefit of practice nurses employed and working in general practice as a key driver of practice nurse role development, including strategic utilisation of MBS item numbers,[30] and the management of chronic disease,[46,47] wounds[101] and risk factors such as alcohol and drug misuse,[98] and smoking.[104] An additional three related cost–benefit of practice nurses as a contributor to practice nurse role development including collaborative care programs with GPs and practice nurses.[48,86,87]

Career and education opportunities: 28 papers described practice nurse career and education opportunities as a key driver of practice nurse role development and scope of practice, in particular whether the nurse is trained as an enrolled or registered nurse,[16,105,106] transition to practice programs,[27,45,115] training and accreditation standards,[90,92] a need to focus on incorporating general practice nursing, including general practice placements, into undergraduate and postgraduate training,[32,42,57,64,74,78,80,93,97,118,119] mentoring,[12,43,53,61] professional development during working hours,[49,51,69,85] and initiatives to target job satisfaction and retention.[56] Another 11 papers described these opportunities as a contributor to practice nurse development, where education and training support for the overall nursing and midwifery workforce is needed,[107] further education of certain conditions and or populations which may be required for practice nurses working in different practice locations,[11,41,55,65,83,117] and career pathway frameworks.[15,66,68,91]

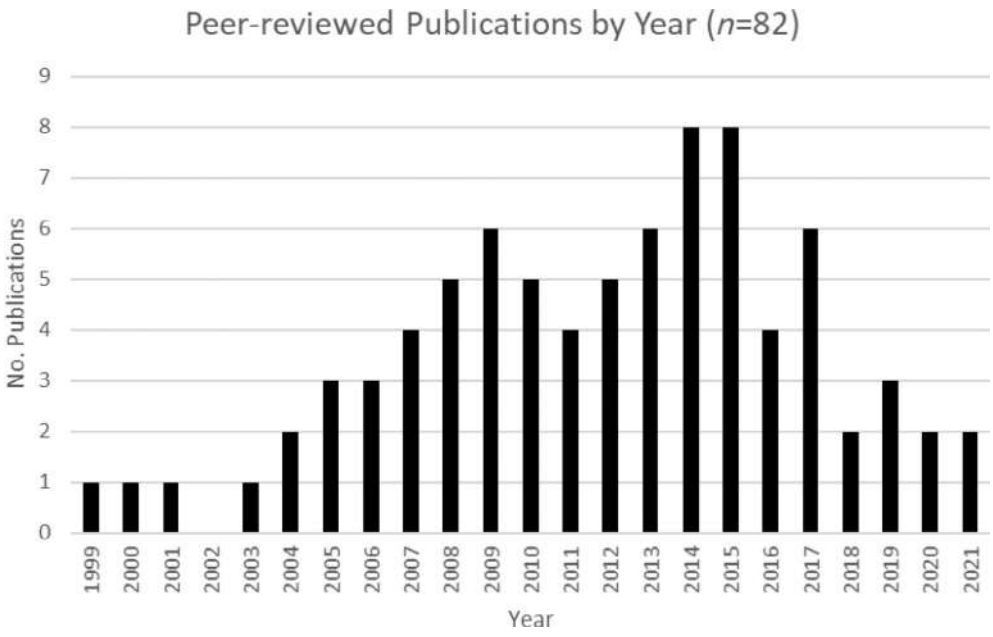

FIGURE 2 Number of publications per year since 1999 to mid-2021 that describe key determinants of Australian practice nurse roles and workforce development in peer-reviewed journals.

GP perspectives of practice nurses: Nine papers described the GP perspectives of practice nurses as a key driver of the practice nurse role development and scope of practice, in particular as GPs and practice nurses working collaboratively to deliver patient care.[73,76,95,102] These perspectives depended on the GP's professional and personal background, including cultural background,[54] and the GP's level of understanding of the practice nurse role and scope of practice.[77,79,84,94,100] Another nine papers described the GP perspective as a contributor, such asin nurse-led care models,[40,55] level of GP's support for new practice nurse initiatives,[11,43,50,78,100] and identified funding as a heavy influence on collaborative relationships between GPs and practice nurses.[75,117]

Patient perspectives of practice nurses: Twelve papers identified the importance of the patient perspective as a key driver of the practice nurse role development and scope of practice. Patient perspectives encompassed, how practice nurses worked with their GP to deliver care,[28] that patients could receive additional information and advice for health management,[29,35,36,72,83] how the role could build on therapeutic relationships through continuity of care at the general practice,[37,38,103] that patients can assist in identifying gaps in care,[98] and that this depended on how well the patient understood the scope of practice nursing.[62,63] Another four papers described the patient perspective as a contributor, where individuals preferred being cared for by their GP, and that practice nurses were seen as assisting[11,78] or filling gaps in GP care.[40,70]

Individual, community and local needs: Seventeen papers described individual, community and local health needs as a key driver to the practice nurse role development and scope of practice, where the practice nurse role should reflect the healthcare needs of the local population,[41,105] including chronic disease management and prevention,[31,33,39,40,44,55,60,65,71,81,86,87,109] women's health,[84] and geographical location.[70,107] Another 13 described these needs as a contributor, such as patient disease status[15,49,58] and age,[27,28] other health risk factors[34,56,63,68,69,99] and the COVID-19 pandemic.[108]

4 | DISCUSSION

This scoping review set out to synthesise the literature describing the development of the practice nurse role, and to identify potential learnings for the private and general practice dietetic workforce. The literature identified was diverse and covered seven key drivers which can be classified into three categories that are highly relevant to dietetics, including government funding support, the role of professional organisations, and recognition of local community needs. These will now be discussed in relation to their potential application to dietitians.

The first of these categories related to government funding, costs and potential benefits to increasing nursing and allied health roles in primary care. The review findings highlight that the practice nurse role has been incrementally developed on the back of iterative changes to government funding incentives through Medicare. Beginning with MBS item numbers for pap smears and wound dressings,[15] these were later consolidated to become any delegated tasks under the supervision of the general practitioner/s, with further autonomy allowed in later incentive programs such as the Medicare Practice Nurse Incentive Program.[20]

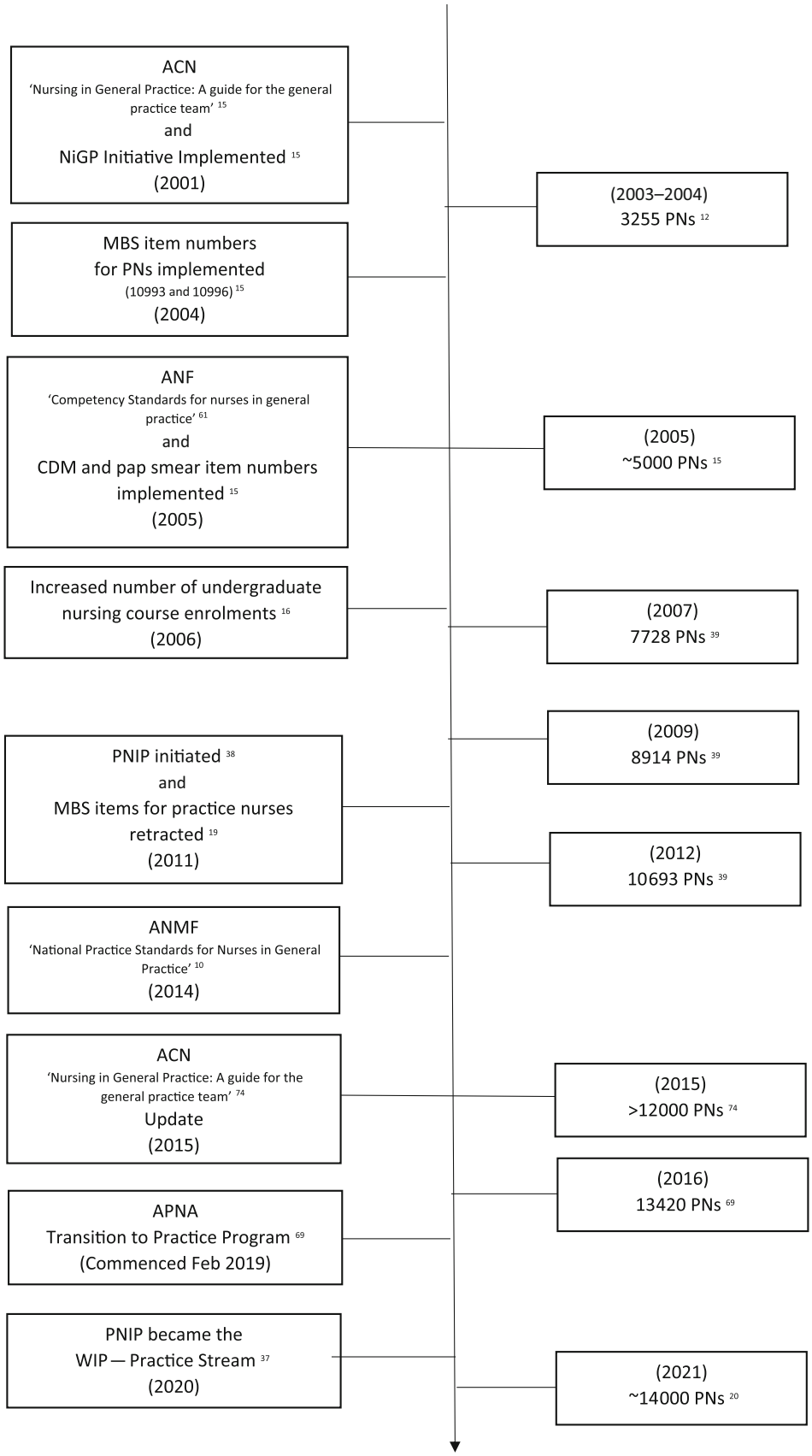

FIGURE 3 Timeline of the Australian practice nurse workforce growth over ~20 years in general practice (right of timeline) and key government funding and initiatives, practice guides and standards (left of timeline). ACN, Australian College of Nursing; ANF, Australian Nursing Federation; ANMF, Australian Nursing and Midwifery Federation; APNA, Australian Primary Health Care Nurses Association; CDM, Chronic Disease Management; MBS, Medicare Benefit Schedule; NiGP, Nursing in General Practice; PNs, Practice Nurses; PNIP, Practice Nurse Incentive Program; WIP, Workforce Incentive Program.

Current government funding to support the professional practice of dietitians in primary care comes from two Medicare funded incentives: Chronic Disease Management Plans and the Workforce Incentive Program. Chronic Disease Management plans are designed to extend access to allied health professionals for

individuals with chronic disease through a limited number of Medicare subsidised appointments.[18] From Enhanced Primary Care rebates in 2004, to Chronic Disease Management plans implemented in 2005, they provided the impetus for structural changes to allied health services within the private sector.[14,88] Interestingly, in comparison to physiotherapists and podiatrists, the Chronic Disease Management item numbers utilised by dietitians decreased after the first 2 years of implementation where they had the highest Enhanced Primary Care consultation-to-provider ratio.[120] However, dietitians remain the third largest Enhanced Primary Care consultation provider.[121] The perceived limitations of Chronic Disease Management plans for expansion of dietetics services are the number of visits available, the payment system being per consultation regardless of the length of the consultation, and the inadequate value of the rebate.[122] These together drive shorter consultation times, limit the potential for meaningful counselling opportunities, hinder the longer-term follow up required to sustain dietary changes, and create a misalignment with best-practice chronic care models.[122] The tension between effectiveness and efficiency of dietetics private practice services has been highlighted previously.[123]

There are existing Medicare opportunities for dietitians in primary care which are not fully leveraged. These include the MBS item related to the provision of group education programs, and the Workforce Incentive Program. Group education for type 2 diabetes was found to be more effective than individual education or standard care in a recent meta-analysis.[124] The MBS item for group education programs is accessible to individuals with type 2 diabetes for up to eight group sessions provided by diabetes educators, exercise physiologists, and/or dietitians. Australian dietitians' use of these groups appears to be greater than diabetes educators but less than exercise physiologists.[121] Further, MBS group education sessions for type 2 diabetes equates to <2% of the total Medicare service provision by dietitians.[121] Lack of appropriate group education facilities, and perceptions of poor financial viability were reasons proposed for why dietitians did not claim type 2 diabetes group education MBS items in a 2017 survey of Australian dietitians.[125] Advocacy for increased Medicare rebates, collaboration with other eligible providers, and creative solutions for private dietitians to access appropriate group education facilities at reasonable cost may increase the use of these MBS items.

A further opportunity for dietitians in primary care is the Workforce Incentive Program which incorporates allied health professionals and Aboriginal and Torres Strait Islander Health workers.[113] The Practice Stream provides funding to the practice to directly employ health professionals, including dietitians to provide services to patients who cannot afford private services. The funding is available to eligible general practices in any location, with loadings for rural and remote Australia.[113] Dietitians could be directly employed by rural and regional practices and could in turn leverage the arrangement to increase private practice referrals. However, to date this program has not been evaluated for its impact on dietetics workforce and service provision, although related work suggests the dietetics workforce is unequally distributed, favouring metropolitan areas, when compared with the location of people with type 2 diabetes.[126] This suggests that advocacy may be best targeted at rural practices in the first instance, so that an evaluation of dietetics services under the Workforce Incentive Program can inform wider uptake.

The second category of literature related to the role of professional organisations. Dietitians in Australia are a self-regulated profession, with the professional association responsible for accreditation of university programs and credentialing of dietitians. In 2021, Dietitians Australia updated the competency standards for dietitians in Australia,[127] which informed decisions on the recently revised accreditation and credentialing standards.[128] Private practice dietetics has not been a focus of the curriculum in Australian accredited nutrition and dietetic tertiary programs, which are still dominated by traditional domains of practice rather than new and emerging settings.[1,7] Thus, graduate dietitians must seek alternative means of learning about business administration and management, to establish and maintain practice in the private sector. Dietitians Australia provides several means of creating and building on such skills following graduation. For example, the Dietitians Australia 'Working in Private Practice' group, accessible to only Accredited Practising Dietitian members, provides practitioners with peer support, resources and links to key information and sites.[129] At a cost, dietitians can access the Dietitians Australia Small Business Manual that provides information on how to start and manage a small business covering private practice and consultancy for a dietitian. It was created by private practice dietitians for other dietitians wanting to and currently working in private practice.[130]

The current tertiary-level programs that are educating the future dietetic workforce have a strict set of competencies to meet and remain accredited by Dietitians Australia.[127,128,131] These competencies include minimal private practice applications although require the development of skills which could be applied to private practice, for example medical nutrition therapy, counselling and other clinical-based skills. Administration, marketing and business skills required to successfully establish and maintain a private practice are less prominent in these

competency standards.[1] Thus, it may be appropriate for Dietitians Australia to include post-tertiary professional development opportunities focused on skills required for successful private practice, rather than adding more content to the already full undergraduate and postgraduate nutrition and dietetic courses.

Options for post-tertiary training in private practice dietetics that are an alternative to Dietitians Australia are dietitian-run platforms: 'Dietitian Connection'[132] and 'Education in Nutrition'.[133] The two platforms cover all areas of dietetics including a private practice component for professional development. Dietitian Connection holds webinars, podcasts and courses aimed at improving private practice business and clinical practices, all dietitian-led.[132] However, much like practice nurse post-tertiary training and professional development,[51] these additional platforms for dietitians may be at a cost, both financial and time, to the individual presenting a potential barrier, and are relatively ad hoc in offerings.[6,134]

Dietitians Australia has produced a Code of Conduct for Dietitians and Nutritionists[131] which includes both professional and ethical considerations for practice, and these should be applied to private and general practice settings. However, private and general practice dietitians lack a clear set of practice standards specific to the setting, such as those that exist for GPs and practice nurses.[105,135] Beyond this short, three-page code of conduct, the scope of private practice dietitians is less understood comparative to traditional hospital dietitian roles.[1,4] A stronger, more comprehensive set of practice standards would improve the integration of dietitians as part of the primary healthcare team. Practice standards could be addressed to GPs, practice nurses and other members of the primary healthcare team. It is recommended that key stakeholders including the Dietitians Australia, Royal Australian College of General Practitioners, Australian College of Nursing and private and general practice dietitians collaborate to develop such practice standards. A clear set of practice standards would assist dietitians, particularly at entry-level, in building their practice and themselves as health professionals in the primary care setting.

The third and final category of literature in this review was recognition of local needs. Access to allied health services in Australia, including dietitians, is variable depending on geographical location, and particularly scarce in rural and remote Australia. This is reflected in the distribution of the Australia dietetics workforce[126] and the uptake of Medicare-funded services.[121] There is a need to address this limited access to dietetics services in underserviced areas and populations.[136] Increasing incentives for dietitians to work in these areas, and use of telehealth, have been proposed as ways to address this inequality.[126] Increasing allied health services in areas of need, including rural and remote services, is a key aim of the Workforce Incentive Program.[113]

As GPs and practice nurses are the two main professionals working in primary healthcare and those providing assessments for referrals and Chronic Disease Management plans, it is important to understand their views of dietitians in the workforce. For a shift in healthcare culture and the acceptance of practice nurses as autonomous and vital members of the primary health team, the key ingredient was time.[16] A trend was identified from earlier papers where GPs, patients, and the profession themselves saw practice nurses as a 'handmaiden' to the GP.[94] To this day certain patient populations, especially older generations and some GPs continue to see the practice nurse in this light. However, views have also shifted with the practice nurse becoming an autonomous and crucial primary health team member, especially in the areas of mental health,[34,58,59] Nurse Practitioners[102] (noting that this review did not include Nurse Practitioners) and in the rural setting where GPs are less available.[20,63,107]

The dietetics workforce should expect a similarly lengthy journey for complete integration in primary health care, that will require the varying levels that practice nursing development had. One of the largest barriers to dietetics referrals from GPs is the GP's knowledge of local dietetics services.[137] Once GPs know of primary care dietetics services, they are open to providing referrals to dietitians as they see their specialist dietary knowledge and counselling as vital in managing chronic conditions, in particular diabetes[138] and cardiovascular disease.[137] Understanding GPs' and practice nurses' perspectives of dietitians is key, as they are the gatekeeper in referrals for Chronic Disease Management plans and present a prime opportunity to raise nutrition awareness to patients as the first point of contact.[139] Therefore, Dietitians Australia, in collaboration with dietitians in primary healthcare settings, should apply advocacy efforts so that GPs and practice nurses are aware of the full range of dietetics services and how best to make referrals for patients. Likewise, the profession needs to embrace primary health as a key setting for the dietetics workforce and recognise the importance of the setting as equal to that of the hospital.

A key strength of this scoping review is there was no publication date limitations for the peer-reviewed literature search which ensures key literature to capture the development of the Australian practice nurse role over time has been identified. A limitation of the study is the use of one database for searching, however the use of grey-literature search engines including key government databases and Google Scholar led to the identification of important non-peer reviewed articles. This was

particularly useful to obtain insight into the substantial government influences on the development of practice nurses. A further limitation is the lack of literature on private insurance rebates, which represent an additional income stream for dietitians which practice nurses cannot usually access. This is a further opportunity for dietitians which this scoping review has not addressed.

In conclusion, the Australian practice nurse and dietetics workforce have grown exponentially over the past two decades. However, the growth in opportunities in general and private practice has been significantly greater for nurses than dietitians. The profession can learn from the growth in practice nurses, as an opportunity to expand the dietetics workforce in primary care settings. The literature on practice nurse development suggests the profession should focus on: (1) Building on and appropriately utilising government funding, (2) Furthering post-tertiary education and career opportunities, including the development of practice standards specific to the primary care setting for dietitians and (3) Initiatives to broaden the geographical locations of the dietetic workforce to better service rural and remote areas. It is recommended that further research into the integration of dietitians in primary care be conducted and is urgently needed to better understand and build on the opportunities for the profession.

AUTHOR CONTRIBUTIONS

Both authors developed the research aim. ARD completed the searches and title and abstract screening. Both authors screened full text papers. ARD conducted data extraction and analysis, checked by DPR. ARD wrote the first manuscript draft. Both authors agree with the manuscript and declare that the content has not been published elsewhere.

CONFLICT OF INTEREST

Alexandra R. Davidson reports no conflicts of interest. Dianne P. Reidlinger is on the editorial board for Nutrition & Dietetics. This manuscript has been managed throughout the review process by the Journal's Editor-in-Chief. The Journal operates a blinded peer review process and the peer reviewers for this manuscript were unaware of the authors of the manuscript. This process prevents authors who also hold an editorial role to influence the editorial decisions made.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analysed in this study.

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