The role of physiotherapists in providing nutrition care to improve dietary behaviours

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ABSTRACT

Background: Non-communicable chronic diseases are the foremost cause of death, illness, and disability in Australia. Poor dietary behaviours contribute significantly to the burden of chronic disease and health care costs. Promoting healthy eating is a crucial step to prevent and manage lifestyle-related chronic diseases. Although extensive evidence-based dietary guidelines are available in Australia, poor dietary habits are common.

Nutrition care is nutrition or dietary related advice given by health professionals to improve dietary behaviour of patients. Previous studies among healthcare professionals highlighted a 'lack of time' as a barrier to deliver nutrition care in primary care.

Physiotherapists are well positioned for such health promotion in comparison to other primary care practitioners as they often have prolonged and repeated consultations with patients. However, to date, there have been no studies in Australia to explore whether physiotherapists could provide nutrition care to their patients.

Aim: This study aims to investigate practices, knowledge, and barriers to providing nutrition care of Australian physiotherapists.

Method: Mixed methods were used. A qualitative study was conducted with physiotherapists practicing in Victoria, exploring their practices, knowledge, barriers, and personal behaviours in relation to nutrition. Interviews were audio-recorded, transcribed verbatim, and thematically analysed. For further exploration, results were used to inform the development of a national survey of physiotherapists working in the primary care setting. Survey results were analysed using STATA software and reported using descriptive statistics.

Results: 20 physiotherapists were interviewed, and 344 practicing physiotherapists participated in the online survey. Three main themes supported by nine sub-themes emerged from the interview data. Participants were strongly motivated to provide nutrition care given the relevance of nutrition to their patients' conditions. However, they suggested the complexity of nutrition care and a lack of training and knowledge often stopped them from promoting healthy eating in their clinical settings. All interview participants engaged in some level of nutrition care in their physiotherapy settings.

The results of the national quantitative study suggest physiotherapists in Australia are engaging in nutrition care commonly by providing a referral to a dietitian (71% of survey participants) and verbal advice (65% of survey participants) to encourage patients to eat healthily. Thirty-eight percent of participants reported encouraging healthy eating with patients regularly. The preferred content for 'basic healthy eating advice' includes drinking water (89%), minimizing intakes of processed (89%) and sugary food (89%) and alcohol (75%), and increasing consumption of fruits and vegetables (68-73%). Eighty percent of survey participants were confident with their knowledge of the Australian Guide to Healthy Eating (AGHE), but only 58% were confident to use AGHE to assist them in evaluating patients' dietary intake.

Based on a validated questionnaire, participants' self-perceived competence scores (mean score 63%; very confident) in providing nutrition care, showed they were confident with their

nutrition knowledge, skills, communication and counselling practices with favourable attitudes towards providing nutrition care for their patients. Barriers identified by the participants to providing nutrition care included lack of clarity in the scope of practice (60%), lack of nutrition-training (52%), lack of time (48%), patient perception (43%) and lack of resources or materials (41%). They have also identified professional development training in nutrition (78%), encouragement or policy statement from the Australian Physiotherapy Association (APA) (76%), and printed or online materials as resources (70%) as facilitators to providing nutrition care to patients.

The majority of participants (83-86%) recognized the impact of diet on NCDs and health, besides being aware of evidence-based information. Ninety-three percent of survey participants agreed that physiotherapists serve as role models for their patients, and 85% agreed that they should assist in improving patients' dietary behaviour. More than half (57%) of the participants were eating according to the Australian Dietary Guidelines (ADG).

Conclusion: The findings of this study indicated that almost all participating physiotherapists were currently providing nutrition care, with the majority referring patients to a dietitian and encouraging patients to eat healthily. Nearly forty percent of participants reported encouraging healthy eating with patients regularly. Participants preferred offering basic healthy eating advice focussing on drinking water, minimizing the intake of less healthy food, and less commonly on increasing the consumption of healthy foods. The majority of participants were confident with their knowledge of AGHE, but fewer of them were confident to use the guidelines to assess patients' food consumption. The study also indicated that more than half of the participants were eating healthily in alignment with national dietary guidelines. The study showed that the participants were confident with their nutrition-related knowledge, skills, communication, and expressed favourable attitudes towards providing nutrition care in physiotherapy settings. However, they have highlighted that training and approval of a broader scope of practice as facilitators to further development of this role. Their practice and motivation in providing nutrition care suggest that they are parallel with the international health promotion advocacy towards eradicating NCDs.

Declaration

This is to certify that:

1. The thesis comprises only my original work towards Master of Philosophy by research except where indicated in the Preface,
2. Due acknowledgement has been made in the text to all other material used; and
3. The thesis is fewer than 40,000 words in length, exclusive of tables, maps, bibliographies, and appendices.

Kaleswari Somasundaram

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1.0 Introduction

This chapter will introduce the scope of this thesis and the rationale for exploring the role of physiotherapists in providing nutrition care to their patients.

1.1 The burden of diseases – Lifestyle-related

The burden of Noncommunicable disease (NCDs) has been described as "***a public health emergency in slow motion***" by the former United Nations (UN) Secretary-General Ban Ki-moon, in a Global Health forum (1). Forty-one million people are reported to die each year due to NCDs, largely cardiovascular disease, cancer, chronic respiratory disease, and diabetes (2). Fifteen million of these deaths are classified as premature deaths which occur before the age of 70 (2). Smoking, physical inactivity, unhealthy diet, and harmful use of alcohol are identified as modifiable behavioural risk factors for NCDs (2). Importantly these risk factors are lifestyle-related and can be controlled or reduced by following a healthy lifestyle.

The World Health Organization (WHO) reported that in Australia, 89% of 160,000 total deaths in 2016 were due to NCDs (3). Furthermore, the probability of premature mortality due to NCDs was about 9% (3). The Australian Burden of Disease Study 2015 states that 38% of disease burden in 2015 was due to modifiable risk factors, and 'all dietary risks' combined accounted for 7.3% of the burden of disease (4). This reflects the estimated burden of disease (7.3%) which could have been prevented if Australians were eating healthily (4), for example as per the national **nutrition** guidelines.

1.2 Nutrition – modifiable factor; influencing health and well-being

Despite many other lifestyles and environmental factors influencing well-being and health, nutrition is acknowledged as a powerful modifiable risk factor for NCDs, as well as being useful in managing disease (5-7). Although chronic diseases cannot be prevented by healthy diet alone, as genetic and other lifestyle factors also contribute (8), diet remains vital in disease prevention and management, with a significant impact on overall health (9).

> *'Diet is arguably the single most important behavioural risk factor that can be improved to have a significant impact on health'* (9)

The Australian government has recognized this key role of diet, as demonstrated by its efforts to provide significant information to the public as described further in the following section.

1.2.1 Nutrition recommendation – Australian Guidelines

The Australian Government has been involved in providing nutrition advice to the public through the National Health and Medical Research Council (NHMRC) and health departments for more than seven decades through food and nutrition policies, summarised in dietary guidelines (9). Dietary guidelines are designed to provide practical information on how to eat for good or optimal health and to prevent diet-related chronic diseases. The Australian Dietary Guidelines (ADG) and the Australian Guide to Healthy Eating (AGHE) provide evidence-based guidelines on appropriate intakes for the general population (10). Importantly, the NHMRC has clearly stated in the guidelines (10) that health professionals

could use the guidelines as a reference to provide evidence-based basic dietary advice to the public.

The revised version of AGHE as pictorial information from the most recent Australian Dietary Guidelines 2013 is presented as Figure 1. The AGHE is a food selection guide focused on food groups, which aims to limit consumption of less healthy foods (such as processed food, junk food & sugary beverages), and encourage intake of a variety of nutritious food from five core groups, namely (Figure 1);

I. grain foods-mostly wholegrain and cereal varieties,
II. vegetables including legumes/beans,
III. fruit,
IV. dairy and or alternatives; mostly reduced-fat varieties,
V. lean meats and poultry, fish, eggs, tofu, nuts and seeds, and legumes/beans,

and drinking plenty of water every day. The approach of these guidelines using food & food groups instead of focussing on nutrients is also practical as people eat food, not individual nutrients (9), and consumption of whole foods as part of a varied diet, provides food components other than nutrients which may have roles in reducing the risk of chronic diseases (11).

Figure 1: Australian Guide to Healthy Eating

adopted from The Australian Dietary Guidelines (9)

1.2.2 Australians are not meeting dietary guidelines

Despite the availability of these guidelines and recommendations, the recent 2017-18 National Health Survey (NHS) based on self-reported data revealed that most Australians still have poor dietary behaviours (12). The survey showed that while 51.3% of Australian adults (aged ≥ 18) reported consuming two serves or more of fruit per day, only 7.5% consumed 5-6 serves of vegetables daily (12). In other words, most adults in Australia were not meeting the minimum recommended intake of vegetables, and nearly half were consuming fewer than the recommended number of fruits serves.

1.2.3 Impact of improved diet on health

The consequences of poor dietary intake are well established in the literature. The latest systematic review of evidence to inform the revision of the ADG (13) provides significant evidence of this. According to the Evidence Report, an increase of a single-serve of vegetables per day is associated with 15-25% reduced risk of coronary heart disease, 20% reduced risk of stroke, and reduced risk of weight gain (13-15). Similarly, an increase of a single-serve of fruit daily is associated with 7% reduced risk of coronary heart disease, 11% reduced risk of stroke, and reduced risk of weight gain (13, 15, 16). Importantly, the enhancement of health outcomes relating to increased consumption of fruit and vegetable is evident irrespective of the baseline intake (13), and the benefits continue with every additional serve per day (17). This suggests that any increases in the consumption of fruit and vegetables are likely to improve health outcomes (17).

1.2.4 Promotion of healthy eating

Clear evidence-based guidelines such as the ADG are required to inform both the public and health professionals on healthy eating (18), in an environment where dietary information of doubtful quality is freely available through media and social networks. The public and some health professionals are unclear on what constitutes a healthy diet (19); government efforts at all levels are essential to support people to make healthy food choices consistent with the ADG (20).

At a global level, The World Cancer Research Fund International has established the NOURISHING Framework to highlight the need for national governments to promote healthy diets and reduce obesity (21). Each letter in the word 'NOURISHING' (Figure 2) represents a policy area where governments need to take action to tackle unhealthy diets and reduce obesity and NCDs in their country, as detailed in Table 1 (21).

Figure 2: The NOURISHING framework

adopted from the World Cancer Research Fund International (21)

The framework also provides a frequently updated overview of implemented government policy actions globally. Under Australia, the database listed activities under four policy areas; labelling, offering healthy food, informing about healthy food, and educating (Table 1). LiveLighter is an example of such efforts under the policy '**I**nform people about food & nutrition through public awareness'.

Table 1: The NOURISHING framework

NO	**Policy areas**	
1	**N**	Nutrition label standards and regulations on the use of claims and implied claims on food
2	**O**	Offer healthy food and set standards in public institutions and other specific settings
3	**U**	Use economic tools to address food affordability & purchase incentives
4	**R**	Restrict food advertising and other forms of commercial promotion
5	**I**	Improve nutritional quality of the whole food supply
6	**S**	Set incentives and rules to create a healthy retail and food service environment
7	**H**	Harness food supply chain & actions across sectors to ensure coherence with health
8	**I**	Inform people about food & nutrition through public awareness
9	**N**	Nutrition advice and counselling in health care settings
10	**G**	Give nutrition education and skills

adapted from the World Cancer Research Fund International (21)

LiveLighter is a public health campaign that was initiated in 2012 by the Department of Health of Western Australia (22). This ongoing campaign has been extended to other parts of the country including Victoria, the Australian Capital Territory, and Northern Territory. LiveLighter delivers important messages to promote healthier lifestyles by encouraging people to eat healthily and be physically active to maintain a healthy weight; through a website, social media with digital and printed tools, and resources (22).

To date, Australia has no policy actions listed under item 9 in the framework shown in Table 1; 'Nutrition advice and counselling in health-care settings'. This indicates a gap in policy actions addressing public awareness of healthy eating in primary care settings.

1.2.5 How to reach the public in health settings

In the Australian context, the **primary care** setting is the first health service a person approaches with a health concern. The Australian Institute of Health and Welfare (23) identifies this health setting as an ideal place for health promotion, prevention, early intervention, treatment of acute conditions and management of chronic disorders. Primary care incorporates health professionals such as General Practitioners (GPs), dentists, practice nurses (PNs), and allied health professionals such as physiotherapists and dietitians (23, 24). Primary care involves health services provided in, for example, general practices, community health centres, allied health practices, and also recently these services via telecommunications technologies (23).

1.2.6 Nutrition services

For the context of this thesis, it is necessary to distinguish between different types of nutrition services, namely; nutrition care and nutrition therapy. General or basic nutrition services include educating patients on basic principles of a healthy diet and screening to determine the requirement for complex services. In contrast to this, assessing and evaluating nutrition requirements and specific counselling involving nutrition management of a particular medical condition is beyond general services and is regarded as medical nutrition therapy. Only qualified nutrition professionals, such as dietitians, can provide medical nutrition therapy. **Nutrition care,** on the other hand, could possibly be provided by other healthcare professionals (25).

Segal et al. suggest the need to "actively promote dietitians as the best source of expert nutrition advice" to improve diet information among the public (19). In Australia, in 2011,

there were just 2,831 employed dietitians, equal to 12.7 per 100,000 population (26). This is far fewer compared to the availability of other health professionals; 750 nurses, 148 GPs, and 86 physiotherapists per 100,000 population (19, 27). The latest statistics for 2017 for the whole of Australia, with a population of 24.6 million (28), show the number of registered and employed health professionals were; 323,122 nurses, 29,455 GPs, and 25,523 physiotherapists but only 4,824 dietitians (29, 30). With this relatively small number to service the Australian population, it is clear that not everyone will be able to receive direct counselling on healthy eating from a dietitian, and referral to dietitians should be for those in need of more complex dietary advice. This raises the question of whether basic nutritional advice according to the dietary guidelines can be delivered by other health professionals.

'Nutrition care' and 'dietary behaviour' are defined in the following section as both the terms will be widely used throughout the thesis.

1.2.7 Nutrition care & Dietary behaviour

Nutrition care refers to the provision of any nutrition-related advice by a health professional to improve their patients' dietary behaviour (31, 32). Features of nutrition care may include nutrition assessment, nutrition advice, and counselling as well as referral to specialist nutrition professionals and relevant services (31). In Australia, nutrition care provision is not restricted to a single profession (32). Primary care professionals including GPs, nurses, dietitians, nutritionists, exercise professionals, naturopaths, diabetes educators, and physiotherapists are able to provide nutrition care to their patients, which might differ in many ways according to guidelines of their respective professional bodies (31-33).

For example, The Royal Australian College of General Practitioners (RACGP) has published – "A population health guide to behavioural risk factors in general practice" (34), which is meant to assist GPs and their teams to work with patients in relation to lifestyle risk factors of smoking, nutrition, alcohol and physical activity (SNAP). This document provides important dietary information to guide GPs in providing advice to their patients. Nutrition information in the SNAP was derived from the ADG (34).

Dietary behaviour is not clearly defined in the literature; however Harris et al. (35) described it as 'food intake' that includes what, where, how, and when food is eaten (35). Similarly, the Australian Health Survey Users' Guide (36) describes dietary behaviours as the type of food consumed, amount, and frequency of food consumption daily as well as food avoidance.

1.3 Nutrition care & primary care health professionals

Ball et al. (31), reviewed the effect of nutrition care provided by primary care professionals on adults' dietary behaviours. This systematic review pointed to the potential of primary care professionals to enhance patients' dietary behaviours, with 12 out of 21 studies reviewed showing significant improvements in patients' dietary behaviour. The reported improvements in dietary behaviour included increases in fruit and vegetable intake. However, these behaviour changes were not linked to any clinical improvements in the patients in these studies. In contrast, the Evidence Report by the National Health and Medical Research Council (NHMRC) (13) (as described in 1.2.3), showed increased intakes of fruit and vegetables was associated with many improvements in health outcomes, including lowering the risk of

coronary heart diseases, stroke and weight gain. Accordingly, it is possible that the significant improvements in dietary behaviours reported by Ball et al. (31)' could improve health outcomes if sustained.

The studies in the systematic review (31) that showed significant improvements in patients' dietary behaviour had three notable qualities. Firstly, these studies involved nutrition care delivered by health professionals other than dietitians, such as GPs, PNs and health counsellors (31). This suggests that it is possible for health professionals not specialized in nutrition to deliver successful nutrition care. Secondly, some of these studies utilised national dietary guidelines or best-practice guidelines to inform the nutrition care provision during interventions. Seven out of nine studies (31) informed by such guidelines reported significant improvements in patients' dietary behaviours. Finally, another consistent feature of the studies which improved dietary behaviours was repeated or multiple consultation sessions with the health professionals.

All of the studies included in the systematic review by Ball et al. (31) involved interventions with food-related outcome measures. Studies exploring primary care professionals' perceptions of providing nutrition care are described next. A number of researchers from Australia and New Zealand have investigated perceptions of primary care professionals, namely GPs, GP registrars, and PNs regarding the provision of nutrition care (37-39); a summary of studies is available in Appendix 1. From the research with these health professionals, the most common barrier identified to the provision of nutrition care was 'lack of time'(37-39).

Physiotherapists are primary care professionals with excellent communication skills (40) who usually have repeated (up to five sessions on the Medicare Chronic Disease Management) and prolonged sessions (>20 minutes) with their patients, and who are subsidised by private and public funding for chronic conditions (41). Given this unique aspect of physiotherapy practice, these health professionals may have the opportunity to provide nutrition care as part of their regular consultations.

According to the Health Workforce Data, physiotherapy is the fourth largest health profession in Australia, with over 25,000 registered and employed physiotherapists in 2017 (42). In the Australian context, physiotherapists work closely with GPs and other professionals in terms of planning and management of treatment. According to the Australian Physiotherapy Association (APA), GPs refer patients to physiotherapists more than to any other healthcare profession (43). Based on these figures, physiotherapists are likely to have considerable contact hours with patients, and there may be an opportunity for health promotion, particularly relating to healthy eating, which is often missed in general practice due to time constraints.

An initial study in Australia among a small sample of health professionals, including physiotherapists, suggested that they were in a position to provide healthy lifestyle advice to overweight patients (44). Although physiotherapists might be able to deliver nutrition care, little focus has been placed on the physiotherapist's role or their perception of providing nutrition care for their patients regardless of patients' presenting problems.

1.4 What is physiotherapy?

Physiotherapists are healthcare professionals who treat people with physical problems due to injury, illness, disease, or ageing (27). Physiotherapy incorporates both disease prevention and promotion of health (45). In the contemporary health landscape, the scope of physiotherapy practice is evolving, and weight management as well as health promotion is increasingly considered to be within the role of the physiotherapist (45). With respect to weight loss interventions, evidence suggests that patients believe it is appropriate and important for physiotherapists to address weight (46).

Physiotherapy services are available in hospitals, community health centres, centres for physically disabled people, mental health services, rehabilitation centres, sports clinics and fitness centres, government departments, and universities. In Australia, this profession is registrable under the National Registration and Accreditation Scheme (NRAS); hence a practitioner must be registered with the Physiotherapy Board of Australia to practice as a physiotherapist (27).

1.4.1 How are physiotherapists trained?

To be a physiotherapist, one needs to complete an accredited program of study; either a four-year full-time equivalent (FTE) program at Bachelor or Honours level, or a two-year FTE program at graduate entry Masters level. These courses include a mandatory supervised practice in a clinical setting (27).

1.4.2 Associations, Regulatory and Accreditation bodies

The Australian Physiotherapy Association (APA) is the national body representing Australian physiotherapists which provides various support for the members with advocacy, continuing professional education, professional and workplace resources.

The Physiotherapy Board of Australia is responsible for registering physiotherapists as well as students. The board is also responsible for developing standards and guidelines for the profession which includes handling notifications, complaints, investigations, and disciplinary hearings, and importantly to approve accreditation standards and accredited courses of study (27). The board has been working in close partnership with the Australian Health Practitioner Regulation Agency (AHPRA) to provide the nation with a safe, qualified and competent workforce under the National Registration and Accreditation Scheme (47).

The Australian Physiotherapy Council (APC) is the responsible body for the accreditation of physiotherapy education programs in universities. This body is responsible for advice to government organizations and the Physiotherapy Board regarding maintenance and review of the national standards for physiotherapy.

1.4.3 Scope of practice

Almost half of the employed clinical physiotherapists report that their primary scope of practice involves musculoskeletal disease management (27). Given that overweight and obesity are risk factors for many chronic musculoskeletal conditions, physiotherapists address lifestyle factors within their treatment (48). The rest of the primary scope of practice includes aged care, neurological, cardiorespiratory, paediatric, sports, and women's health (27).

The APA has further described three frontiers that define the scope of practice for physiotherapists in Australia. Firstly, their competence is based on their level of knowledge and capability; secondly, the settings and their safeguards involving safe work procedures, and thirdly, the law (49). The position statement of this association on the scope of practice for physiotherapy, emphasises:

> *"…a holistic approach to the prevention, diagnosis and therapeutic management of disorders of movement or optimisation of function to enhance the health and welfare of the community from an individual or population perspective. The practice of physiotherapy encompasses a diversity of clinical specialties to meet the unique needs of different client groups"* (50)

This statement shows that the physiotherapists are expected to provide care with a holistic perspective in treating their patients by incorporating diverse care according to the need of the patients.

Similarly, regarding chronic disease and physiotherapy, APA has also described that physiotherapists are well-positioned with appropriate skills to manage patients at various stages relating to chronic disease, and in educating patients to manage their condition and self-care (40). Services by physiotherapists may include advice and education on activity with lifestyle modification strategies inclusive of dietary advice (40).

1.4.4 International bodies

The World Confederation for Physical Therapy (WCPT) provides the umbrella professional voice for physiotherapists, representing more than 450,000 physiotherapists from around the world through its 120 member organisations (51).

1.5 Advocacy within the profession

The WCPT advocates a role for physiotherapists in health promotion. The WCPT endorses the International Classification of Functioning, Disability, and Health (ICF) based on the World Health Organization (WHO)'s definition of health as a basis for service delivery (52). Contemporary physiotherapy must, therefore, extend beyond the management of typical musculoskeletal conditions and hands-on intervention (53). The WCPT has emphasised health promotion practice position statements to encourage physiotherapists' practices towards general health and prevention of NCDs (54). WCPT also provides a platform for practitioners to interact and share knowledge and experiences on implementing efficient health promotion in physiotherapy practices; through its Network for Health Promotion in Life and Work (55).

To date, there have been three physiotherapy summits on global health addressing NCDs convened in WCPT congresses. The themes of these summits held in 2007, 2011 & 2015 all primarily focused on the physiotherapists' role in reducing the knowledge translation gap between the evidence on healthy lifestyle choices and the practices of health professionals in health promotion; declaring such efforts as a professional priority (53, 56).

This demonstrates the collective voice across the profession globally, which is encouraging current physiotherapists to expand their role to combat NCDs and their risk factors. Addressing modifiable lifestyle risk factors such as advising patients/ clients to improve dietary behaviour is one possible pragmatic example – addressed in this thesis.

1.5.1 Advocacy to expand the role of physiotherapists in health promotion

Physiotherapists are committed to empowering patients to self-heal by providing coaching in wellness, prevention, and rehabilitation with minimal iatrogenic risks and cost-effective care. Given the qualifications of physiotherapists and the nature of their practice, it has been suggested that they are well-positioned to lead the effort against lifestyle-related NCDs in primary care (53, 57, 58). Dean et al.'s (53) position paper argues that physiotherapists should include intervention around patients' health behaviour in physiotherapy consultations. Similar views have been supported by editorials in physiotherapy journals (59-61).

Patients usually present to physiotherapists with musculoskeletal complaints, which may be confounded by lifestyle-related risk factors. These risk factors and their manifestations could have larger implications for health when compared to the primary reason or complaint. To be able to address such health issues, contemporary physiotherapists as primary care health professionals, need sufficient clinical competence focused on counselling in smoking cessation, basic healthy nutrition, weight control, physical exercise guidelines and prescription, stress, optimal sleep, and appropriate alcohol intake (57). Dean et al. (53) recommends that every patient should be screened and assessed for health behaviours, including nutrition. Intervention to improve patients' health behaviour needs to be undertaken, or the patient referred to other qualified professionals for such management (53, 57, 58).

Correspondingly, Morris et al. (62) also advocated for the physiotherapist's role in educating and improving patients' nutrition behaviour using reliable and evidence-based information. It is important for physiotherapists to be aware of current national dietary guidelines to provide basic advice to their patients on healthy eating. Morris et al. (62) stressed screening for nutrition problems as an essential step. Nutrition screening is a brief process of determining risk factors and unhealthy food behaviours. This screening is different from nutritional assessment, and importantly could be administered or conducted without dietetic training (62). Morris et al. (62) have suggested several nutritional screening strategies for physiotherapists, and further recommended that all individuals should be screened for malnutrition as this condition can exist in all categories of patients, including those with normal weight.

Once a physiotherapist has identified a patient's nutritional risk, the next step is to facilitate dietary change or refer to a nutrition professional. Morris et al. (62) state that it is important for physiotherapists to assess patient health behaviour to guide them in providing appropriate information and resources. If patients fail to change their behaviour with repeated attempts, then referral to a registered dietitian is indicated (62). Similar to Dean, Morris et al. also stress that given that physiotherapy practice involves repeated and intensive sessions with patients, it is ideal for facilitating the expanded role in nutritional care. For this to work, comprehensive knowledge of basic nutrition assessment and counselling is important for physiotherapists (62).

1.5.2 Nutrition advice may be within the purview of physiotherapists

The Physiotherapy Board of Australia, working closely with APHRA, have recently published a document titled, "Physiotherapy practice thresholds in Australia and Aotearoa New Zealand". The purpose of this document is to describe the threshold competence needed for initial and continuing registration of physiotherapy professionals in Australia and New Zealand. The key features of physiotherapy are documented as,

> "…*work in partnership with individuals and populations to optimise their function and quality of life. Physiotherapists promote health and implement strategies to prevent and minimise impairments, activity limitations and participation restrictions including those associated with complex and chronic conditions. Physiotherapists consider each client as a whole and facilitate each client's self-management. They evaluate each client's environment and recognise personal factors that may that client's functioning, disability and health. Physiotherapists in Australia and Aotearoa New Zealand consider these factors and client preferences as part of their evidence-based practice."* (63)

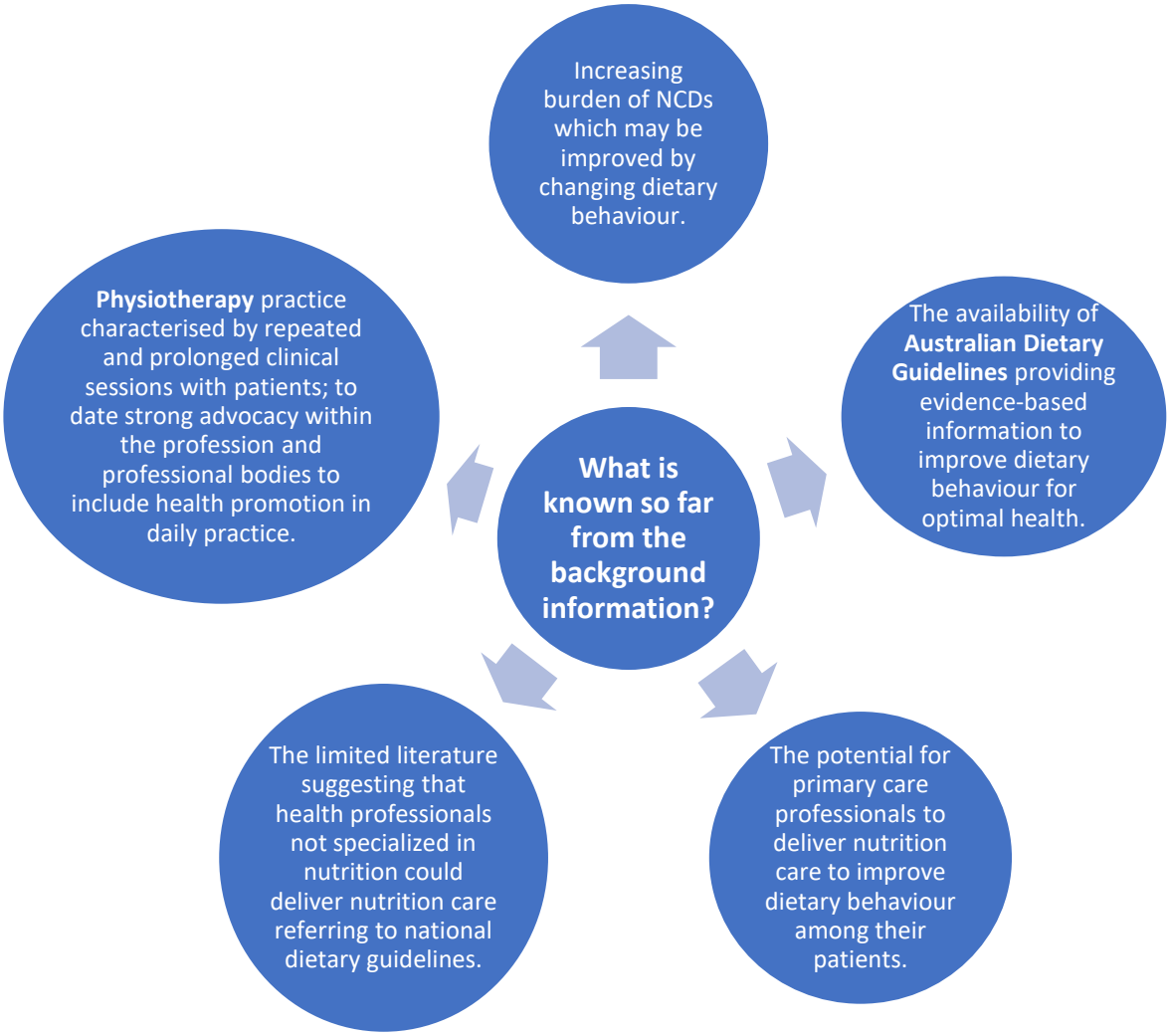
It is evident that Australian physiotherapists are expected to practice holistic care and provide relevant care to their patients to optimise their health. Therefore, it is likely that provision of basic dietary advice to improve patient's dietary behaviour is within the responsibilities and competencies of a physiotherapist.

With such advocacy within the profession internationally, it is timely to explore the views of physiotherapists on this expanded role in health promotion.

1.6 Summary

As shown in Figure 3, given these background insights and limited body of literature available relating to nutrition care and physiotherapists, a literature review was performed to identify what is known so far about **physiotherapists** in terms of **nutrition care** and **dietary behaviour** (Chapter 2).

Figure 3: Insights from the background information



2.0 Literature Review

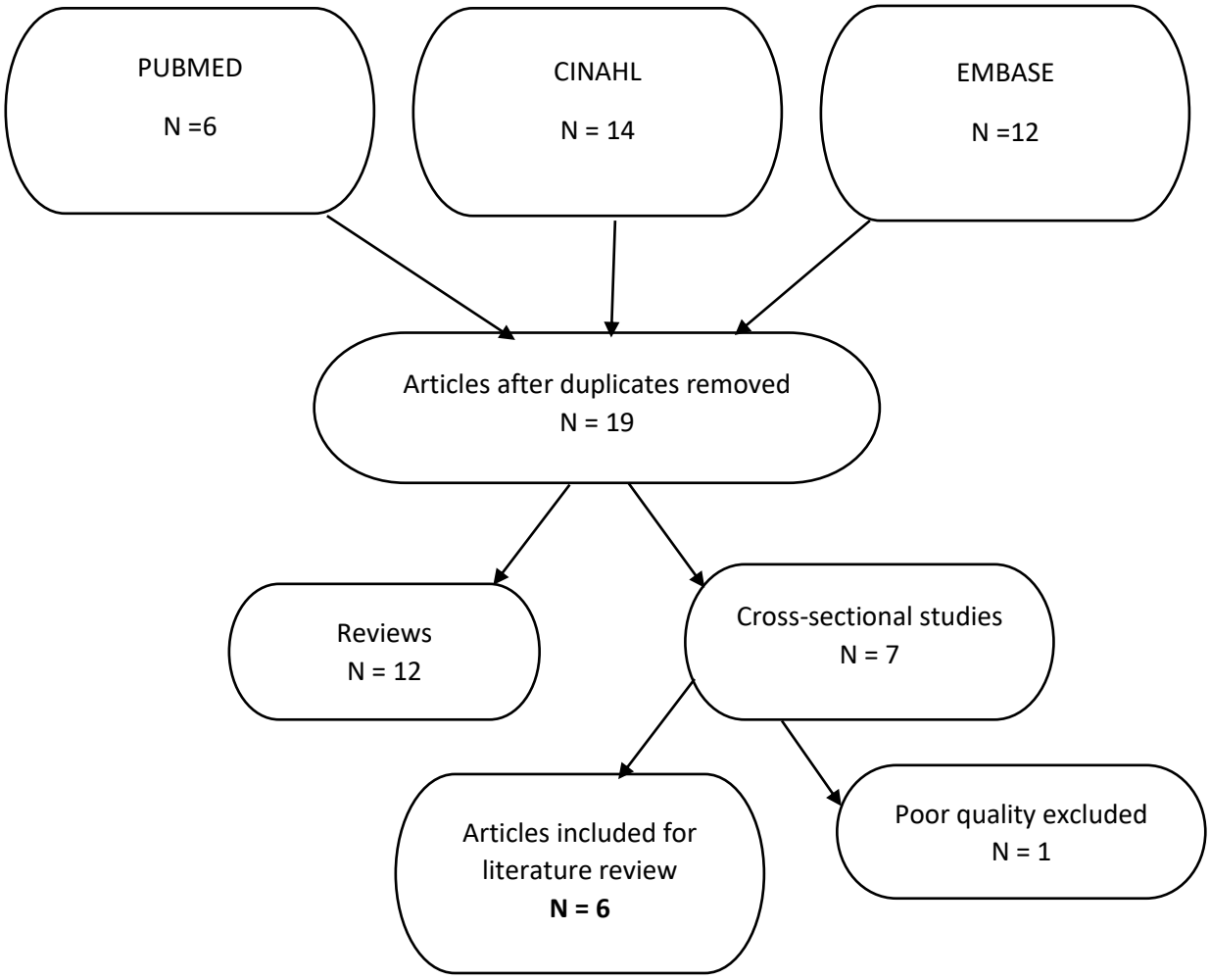
This literature review aimed to explore recent findings regarding diet or nutrition-related studies in physiotherapists, in order to provide the context for this research and to identify current research gaps. The following section describes the literature review methods followed by the broad summary and synthesis of the reviewed literature.

2.1 Search strategy

Various combinations of keywords; “physiotherap*”, “physical therap*”, “nutrition care”, “dietary”, “health promotion” were searched with AND or OR.

Articles were searched using three electronic databases, Pubmed, CINAHL, and EMBASE. The search in Pubmed was performed using a combination of Medical Subject Heading (MeSH) and keywords. Related references (that were suggested by the databases) and references cited in the retrieved articles were also searched.

Figure 4: Flow chart of literature search



Only original studies in physiotherapy were included in the review. Exclusion criteria included articles not in English language, reviews and publication dates before year 2000. After application of inclusion and exclusion criteria, seven cross-sectional studies were identified. The identified studies are presented in Appendix 2. The quality of the papers was assessed using an appraisal tool with a checklist of “*11 questions to help you make sense of descriptive cross-sectional studies*”(64). The highest possible score based on the quality assessment was

11. The articles were categorized based on the description in Table 2. Based on this quality assessment, one study was removed as it only met 3 out of 11 criteria from the checklist.

Table 2: Quality score for the papers assessed

Quality score	Description	
7 – 11	Good	The article has met at least 7 criteria outlined in the tool
4 – 6	Moderate	The article has met between 4 to 6 criteria outlined in the tool
0 – 3	Poor	The article has less than 3 criteria met

Only good and moderately good papers were included in the literature review; thus, six articles were critically appraised and reviewed. Further details of these studies are available in Appendix 3.

2.2 Broad summary of literature review

This literature review identified six cross-sectional studies with sample sizes of 65-451 participants which explored the views of physiotherapists, physiotherapy students, and patients regarding the provision of nutrition or dietary advice by physiotherapists. Four studies described practices, perceived barriers, beliefs, and training needs among Irish (65), Nigerian (66, 67), and a small sample of Australian physiotherapists (68). A further two studies from the USA (46, 69) reported on physiotherapists' own health behaviours and patients' opinions regarding health promotion in the physiotherapy setting.

Given the nature of physiotherapy, these studies, with one exception (66), focused more on physical activity and weight management than nutrition. Despite the differences and limitations of the studies, all six (46, 65-69) concluded that physiotherapists should have a significant role in health promotion. However, four studies (65-68) noted that professional development in nutrition would be crucial to enable physiotherapists to deliver dietary advice.

There were some contradictory findings across the studies. Both the Australian and Nigerian physiotherapists perceived that dietary advice provision is within their scope of practice (66-68), while the Irish physiotherapists believed this to be outside their role. The Irish physiotherapists also believed that their patients did not welcome their dietary advice (65). In contrast to this, the Nigerian physiotherapists were confident that their patients were receptive of their dietary advice. The findings of the American study with physiotherapy patients (46) was consistent with the perception of Irish physiotherapists; that less than half of the patients would welcome dietary advice from their physiotherapists. Similarly, the majority of the patients did not agree that their physiotherapist should be a role model for the healty eating (46).

Four health behaviours of physiotherapists and physiotherapy students regarding physical activity, fruit and vegetable consumption, not smoking, and maintenance of healthy weight (69) were explored in the first American-study. In the second American-study(46), patients' opinions regarding physiotherapists discussing these four health behaviours were investigated. Both groups of participants considered fruit and vegetable consumption a lower priority than the other three health behaviours. Given the findings from both the American studies (46, 69), it can be concluded that dietary behaviour received minimal attention from the participants compared to other three health behaviours.

2.3 Synthesis of literature review

The synthesis of the literature review is detailed in Appendix 4. Three major themes were evident: **Knowledge**, **Practice**, and **Barriers**. These are discussed below with a general summary followed by details of the contributing studies.

Knowledge of best practice dietary management

The Australian (68) and Irish (65) physiotherapists felt they lacked knowledge on best practice dietary management. Although the Nigerian (66, 67) and American (46, 69) studies did not directly report on knowledge status, other results reported suggested that the participants were likely to lack the knowledge to provide nutrition or dietary advice.

In 2010, more than half of the 65 Australian physiotherapists surveyed, reported a low level of knowledge regarding best practice dietary management of overweight clients, and a low level of confidence to assess and recommend dietary changes (68). Close to 35% of the physiotherapists surveyed in this study worked in a rural region with a shortage of dietary professionals (68), suggesting patients in this area may lack access to advise on nutrition. Health professionals in Australia are able to provide basic healthy eating advice by referring to the Australian Dietary Guidelines (ADG) (9, 34). However, the physiotherapists in this study were not asked about their familiarity with the ADG. In the same study, more than half of the participants believed that physical activity alone was as effective as diet alone in treating obesity (68). This is not supported by the existing evidence (70) and indicates an important knowledge gap among the physiotherapists who participated in the study.

Unlike the Australian study (68) discussed above, other studies lacked information on participants' knowledge of best practice dietary management. Close to three-quarters of 163 Irish physiotherapists (65) reported they lacked the knowledge to manage diet as a lifestyle risk factor. Nearly one-third of 103 Nigerian physiotherapists (66) felt they lacked the expertise to assess and manage dietary risk factors and were uncertain of what service to provide, which also suggests a lack of knowledge. Furthermore, both studies from Nigeria (66) (67) reported physiotherapists managed dietary advice for patients to reduce calories and dietary fat, increase fibre intake and aim for weight loss according to patient pathophysiological condition; obesity, glucose intolerance, hypertension, and hyperlipidaemia. This seems superfluous since the changes suggested to improve dietary behaviour should be general for everyone. The basic dietary advice should be standard guidance instead of emphasizing a certain point to one patient and not to another. Specific nutrition counselling for such medical conditions has been acknowledged as beyond the scope of practice for physiotherapists (62). Therefore, the results of these studies suggest lack of best practice dietary management among the participating Nigerian physiotherapists.

While the studies from Australia (68), Ireland (65) and Nigeria (66) (67) reported on physiotherapists' service provision, the American study (69) reported on physiotherapists' own health behaviours. Findings from this study revealed that close to a quarter of participants did not believe that eating 5 or more servings of fruit and vegetables per day was a recommended health behaviour. This suggests a lack of knowledge among the physiotherapists of the importance of eating fruit and vegetables as per the national dietary guidelines.

None of the studies discussed whether their participating physiotherapists utilized national dietary guidelines, except the Australian study (68). Based on this single study, provision of

dietary advice by Australian physiotherapists may not be in line with the national guidelines (68), which further strengthens the need to investigate this. Nigeria was reported as not having a guide to healthy eating (66) but this was not listed as a barrier preventing physiotherapists from providing nutrition advice. Perhaps this also explains why more than half of the respondents reported on lack of proper patient education materials, and that they did not provide any written dietary advice for their patients. Australia has overarching evidence-based dietary guidelines for healthy eating and these should be used as a guide for basic nutritional advice in the primary care setting.

What is known so far?

- *The majority of the studied physiotherapists revealed a lack of knowledge of best practice dietary management.*

What gap needs to be addressed?

- *Are Australian physiotherapists aware of the Australian Dietary Guidelines as a reference to guide their provision of nutrition care?*

Practice around providing dietary advice

Physiotherapists surveyed in Australia, Ireland, and Nigeria reported providing some sort of dietary advice to their patients.

Almost 42% of Australian physiotherapists surveyed provided dietary advice in their practice (68). One of the findings highlighted in this study was the significant higher likelihood of providing dietary advice if the participants had received training in weight management during their tertiary education. The odds of physiotherapists providing dietary advice was nearly nine times higher for those with training (68). However, this study included only a small sample of physiotherapists in The Hunter New England region in New South Wales, and therefore was insufficient for generalization of the findings to overall Australian physiotherapy practice.

The Irish study (65) did not report on how the physiotherapists managed diet as a risk factor nor how they promoted a healthy diet among their patients. Therefore, it is difficult to compare the results of this study to others. However, about half of the Irish physiotherapists reported irregular provision of educational materials relating to increasing fruit, vegetable, and fibre consumption to their patients (65).

In both Nigerian studies, more than half of the physiotherapists (66, 67) reported regularly advising patients with poor eating habits to improve dietary behaviour. However, the nationwide-survey also reported that the majority of the respondents (74%) rarely provided any written advice about a healthy diet for their patients (67). This perhaps suggests a lack of confidence to manage diet as a risk factor, although the studies showed a tendency to intervene verbally. It would be interesting to explore whether the Australian physiotherapists practice health promotion similarly, and their perceived confidence in providing such care.

While nearly 40-70% physiotherapists in the reviewed studies reported provision of dietary advice to their patients (65-68), the findings from America (46) indicated that only about 6% of 230 patient-participants reported receiving advice about fruit and vegetable consumption

from their physiotherapists. However, it is unsurprising given that the studies were conducted in different settings.

The Australian study (68) did not report on assessing dietary status in new and returning patients but did mention that only one-third of physiotherapist respondents were confident to assess dietary intake. Although sampling of physiotherapists in the Irish study (65) focussed on those with interest in community care, only one-fifth of the physiotherapists reported regularly assessing their clients for dietary status in new visits. Although most of the physiotherapists participating in the Nigerian studies (66, 67) acknowledged the importance of including dietary advice in their daily practice, only one-third of them assessed dietary status in either new or returning patients in the smaller study limited to southeast Nigeria (66), compared to almost half of the respondents from the nationwide survey (67). Both the Irish (65) and Nigerian' physiotherapists (66) reported that the reason for this was limited access to support from other healthcare providers who specialized in nutrition. This may also be a problem in the Australian context since few dietitians are available in general, compared to physiotherapists (29, 42).

Sixty percent of the American physiotherapist cohort reported consuming healthy servings of fruit and vegetables (69). However, comparing participants' responses across four health behaviours; abstaining from smoking (99%), engaging in regular physical activity (81%), maintaining a healthy weight (79%), 'fruits and vegetable consumption' (60%) were less commonly practiced. The findings of this study indicated that although the participants were aware of the importance of consuming an adequate amount of fruits and vegetables, they did not give equal priority to this compared to physical activity or weight management. This raises the question of whether Australian physiotherapists would prioritize eating fruit and vegetable as health behaviour or preach what they practice; if they were to provide healthy eating advice to patients.

What is known so far?

- *40-70% of the studied physiotherapists reported providing dietary advice; however only a smaller group assessed dietary status.*
- *60% of the studied physiotherapists reported consuming adequate or recommended servings of fruits and vegetables.*

What gap needs to be addressed?

- *Do Australian physiotherapists provide dietary advice in their practice?*
- *Do Australian physiotherapists practice healthy eating themselves?*

Barriers to providing dietary advice

Physiotherapists from Ireland, Australia and Nigeria have reported several barriers to providing dietary advice to their patients.

Three (65, 66, 68) out of six reviewed studies strongly indicated that physiotherapists need further training relating to nutrition if they are to provide dietary advice. Besides training and professional development needs, both Irish (65) and Nigerian physiotherapists (66) reported difficulty in referring their patients to other service providers, such as dietitians, because of their limited availability. Indirectly, these studies indicated limited access to other healthcare providers as one of the demotivating factors for the physiotherapists to provide dietary advice among their patients (65-67). On the other hand, the Australian study (68) noted that rural areas in the study region are understaffed with dietetics and technical support staff; which demands service support from other health professionals. This suggests Australian physiotherapists may be required to provide service beyond the conventional scope but this must be explored further since the study only involved a sample of 65 physiotherapists in New South Wales.

The Irish (65) and Nigerian (66) physiotherapists reported a lack of appropriate educational materials on healthy eating. In Australia, the evidence-based dietary guidelines should be the basis of dietary advice in the primary care setting (9, 34). Although Nigerian physiotherapists encountered several barriers to incorporating dietary advice into their practice; lack of access to dietitians & health promotion officers, lack of proper education materials, and lack of healthy eating guidelines, generally they were consistent in providing dietary advice, especially to increase consumption of fruit and vegetables, among their patients.

What is known so far?

- *Lack of training, limited support from other healthcare professionals and lack of appropriate education materials are most noted barriers preventing physiotherapists from providing dietary advice.*

What gap needs to be addressed?

- *What barriers do Australian physiotherapists face in providing dietary advice?*

The gaps identified in this literature review provided the aim of this study and associated research questions.

2.4 Aim

This thesis aimed to investigate practices, knowledge of, and barriers to providing nutrition care in Australian physiotherapists.

2.5 Research Questions

To answer the over-arching aim, the study addressed the following questions:

R1. What are the current practices of providing nutrition care by Australian physiotherapists in primary care settings?
- If physiotherapists are providing nutrition care, what is the content of nutrition care?
- Are Australian physiotherapists aware of the Australian Dietary Guidelines (ADG) and are they using this as a reference to provide nutrition care?

R2. Are physiotherapists confident in providing nutrition care to patients in primary care settings in Australia?
- What are the barriers to providing nutrition care?

R3. Do Australian physiotherapists themselves adhere to the recommended guidelines for healthy eating?

3.0 Methodology

This chapter describes the methods used to conduct the research, which includes two separate phases; a qualitative study and followed by a quantitative study to answer all the research questions listed in Chapter 2.

3.1 Research Design

This study employed **exploratory mixed-methods** to answer the research questions.
A common exploratory mixed-method approach utilizes broad qualitative data collection to inform a subsequent tailored survey or quantitative data collection (71). Given that limited literature is available regarding the provision of nutrition care by Australian physiotherapists, this method is well suited to the descriptive and explorative nature of the stated research questions (72), as well as to provide a deeper understanding of the views of participating physiotherapists.

The first phase of the study involved a small exploration among physiotherapists working within the state of Victoria and aimed to collect qualitative data to answer the first two research questions, R1 & R2. Qualitative methods are useful to explore the understanding of an issue providing in-depth, rich information which unpacks the detail of the context in which actions occur.

The findings from the qualitative study were used to inform and develop the survey instrument for the quantitative study in the second phase. The value of the quantitative analysis is that it offers insight into whether the findings from the qualitative study apply to a broader sample of physiotherapists. The second phase of the study involved a cross-sectional survey among physiotherapists from all states and territories in Australia, covering all research questions, R1-R3.

3.1.1 Part 1: Qualitative study: Semi-structured interviews

3.1.1.1 Ethical considerations and approval

A minimal risk ethics approval for the first part of the study was obtained from the University of Melbourne Human Research Ethics Committee (HREC). The ethics application was submitted and approved in January 2018 with Ethics ID: 1850995.1 (Letter of approval attached in Appendix 5).

3.1.1.2 Semi-structured interview guide

The interviews were conducted based on the interview guide (see Appendix 6) but also included relevant open-ended questions to allow for the collection of in-depth information. The interview guide was developed to explore physiotherapists' views, knowledge, practices, and perceptions of their role in nutrition care.

At the start of the phone interview, demographic information was collected. This was followed by the researcher verbally defining 'nutrition care' to the participants. The first section of the interview aimed to explore the views of physiotherapists on their role in providing nutrition care and whether they consider it within their scope of practice. This also included their perception of the importance of discussing nutrition with their patients and the patients' expectation of the physiotherapist with regard to food/nutrition advice. This section ended with open-ended questions on awareness and what they feel about the Australian Dietary Guidelines (ADG) and the Australian Guide to Healthy Eating (AGHE).

The second section of the interview included open-ended questions on the current practice of nutrition care, the context, the environment, and who initiated the discussion. This also included probing on the tools or principles used to deliver dietary advice and physiotherapists' use of ADG/ AGHE. Questions on the physiotherapist's comfort in providing nutrition care and how they would define 'basic healthy eating advice' were also included in this section.

The third section of the interview included questions on physiotherapists' perceived barriers to provision of nutrition care and what could facilitate routine inclusion of this in consultations. This section also explored whether nutrition was covered in their tertiary education and what they saw as an ideal role for physiotherapists in nutrition care. Finally, participants were asked to summarize their opinions on nutrition care in physiotherapy.

3.1.1.3 Population & Recruitment

The target population for this study was physiotherapists working in primary care settings in Victoria. A purposive and convenience sample was recruited for interviews, via the Victorian Primary Care Practice-Based Research Network (VicReN) and personal professional networks known to the researchers in this study, the Australian Physiotherapy Association (APA) and Alumni of University of Melbourne networks. The study was advertised in the newsletters of VicReN, Alumni of University of Melbourne and APA. A template embedded with the researcher's contact details and brief information regarding the study was included in the advertisement (see Appendix 7) to gauge interest from physiotherapists around Victoria. Physiotherapists whose email addresses were known to the study researchers were approached via emails including the study advertisement. Interested physiotherapists contacted the researchers to express their intention to participate in the interviews. These physiotherapists were emailed an information pack, including a Plain Language Statement (PLS) and Consent form (see Appendix 8). Following confirmation of interest, the physiotherapists were contacted via email to arrange a convenient time for the interview.

Once the interview date was fixed, the participants were also sent an image of the AGHE as a reference to be used during the interview.

Participants were recruited until data saturation was achieved. Data saturation was considered to be achieved when no more new themes/ sub-themes were identified from the analysis of interview transcripts (73).

3.1.1.4 Participants

Participants were purposively sampled to ensure a good range of age, gender, work experience (years worked and educational level) and geographical representation (urban/rural/regional) was achieved. Only currently practicing physiotherapists were eligible for the interviews.

3.1.1.5 Data collection

Interviews were conducted from mid-March to June 2018. Interviews were approximately 20-30 minutes in length. All interviews were conducted over the telephone, and verbal consent was recorded on interviews, in addition to the completed consent form. The research student undertook all the interviews. Before interviewing the participants, the interview questions were tested with two physiotherapists working at the University of Melbourne to ensure a good and appropriate flow of questions and to avoid any unforeseen problems during the actual interviews. All interviews were audio-recorded using Samsung S5; through the Voice Recorder Application and also backed up using the Olympus Digital Voice Recorder.

3.1.1.6 Data management

When physiotherapists contacted the researcher to register their interest in the study, their contact details were collected (name, contact phone number and email address) and stored on a password-protected server at the Department of General Practice. This identifiable data was necessary to enable the information pack to be emailed to the participants, and was only accessible by the researchers involved in the study. No identifying information was recorded in the interview; however, in a document kept separately, a study ID was linked to their contact details to allow us to contact participants again should we need to clarify information they had provided. All data collected in the interview was de-identified before analysis. Physiotherapists were referred to by their study ID number.

3.1.1.7 Interview data analysis - Thematic analysis & Content analysis

Audio recordings of the interviews were transcribed verbatim electronically. Transcripts were read initially by the student researcher who conducted the interviews and took field notes. Data was managed using the qualitative research software program, N-Vivo 12 Plus. Each transcript was assigned codes using this program.

Content analysis and thematic analysis were undertaken. While both thematic and content analysis allow examination of qualitative data, there are differences in these approaches (74). According to Braun & Clarke (75), thematic analysis allows a descriptive approach through identifying, analysing, and reporting patterns or themes within rich and complex qualitative data. In contrast, content analysis permits quantification of data within the qualitative codes (76) to report simple and common issues identified in the findings (74, 77). Given that this study was exploratory, both approaches were used to analyse and report the qualitative findings from the interviews.

The main ideas and topics in the data were grouped as codes (sub-themes) and these sub-themes were grouped into themes. Emerging themes were subjected to ongoing reflection and comparison with new data. Coding (sub-theme identification) was discussed with the research team to achieve consensus on coding definitions and organization of sub-themes into themes, and this analysis was used to describe the perspectives of physiotherapists on their role in providing nutrition care.

3.1.2 Part 2: Quantitative study: Cross-sectional Survey

A national online survey was used to provide a snapshot of Australian physiotherapists' current practices, knowledge of, views on, perceived barriers, and facilitators to including nutrition care in their clinical settings.

3.1.2.1 Ethical consideration and approval

A second minimal risk ethics approval for the quantitative study was obtained from the University of Melbourne HREC. The ethics application was submitted and approved in June 2018 with Ethics ID: 1852192.1 (letter of approval attached in Appendix 9).

3.1.2.2 Population & Recruitment

Physiotherapists working in various primary care settings from all states and territories in Australia were invited to complete an online survey for the quantitative study. Recruitment of survey participants was conducted through the APA newsletter and social networking using Twitter. Social networking was included for recruitment given the online nature of the survey, this platform allowed targeting of Australian physiotherapists. A link to the online survey embedded with the plain language statement and researcher's contact details was advertised in both platforms. The survey remained open from August to December 2018.

3.1.2.3 Sample size calculation

The Melbourne Statistical Consulting Platform (MSCP), University of Melbourne, calculated the sample size of 380 would provide a 5% margin of error for a 95% confidence interval for a single proportion; so that a statement such as "50% of physiotherapists followed the healthy eating guidelines" would have a 95% confidence interval of 45% to 55%. This calculation was based on a total of 30,642 practicing physiotherapists registered with the Physiotherapy Board of Australia, AHPRA (78) as of March 2018.

3.1.2.4 Development of online survey

REDCap

The online survey instrument was developed using a web-based application, Research Electronic Data Capture (REDCap). The student researcher attended an introductory workshop with The University of Melbourne REDCap team, before designing the survey using this application.

Survey development

Before developing the survey instrument, three potential tools previously utilised in published research were identified for reference: the NUTrition COMPetence (NUTCOMP) questionnaire(33), a survey by Snodgrass et al. (68) and a survey by Bodner et al. (79). The key elements identified from the literature review as portrayed in the research questions were identified within these survey instruments for adaptation to this study. In addition to the tools used, findings from the qualitative study have been used to inform and create the survey questions and the answer options. Survey instruments by Snodgrass et al. and Bodner

et al. were referred to for guidance in structuring the questionnaire whereas NUTCOMP was used in its entirety as part of the questionnaire.

The NUTCOMP questionnaire is a validated tool; therefore, the wording and questions were not changed when it was included in the survey. NUTCOMP consists of four constructs with 35 questions designed to measure the confidence of health professionals in providing nutrition care to patients with and without chronic disease (33, 80). The first three constructs in the questionnaire include 5-point Likert scale questions to rate confidence in knowledge about nutrition & chronic disease, nutrition skills, and communication about nutrition. The fourth construct includes 5-point Likert scale questions to rate agreement /attitude of participants towards providing nutrition care. Two questions from this instrument related directly to the Australian Guide to Healthy Eating. NUTCOMP was initially pre-piloted among Australian primary care professionals, including physiotherapists (33) for validation purposes, hence it was considered appropriate for this study of physiotherapists in primary care settings.

The final format of the survey

The final survey instrument was constructed as five sections with 66 questions in total, Table 3.0 (see Appendix 10 for complete survey):

Table 3.0 Final format of the online survey

Section	**Section header**	**Number of questions**
A	Demographics	10
B	Views	4
C	Practice Diet score	4 10
D	Barriers & Facilitators	3
E	NUTCOMP I. Confidence in Knowledge about Nutrition and Chronic Disease II. Confidence in Nutrition Skills III. Confidence in Communication & Counselling about Nutrition IV. Attitudes Towards Nutrition Care	 7 11 9 8

The introduction of the survey included a definition of 'nutrition care' along with a plain-language summary (PLS) of the study in a downloadable PDF format. The first question established eligibility, whether the participant was practicing as a physiotherapist and had a current patient load. If the participant answered 'NO', then the instrument would end the session with a thank you note. The demographic section included questions regarding whether the physiotherapist had participated in nutrition-related training.

Questions under 'Views' were designed to explore physiotherapists' knowledge of nutrition. The questions in this section were carefully worded to avoid overlapping with questions from NUTCOMP. Questions under 'Practice' were aimed to identify the current nutrition care practices of physiotherapists in their clinical settings. Response options for most of the questions in this section were based on data collected from the qualitative interviews. The last part of the practice section probed the physiotherapists' own eating behaviour with 10

questions adapted from the summary of the Australian Dietary Guidelines (81). Next, questions on 'Barriers and Facilitators' for providing nutrition care were based on findings from the qualitative study. The 35 NUTCOMP questions made up the last section of the questionnaire. Given that the NUTCOMP section was lengthy, it was thought best to be at the end to reduce respondent fatigue while completing the rest of the survey. At the completion of the survey, participants were invited to provide their email address if they wished to hear about the findings of the study, and were provided the opportunity to express their views on this research topic.

The final version of the survey was piloted with five local physiotherapists for face validity before inviting participants to complete the questionnaire online. Participants reported taking an average of 10 minutes to complete the pilot survey, and suggested that it might take longer to complete the survey via smartphone. Following this feedback, the survey introduction was edited to recommend completing the questionnaire via computer rather than a mobile phone. Other changes made due to the feedback received were expanded answer options for the diet score.

The link to the online survey generated from REDCap is https://is.gd/physionutrition and a shorter link was created using The University of Melbourne URL go.unimelb.edu.au/zsc6 for research promotion and recruitment.

3.1.2.5 Survey data analysis

Surveys included for analysis were from physiotherapists who had answered yes to the screening question, that is they currently had a patient load, and who had completed any survey questions beyond the demographic section. Particularly for Diet score and NUTCOMP score, participants had to complete all the questions relating to the score to be included for analysis; however, for other individual questions, the data was included as available. Some questions allowed multiple responses, whereas for others, only a single response was accepted (Table 3.1).

Table 3.1 Example of questions with multiple and single answers from the survey

Section	Questions in the survey	Multiple responses allowed
Practice	C1. Which of the following do you do with your patients? (Tick all that apply)	□ I ask my clients if they eat 2 serves of fruits and 5 serves of vegetables per day □ I urge and encourage my clients who eat poorly, to increase the intake of healthy foods □ I wait for the clients to bring up the topic before I mention healthy eating □ I follow-up with my client's attempt towards healthy eating □ I provide self-help materials regarding healthy eating □ I refer clients to a dietitian for specific dietary advice □ I refer clients to a dietitian for general healthy eating advice □ None of the above
	C4. We asked a few physiotherapists about elements of basic healthy eating' advice, and their responses are listed below. Which of these, do YOU think	□ Eat 2 serves of fruits and 5 serves of vegetables □ Eat fruits and veggies of different colours and types □ Eat more whole grain food □ Eat lean meat and unprocessed meat □ Eat more legumes and nuts □ Eat plant-based food

	should be part of 'Basic healthy eating advice'? (Tick all that apply)	□ Use low-fat dairy products □ Minimize processed food □ Eat whole food □ Minimize sugar intake □ Minimize fatty food & saturated fat intake □ Minimize the portion size of each meal □ Drink water □ Eat regular meals □ Use olive oil in preference to other oil types □ Minimize alcohol intake □ None of the above
Barriers & Facilitators	D1. Which of these is a barrier to YOU in providing nutrition care to patients? (Tick all that apply)	□ Lack of undergraduate education/ training □ Patient perception that it is not within the scope of physiotherapy □ Lack of time (assuming you are motivated to provide basic dietary advice) □ Lack of patient compliance □ Lack of resources and materials □ Intrusion into the patient's privacy □ Lack of interest in addressing nutrition □ Perceived lack of clarity of the scope of practice/overlap with other health professionals in nutrition care □ Personal discomfort addressing dietary issues □ None of the above
	D2. Which of these would be a facilitator for YOU in providing nutrition care to patients? (Tick all that apply)	□ Undergraduate education/training in providing nutrition care □ Professional development in providing nutrition care after completion of physiotherapy degree □ Resources for patients (both printed and online) □ Encouragement or statement from the Australian Physiotherapy Association (APA) that nutrition care is within the scope of practice □ Encouragement from Practice Manager or Head of Department to include nutrition care in daily practice □ Change in practice policy to enable consultations including nutrition care □ None of the above
Section	**Questions in the survey**	**Single response allowed**
Practice	C2. How often do you encourage healthy eating with your patients?	□ All the time (100% of the time) □ Most times (75% of the time) □ Sometimes (50% of the time) □ Rarely (25% of the time) □ Never (0% of the time)
	C3. During a consultation with a patient who is obese /overweight, which of the following would you prefer to do? (Tick only one)	□ Discuss weight loss goals □ Discuss eating healthy foods which could indirectly result in weight loss □ None of the above

Statistical Analysis

Demographics

A Chi-squared test was performed to see if the demographics such as gender, age, and geographical location of the participants in the study sample differed from Australian physiotherapists registered with AHPRA in March 2018 (Section 3.1.2.3). Numbers and percentages were reported.

Views

Section B of the survey asked four questions to determine participants' view on giving nutrition care (see Table 3.0 above). Responses for the 'Views' questions reflected agreement with the provided statements using a 5-point scale; completely disagree, somewhat disagree, neither agree nor disagree, somewhat agree, and completely agree. For the analysis, these responses were grouped into three categories whereby *completely disagree* and *somewhat disagree* were combined as '*disagree'* and *somewhat agree* and *completely agree* as '*agree*' and the mid-range remain as '*neither agree nor disagree*'. Numbers and percentages were reported.

Practices of nutrition care

Practices around nutrition care originally comprised four questions (see Section C in Table 3.0). Two questions from the 'Practice' section had multiple responses allowed (C1 & C4 in Table 3.1) and two questions allowed only a single response (C2 & C4 in Table 3.1). In addition, two questions from NUTCOMP were analysed individually and ultimaltely included under 'Practices of nutrition care' in the results section. All responses for the six questions were reported as numbers and percentages.

Responses for question C1 were further categorized according to the type of nutrition care whether it was 'verbal advice' or 'providing referral'. This categorization was used for comparison with the qualitative interview data in the discussion. Responses for Question C2 (Table 3.1) included an estimate of how often nutrition care (encouraging healthy eating) was provided, ranging from 0-100% in five categories (Table 3.1). For the analysis of the responses to Question C2, the frequency of nutrition care provision was considered as a continuous variable, with the same frequency attributed to everyone in the category. To see whether the responses for this question (continuous variable) had any association with nutrition training (categorical variable) or years of experience (ordinal variable), a two-sample t-test, and a one-way ANOVA were performed respectively.

Australian Guide to Healthy Eating (AGHE)

Questions related to AGHE were under 'Practice' (diet score, section C in Table 3.0), and 'NUTCOMP' (2 questions) sections in the questionnaire. Data responding to these questions were presented under the AGHE-section in the results. The responses for the two questions from NUTCOMP were reported as numbers and percentages. Values 1-5 were allocated for each responses, *not confident at all – extremely confident* (as detailed in Table 3.3). A two-sample t-test was performed to see whether the responses (continuous variables) for the two questions (from NUTCOMP) had any association with nutrition training (categorical variable). Details of diet score analysis are described in the following section.

Diet score

The diet score was calculated by summing scores all the ten questions in Section C in Table 3.0; which assessed adherence to the dietary guidelines. Responses for each question were scored as detailed in Table 3.2 to reflect the original scoring from the summary of ADG (81):

Table 3.2 Scores allocated for the responses for diet score

Score	Answer options provided
1	Yes, and I've done so for less than 6 months / Yes, and I've done so for longer than 6 months
0	No / No, but I'm aware I should / No, but I try to

An overall score was then produced by summing the total scores (possible score ranged from 0-10). The maximum score of 10 reflected a participant following all guidelines, while a 0 indicated following no guidelines. A person with a diet score of 8-10 was considered as a 'healthy eater' (81) reflected healthy eating habits.

The percentage of respondents who were healthy eaters was reported separately for males and females. A two-sample t-test was performed to see whether there was any association between the diet score (continuous variable) and gender (categorical variable). The association between diet score and the participants' response on a scale of 1-5 regarding whether they should be a role model for their clients (continuous variable) was investigated using Pearson's r.

NUTCOMP score

Responses to NUTCOMP questions in Section E, Table 3.0 were either related to the degree of confidence or agreement with a statement on a scale of 1-5. Competence scores for **NUTCOMP** were calculated for those completing the 35 questions by scoring the responses as detailed in Table 3.3.

Table 3.3 Scores allocated for the responses for NUTCOMP

Responses in the Likert scale for confidence	Responses in the Likert scale for an agreement of a statement	Value scored for the response
Not very confident at all	*Completely disagree*	1
Not very confident	*Somewhat disagree*	2
Somewhat confident	*Neither agree nor disagree*	3
Very confident	*Somewhat agree*	4
Extremely confident	*Completely agree*	5

The 5-point Likert scale results for confidence in nutrition care were collapsed down to two; *Confident* (somewhat, very or extremely confident), and *Not Confident* (not very confident at all or not very confident) for reporting of results. Similarly, the 5-point Likert scale results for agreement with statements were collapsed down to three, *Agree* (somewhat or completely agree), *Neither agree nor disagree*, and *Disagree* (somewhat or completely disagree).

For participants who had answered all the questions, response scores were summed within the four constructs of Knowledge, Skills, Communication, and Attitudes with maximum

possible scores 35, 55, 45, and 40, respectively. An overall, NUTCOMP score was then calculated by summing scores for all four constructs (score range 35-175). These scores were converted to percentages for comparison between the four constructs. The association between constructs (continuous variables) and other variables such as training (categorical variable), experience (continuous variable), nutrition care frequency (continuous variable), and diet score (continuous variable) were calculated using Pearson's r.

Barriers and facilitators

Numbers and percentages were reported for counts/ responses under barriers and facilitators, which comprised the three questions of Section D of the survey, shown in Table 3.0.

All survey data analysis was conducted using Stata/IC 15.0 (Stata Corporation, College Station, Texas, USA). Statistical significance was considered when P≤0.05. The correlation results were described based on the guidance by Harries et al. (82).

0-0.2 = a very low correlation
0.2-0.4 = a low correlation
0.4-0.6 = a reasonable correlation
0.6-0.8 = a high correlation
0.8-1.0 = a very high correlation

3.2 Conclusion

Mixed-methods was employed in this study with the first phase exploring Victorian physiotherapists' practices of nutrition care and their perceptions of barriers and enablers to providing this care, using semi-structured interviews. The data from the first phase were used to inform and explore further with the second phase of the study using a national online survey targeting a larger number of physiotherapists, to answer all three research questions. The survey questions also included investigation of physiotherapists' confidence to provide nutrition care using a validated questionnaire and their personal dietary behaviours.

4.0 Qualitative Study Results

Results are presented in four sections including results from the different recruitment strategies, demographic characteristics of the participants, and the findings from two types of interview data analysis; thematic analysis and content analysis.

4.1 Recruitment results

Twenty participants were recruited for this study. The most effective recruitment strategy was through advertising in the Australian Physiotherapy Association (APA) monthly online newsletter from which 65% (n=13) of the participants were recruited. A further 10% (n=2) of participants were recruited through advertising delivered to the Victorian Primary Care Practice-Based Research Network (VicReN). Professional networks were used to purposively recruit the remaining five participants to ensure a diverse sample of practicing physiotherapists (27). When data saturation was reached, recruitment was stopped at twenty participants. Four more participants who expressed interest to participate in the interviews were not included once data saturation was reached, instead they were invited to pilot survey questions developed for the second part of the study. Two physiotherapists who contacted the research team to participate in the interviews could not be included as they were no longer practicing as physiotherapists.

4.2 Characteristics of participants

Participant characteristics are presented in Table 4.0. All physiotherapists were currently registered and practicing in various healthcare settings in Victoria including private (45%), rehabilitation (20%), and community health (10%) settings, teaching universities (10%) and hospitals (10%) and one participant working in a special school. More than half of the participants were female (60%), and the majority of the participants (85%) were in the 20-30 year age group. Participants were well spread between working in urban (35%), rural (40%), and regional areas (25%). The duration of clinical work experience ranged from 1 month to 40 years. Four participants had pursued a formal qualification in nutrition, and another four participants reported nutrition training due to personal interests and not related to their professional role. Seventy percent of the participants reported that they did not remember receiving any nutrition training during their physiotherapy degree.

Table 4.0 Demographic characteristics of physiotherapists participating in the interviews

Characteristic	Number of participants	
	n	%
Gender		
Male	8	40
Female	12	60
Years in clinical practice		
<10 years	10	50
10-20 years	7	35
>20 years	3	15
Employment location		
Rural	8	40
Urban	7	35
Regional	5	25
Healthcare settings		
Private	9	45
Rehabilitation	4	20
Community health	2	10
Hospitals	2	10
Teaching university & mixed private	2	10
Special school	1	5
Age		
20-29 years	6	30
30-39 years	11	55
50-59 years	1	5
60-69 years	2	10
Postgraduate/professional training in nutrition		
Yes		20
Degree	*1*	*5*
Advanced Diploma	*1*	*5*
Certificate	*1*	*5*
Webinar	*1*	*5*
No	16	80
Nutrition included in undergraduate education		
No	14	70
Uncertain	6	30

4.3 Thematic analysis results

Three overall main themes, supported by multiple subthemes, were identified from the interview data analysis via thematic analysis (Figure 5):

Theme 1: Physiotherapists' motivation for involvement in nutrition care
Theme 2: Complexity around delivering nutrition care
Theme 3: Professional barriers to engaging in nutrition care

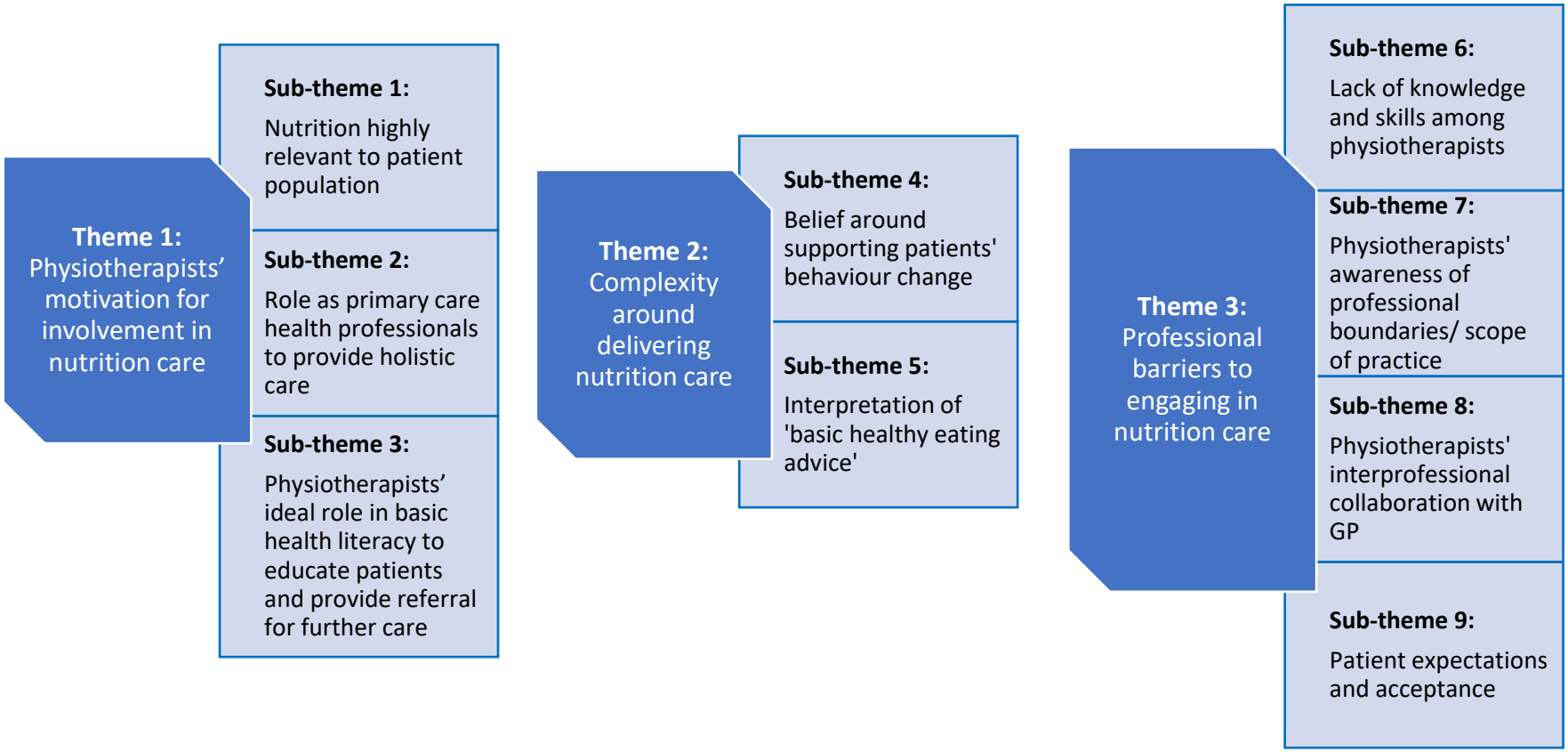


Figure 5: Themes and supporting sub-themes (codes) identified from the interview data via thematic analysis

4.3.1 Theme 1: Physiotherapists' motivation for involvement in nutrition care

A strong theme emerged from the data where nearly all participants expressed a motivation for involvement in nutrition care. This motivation was related to the perceived relevance of nutrition care to their patient population (Subtheme 1 – *Nutrition highly relevant to the patient population*) and their perceived holistic primary care role (Subtheme 2 – *Role as primary care health professionals to provide holistic care*). Participants' ideal role in nutrition care (Subtheme 3 – *Physiotherapists' ideal role in basic health literacy to educate patients and provide a referral for further care*) also emerged from the data.

Sub-theme 1: Nutrition highly relevant to the patient population

This was a powerful theme in the data relating to the participants' perception of the significance in addressing their patient's pathological conditions with nutrition care. Almost all participants felt that nutrition care was highly relevant to their patient population.

> *"[For my patients, nutrition is] extremely important. A number of patients that I see are overweight or obese and particularly ones like in chronic degenerative conditions, nutrition is extremely important for them. For example conditions like tendinopathy, good nutrition [intake] can relate to the better [health] outcome. So, I think it's [nutrition] becoming more relevant for physiotherapists to understand and for their patients to understand the importance of [incorporating] it."*
>
> *Participant 11 (6 years of experience, Private Practice)*

> *"I think probably [nutrition is] 95% of the importance [for my patients]. If someone's got arthritis or [is] overweight or anything, nutrition definitely should be discussed. I do believe nutritional information is very important for many of our physiotherapy patients and if we can spread a positive food message to help assist our patients, I think that is very valuable."*
>
> *Participant 1 (8 years of experience, Private Practice)*

Most participants identified the role of nutrition in addressing specific pathologic conditions among their patients. Frequently, the participants cited energy balance in the context of weight loss when nutrition was discussed with patients in a therapeutic consultation. Typically, they integrated weight loss and energy intake when they discussed nutrition with their patients.

> *"[I see nutrition as], extremely important, especially [in] patients with arthritic pain or musculoskeletal pain related to their weight. I'd guess more than 50 percent of my patients are obese or morbidly obese. And for example, their non-specific low back pain is largely contributed by their weight, and it gets worse because they don't exercise as they're so big. Perhaps dietary advice to lose a bit of weight to enable them to exercise better would help instead of us just referring them to hydrotherapy.*
>
> *Even with recovery from injury, nutrition is very important because say an athlete becomes injured, and they can't perform at the level that they were performing at, but [if] they continue to eat the amount that they were eating, they will be rapidly gaining weight."*
>
> *Participant 15 (5 years of experience, Private Practice)*

Participants involved in women's and urogenital health particularly acknowledged the impact of nutrition in addressing their patients' pathologic conditions.

> *"So, in a women's health setting, nutrition has a lot of impact on the urinary tract system or the bowel system or the anorectal system. So, [nutrition care] has a role in that aspect in terms of physios need to be giving the correct advice and to be able to assess what patients are drinking and eating and how that is having an effect on their gut maturity of the bladder. I see the results, as well. If someone got urgency [advising them to avoid or] take out caffeine for six weeks, and they come back and say no urgency anymore, it's a pretty big impact."*
>
> *Participant 10 (5 years of experience, Private Practice)*

> *"[I see nutrition as] highly relevant for the work that I do in urogenital health because a lot of people see [the problem] can be alleviated when [nutritional input is provided]. We are talking about bladder and bowel function, like giving them into dietary information."*
>
> *Participant 9 (13 years of experience, Rehabilitation)*

Some participants reported a facilitator for discussions about nutrition, was when the topic arose as part of a physiotherapy treatment plan.

> *"I think you need to take up the opportunity when patients are discussing the problem with you, [physiotherapist] need to direct that this is another way [nutritional input] of having to target their problem."*
>
> *Participant 8 (38 years of experience, Private Practice)*

> *"[Nutrition care is relevant to my patients] there's a lot of opportunity for adding value to what we do [in physiotherapy]. If we get you [patients] to do some manual therapy, provide some exercise, [at the same time] we'll give some other advice about managing inflammation and how to best support healing or manage chronic illnesses with a nutritional perspective as well."*
>
> *Participant 18 (11 years of experience, Private Practice)*

Some participants saw nutrition care as integral to their primary role, and one participant particularly argued that time could be prioritised to provide this care.

> *"I think it's [nutrition care], an integral part of the health care profession in whatever aspect we are providing [in physiotherapy]."*
>
> *Participant 11 (6 years of experience, Private Practice)*

> *"So, [the relevance of nutrition care to patients in physiotherapy] I think the more that we capture every patient to see how important it is to eat well and to eat appropriately, I think it [nutrition care] helps every aspect of people's healthcare. I think you need to treat the person as a whole and if time is an issue, sometimes if it's the highest or the greatest priority of someone in your session, then that's what or where the time needs to be spent, maybe not on my own professional goals."*
>
> *Participant 12 (9 years of experience, Rehabilitation)*

Sub-theme 2: Role as primary care health professionals to provide holistic care

The participants generally perceived their role as primary care health professionals; capable of relating nutrition to the overall health and wellness of their patients.

> *"We have a huge role to play [in nutrition care] as we are the first port of call, often the first professional they [patients] would see, who has the authority to say you really need to lose weight for your condition."*
>
> *Participant 3 (40 years of experience, Special School)*

This notion included their role in referring their patients to professionals in diet and nutrition.

> *"I think we are well placed as a profession to be able to identify people who have a need and potential referral on to the best-skilled person, as a primary care provider."*
>
> *Participant 14 (17 years of experience, Private Practice)*

> *"We have an important role to play mostly with flagging when a referral is needed."*
>
> *Participant 10 (5 years of experience, Private Practice)*

Some participants working rurally acknowledged the need to deliver nutrition care given that a dietitian service is limited or non-accessible for all patients.

> *"In a general sense, I see that physio is a good opportunity [to play role in nutrition care]. I think we need to be able to provide the referrals and be confident to have those conversations, and being in a rural practice, sometimes it is especially hard for some demographics to access healthcare …"*
>
> *Participant 10 (5 years of experience, Private Practice)*

> *"I think, particularly often in rural health, we 'transdisciplinary' treat people [by providing nutrition care]. Like not everybody [patient] could go and see everybody [health professional such as specialist] or that patient can come into the centre only once. So, you can't get them to see everybody, way too much for one person [not everyone gets to see a dietitian]"*
>
> *Participant 12 (9 years of experience, Rehabilitation)*

> *"I worked in regional areas where there would be a dietitian as well, so a lot of people that come to me would not ask for specific dietary advice because there was an option of seeing a dietitian. But I see if I worked in a remote area where there is no dietitian at all then it would be a different story, then people don't have that person to go to and they would ask you more questions [relating to nutrition]. The dietitian that works with me, she's coming with a 100km radius but what if people can't come to her [not everyone gets to see a dietitian]"*
>
> *Participant 6 (1 month of experience, Community Health)*

Sub-theme 3: Physiotherapists' ideal role in basic health literacy to educate patients and provide a referral for further care

Most of the participants in this study described their ideal role in nutrition care as promoting general healthy eating in the broad sense and recognized the need for a referral to a dietitian for specific interventions.

> *"I think the physiotherapists' role is perhaps very broadly two-fold. One, they should be an advocate for; I think good or a healthy balanced nutritional diet. I think the second probably is that in specific cases where patients require severe intervention and advice about their nutrition, request or be an advocate [to provide referral] such as a dietitian; in implementing strategies for these patients."*
>
> *Participant 11 (6 years of experience, Private Practice)*

> *"I think that there probably are some basic things that we could offer information on but I would refer someone to the best-skilled person [for specific dietary intervention], so I would refer on to a dietitian. That's what I typically do; I would defer to them [dietitian] outside of basic things [basic nutritional advice]."*
>
> *Participant 14 (17 years of experience, Private Practice)*

> *"Ideally I reckon it [the ideal role of physiotherapist in nutrition care] is similar to what we're always doing except more in depth. So, like physios maybe bring up that, it [nutrition is an area to look into] is an issue and then giving simple advice about what they should and shouldn't be [eating for healthy food consumption] leaning towards and then pass on to a more professional in the area [referral to dietitian]."*
>
> *Participant 19 (9 years of experience, Community Health)*

Generally, as mentioned earlier (Sub-theme 1), participants often related nutrition to weight management as they viewed weight as highly relevant to the physical issues they treat. Among all the physiotherapists interviewed, only two (Participants 15 and 11) clearly described health professionals' role in nutrition care as being able to provide dietary advice by referring to the national dietary guidelines (example of quote from Participant 11 is in Sub-theme 5).

> *"I think it's a very basic level just everyday advice for the non-complicated overweight patients, not giving advice on diabetes management or anything like that but just basic healthy eating for weight loss or healthy lifestyle maintenance advice. And I think that's often missed. As a physio, I know that we are able to just reiterate the Australian Dietary Guidelines to patients. And I do have a few handouts that I will give to patients and say you know this is the Australian dietary guidelines, this is what you should be eating, if you have any more questions or if you're having trouble then maybe ask your doctor for a referral to a dietician or consult a private nutritionist or a dietician."*
>
> *Participant 15 (5 years of experience, Private Practice)*

Almost half of the participants interviewed acknowledged that it is important to understand basic nutritional principles and guidelines in order to advocate healthy eating to their patients.

"I think that [basic nutrition] should be part of the undergraduate degree. Yeah, definitely good basic nutrition advice should be for the health professional. We're not prescribing a diet or specialty dietary advice but just encouraging healthy eating."

Participant 15 (5 years of experience, Private Practice)

One participant commented that the healthy eating advice conveyed to the patients should be simple and achievable for patients to adopt in their daily life, such as general advice about increasing fruit and vegetable intake and reducing processed food intake.

"[Two simple reliable messages for patients to focus on] the two key messages; eat more fruit and vegetables- message number 1, and message number 2- eat less refined food. I mean that sounds very basic, like anything more complicated [dietary advice] people are not necessarily ready [able to follow] when messages are more complex."

Participant 16 (39 years of experience, Hospital)

Knowing the basics helps participants guide their patients with evidence-based nutrition recommendations, given that the public (patients) are exposed to information on nutrition in media and social media which is not always true or evidence-based.

"I think that being a health professional I want to add my voice to the sound messages, [nutrition care] is increasingly important to me when I see such rubbish in the mass media or product marketing for food for items that purport to be food but really have poor nutritional status and are [meant] about making profit."

Participant 16 (39 years of experience, Hospital)

"…we should have an understanding of that [basic nutrition knowledge], and then give them [patients] general guidance about what they should be eating . I think a majority of our [physiotherapists] role, as in my role, there is so much information out there on the internet about food. I think that they [patients] expect a certain degree of ability to breakdown myth; 'so people are like following this style or that style of diet, is that doing any good for me?"

Participant 17 (2 years of experience, Private Practice)

4.3.2 Theme 2: Complexity around delivering nutrition care

Some physiotherapists acknowledged the complexity within nutrition care provision. This complexity was related to their belief that supporting behaviour change would be valuable in nutrition care (Sub-theme 4 - *Belief around supporting patients' behaviour change*) rather than knowledge transfer to their patients. Other complexity includes various interpretations of 'basic healthy eating' advice by the physiotherapists (Sub-theme 5 – *Interpretation of 'basic healthy eating' advice*) in this study.

Sub-theme 4: Belief around supporting patients' behaviour change

Some physiotherapists perceived that strategies on healthy behaviour change would be beneficial instead of focussing on educating patients with nutritional information in terms of improving patient's dietary behaviour. In other words, the physiotherapists often felt that health behaviour change strategy was more relevant for their patients than knowledge about nutrition or diet.

> *"I don't think it's a knowledge issue anymore. I think that the generation we live in [has] access to technology and social media, I think people know what's good and bad. Everyone knows some sort of [nutritional knowledge], even in regional towns everyone has exposure to fresh food, healthy food. I think the behaviour change model is much more important than the knowledge-based model, it's an issue of how they can basically set their habits or how they can set it out as part of their routine, is more like developing mindsets and have a strategy more than actual knowledge of nutrition."*
>
> *Participant* 17 *(2 years of experience, Private Practice)*

> *"The whole thing becomes a behaviour management problem as much as a physical problem."*
>
> *Participant* 3 *(40 years of experience, Special School)*

> *"In terms of being a physio, working in a team where we're looking at self-management and behaviour change and asking people to begin to nominate goals for change. Eating and drinking [healthy eating]; habits that are part of healthy behaviours in pain management."*
>
> *Participant* 16 *(39 years of experience, Hospital)*

One physiotherapist even argued that there is no difference in knowledge regarding nutrition between physiotherapists and patients.

> *"I mean in terms of my knowledge [on nutrition and] the patients' knowledge is the same. They know what they should be eating, but they just don't do it."*
>
> *Participant* 2 *(10 years of experience, Teaching University & Private Practice)*

Sub-theme 5: Interpretation of 'basic healthy eating' advice

The interpretation of 'basic healthy eating' varied between all twenty participants. Some included advice on consuming healthy foods, some preferred focusing on behavioural aspects of eating instead of food choices, and a few based their advice on national eating guidelines. All but three participants included advice relating to the intake of fruits and vegetables.

Example of quotes where physiotherapists gave basic healthy eating advice based on healthy foods:

> *"Eat food just which is real food, mostly veggies, meat, fish, chicken, egg, fresh fruit in its whole form, good quality whole grain, nuts and seeds, natural dairy and olive oil."*
>
> *Participant 1 (8 years of experience, Private Practice)*

Examples of basic healthy eating advice based on including behavioural aspects (e.g., focussing on mindsets/portion sizes of food/ moderation food intake):

> *"I think basic healthy eating advice would encompass … then the mindsets stuff that I already spoke to you about, I think [mindset is] quite a bigger component to it to my knowledge base."*
>
> *Participant 17 (2 years of experience, Private Practice)*

> *"I probably just advocate [eat] everything in moderation."*
>
> *Participant 10 (5 years of experience, Private Practice)*

Example of basic healthy eating advice based on national dietary guidelines:

> *"I probably refer patients to the guide [Australian Guide to Healthy Eating]. But with a lot of the overweight patients, I'm often surprised to find how much fatty or high sugary food they are eating. So, I think, I often ask about their eating habits and in regard to the advice, in referring to the guide and talk to them about the proportion of what they are eating and how out of proportion it is with the guidelines."*
>
> *Participant 11 (6 years of experience, Private Practice)*

4.3.3 Theme 3: Professional barriers to engaging in nutrition care

Participants reported various reasons why they hesitated to actively engage in nutrition care. The largest barrier was a lack of formal nutritional exposure in physiotherapy education and training (Sub-theme 6 – *Lack of knowledge & skills among physiotherapists*). Participants also acknowledged professional boundaries and the ambiguity within the physiotherapy scope of practice to provide nutrition care (Sub-theme 7 – *Physiotherapists' awareness of professional boundaries/ scope of practice*). Some of them pointed out that their interprofessional collaborations with GPs, could enhance nutrition care provision (Sub-theme 8 – *Physiotherapists' interprofessional collaboration with GP*). Finally, participants also elaborated on their beliefs regarding patient acceptance and expectation of nutrition care in physiotherapy settings (Sub-theme 9 – *Patient expectations and acceptance*) constituting a barrier.

Sub-theme 6: Lack of knowledge & skills among physiotherapists

This was a strong theme in the data, with almost all interviewees acknowledging the absence of training or education in nutrition during their physiotherapy degree. Although most physiotherapists in this study accepted the significance of nutrition for their patients, the lack of basic nutrition education and training in their undergraduate years was considered the biggest barrier to providing nutrition care in their practice.

> *"So as physiotherapists we don't get education about nutrition, so it will be very hard for a physiotherapist who doesn't have a keen interest in [nutrition care] going out and doing their research in nutrition to actually be confident to share advice or information on nutrition because they don't have that in their studies."*
>
> *Participant 1 (8 years of experience, Private Practice)*

> *"I think it [nutrition] is one of the major things that contribute to people's health, but we have not been taught of it much at all at the university."*
>
> *Participant 20 (10 years of experience, Hospital)*

Some physiotherapists also discussed examples of nutrition care being provided to patients based on personal or anecdotal beliefs.

> *"I've observed many physiotherapists giving advice that I wouldn't say is evidence-based and it's unprofessional because they are based on personal [opinion]. I feel that's an issue in the profession."*
>
> *Participant 5 (5 years of experience, Teaching University & Private Practice)*

> *"I feel like, I am providing more opinion based than evidence-based support [regarding nutrition]. So, I often qualify the conversations with, 'this is this is my personal opinion rather than a qualified and professional thing.' So, that way, I'm avoiding giving them advice that might be conflicting with whatever other health professionals have told them more or might conflict with what the evidence or best practice is."*
>
> *Participant* 18 (16 years of experience, Private Practice)

Some physiotherapists interviewed had taken the initiative to attain an extra qualification in nutrition to be able to expand their scope of practice given that nutrition was not included in their tertiary education. In general, these physiotherapists showed greater confidence in both acknowledging the

importance of nutrition care in their patient population and incorporating nutrition care in their daily clinical practice. They also argued that nutrition care is not within their scope of practice as it was not part of their physiotherapy training.

> *"I don't think it [discussing nutrition] is in the scope of practice just because we are not adequately educated to be discussing nutrition. But I think because I did the one-year-long certificate, [it] gave me some additional knowledge so, after that, I've been very confident within my scope of practice to give generalized nutritional advice and I think it's really important, too; especially working in regional health."*
>
> *Participant 17 (2 years of experience, Private Practice)*

> *"No, I do not think that discussing nutrition is within my professional scope of practice. That's why I enrolled in the nutrition course."*
>
> *Participant 15 (5 years of experience, Private Practice)*

Some participants acknowledged that nutrition care is within their scope of practice as they have obtained extra training.

> *"Yes [discussing nutrition is within my score of practice], because I have done extra training incontinence in women's health, a lot of education on diet and nutrition comes into that, so I feel like yes I can give advice."*
>
> *Participant 10 (5 years of experience, Private Practice)*

> *"[I have done Advanced Diploma in Nutritional Medicine]. Yes [discussing nutrition is within my scope of practice]. As physiotherapists, we probably need to be more educated so that we are able to share appropriate and safe nutritional information with our patients."*
>
> *Participant 1 (8 years of experience, Private Practice)*

Two participants who had completed their physiotherapy training around four decades apart, both noted that they did not learn much about nutrition during their tertiary education.

> *"I'm a recent graduate, to be very honest, in my degree, we didn't learn much about nutrition. You know looking at the holistic picture [of patients], there's a lot of emphasis on other factors like stress, anxiety & depression and all the psychological part of things that might be affecting their health but not much on diet. They [physiotherapy curicullum] included things relating to a job, to a husband-wife relationship or whatever, but diet is pretty important but not given a lot of emphasis."*
>
> *Participant 6 (1 month of experience, Community Health)*

> *"I'm fairly confident it wasn't [nutrition was not included in my physiotherapy degree]. Well, I think you know if there's some undergraduate exposure, it helps prime people for the fact that there may be a role for them [physiotherapist] to step in [to provide nutrition care in] a limited way."*
>
> *Participant 16 (39 years of experience, Hospital)*

Sub-theme 7: Physiotherapists' awareness of professional boundaries/ scope of practice

All physiotherapists interviewed were cognisant of their professional boundaries and cautious of staying within their professional scope of practice in delivering nutrition care. This was mentioned by almost all the interviewees.

> *"I think, it needs to be clear that we're not stepping on toes of nutritionists and dietitians. We'll have to make sure that we still have a good working relationship with the dietitian. We would be very confident in managing in your [patient] general dietary requirements but not tailoring it to any medical-based dietary problems, so the dietitians will still be the first point of call for that."*
>
> *Participant 17 (2 years of experience, Private Practice)*

> *"Not modifying their [patient] whole diet per se but [suggesting] changing just bit by bit by adding things [more vegetables] essentially that is how far I would go with my patients. Very comfortable [discussing nutrition] like I said in a very general sense [or general basic advice]. Again, it is not my place to go into detail."*
>
> *Participant 2 (10 years of experience, Teaching University & Private Practice)*

> *"Someone has like endocrine rheumatology-based or an intolerance-based [condition], eg; gluten or celiac or whatever, that is out of the scope of my knowledge. I don't think it's for me to give input in an area that is outside my field."*
>
> *Participant 14 (17 years of experience, Private Practice)*

The concern to be within the physiotherapy scope of practice has also prevented some physiotherapists from actively providing nutrition care in their clinical practice. Due to this ambiguity or fear of straying outside their professional boundaries, most physiotherapists perceived their ideal role in providing nutrition care as referring patients to a specialist in the field, as mentioned in Sub-theme 3.

> *"We advise sort of like losing weight but it's more like referring them to dietitian, I do recognize that diet is very important component of it [physiotherapy] but I actually never advise people what to eat because I just thought that it's not right as I haven't had a degree in that. I don't reckon physio should be giving diet related advice because I feel like it is outside scope of practice "*
>
> *Participant 6 (1 month of experience, Community Health)*

The narrative of some physiotherapists believing that including any dietary advice was outside their scope of practice and professional experience was closely related to lack of knowledge and training in this field as discussed in Sub-theme 6.

> *"I would say probably I'm not capable [to deliver nutrition care], because it's outside of my scope of practice, professionally. Dietary advice is not in the scope of physiotherapy practice because they are not trained in it [nutrition] and I'm not confident that the physiotherapy course could fit enough dietary advice [training] that could significantly change physiotherapists' dietary advice on the clinic."*
>
> *Participant 13 (1 year of experience, Private Practice)*

Most physiotherapists who considered nutrition care to be primarily promotion of general healthy eating believed that discussing nutrition is within their professional scope of practice.

> *"I think yeah giving general advice, so it's still within [scope of practice]."*
>
> *Participant 10 (5 years of experience, Private Practice)*

> *"I do believe that physiotherapists should be more involved in discussing nutrition with their patient and knowing when to refer on, you know when the line is to refer to someone with more expertise. I think it would be wonderful if physiotherapists can start to see the benefit of delivering nutrition advice. I think physiotherapists are aware that this potential should be part of their practice, I think they'll be quite happy to include in their consultation."*
>
> *Participant 9 (13 years of experience, Rehabilitation)*

> *"I think we are in the overall health-promoting role so yes, [it is within scope of practice], it should be part of our role."*
>
> *Participant 7 (14 years of experience, Rehabilitation)*

The structure of the health care system in which participants worked influenced their perceptions about their role and scope of practice. This was particularly relevant for physiotherapists who worked remotely, where access to dietitians was limited.

> *"I think it is [within scope of practice] and I think it should be. I think there's a lot more that we could do. I know our dietitian here is completely booked out and [patients] take a long time to get into. So, I think basic advice [for healthy eating] - we can be confident to give patients."*
>
> *Participant 20 (10 years of experience, Hospital)*

> *"Yes, it [discussing nutrition] is in the scope of practice, in the absence of an active dietitian."*
>
> *Participant 3 (40 years of experience, Special School)*

> *"I do think it is [within scope of practice]. I think sometimes we think that we are overstepping our clinical boundary; that's not our role and that it is in nutritionist role, which I completely agree they [dietitian] are the experts in it but when I think from the perspective where I am; which a deciding role [role as health professional] for Australia, it is hard enough for people to get to see a physio, let alone for them to get to go see a dietitian. So, I completely agree that they [dietitian] are the experts and when they are there and available, and you can get someone to them but if you can't, I think that incorporating [nutrition care] into physiotherapy is really important."*
>
> *Participant 4 (12 years of experience, Rehabilitation)*

Only two physiotherapists, clearly described their permissible role within their scope of practice to provide nutrition care based on the national dietary guidelines (an example is provided in Sub-theme 3; participant 15 and Sub-theme 5; participant 11). Some physiotherapists were uncertain as to whether delivering nutrition care was within their scope of practice.

" I would say no; I don't think [discussing nutrition] is in our scope of practice because we haven't had more depth inside, as much training as what is required. It's a bit of a slight grey line."

Participant 12 (9 years of experience, Rehabilitation)

"I'm not sure for the scope of physiotherapy whether [discussing nutrition] is in our scope of practice. I don't know whether physiotherapist as a profession we have nutrition guidelines on what we support, what we endorse and what informs our practice, because I think often we are influenced by non-regulated [anecdotal] advice."

Participant 5 (5 years of experience, Teaching University & Private Practice)

Sub-theme 8: Physiotherapists' interprofessional collaboration with GP

Participants perceived their referral relationship with GPs as an opportunity to enhance the credibility of their role in providing nutrition care to patients. Specifically, participants felt that if a GP in their referral to physiotherapy discussed with the patient that nutrition may be an expected component of their care, this would enhance patients' receptibility to engaging in nutrition weight management in physiotherapy management (related to Subtheme 9 – *Patient expectations and acceptance* below)

"We're the preferred referral pathway for GPs. [To enable physiotherapists to be actively involved in nutrition care] I think it needs to be better promoted amongst the community, general practice and doctors as well that we're capable of providing that information; management of someone's pain and nutrition. So, with the GP it would be the best place to make a call and if the GPs know that we are able to do that, perhaps then it would influence patients' decision."

Participant 17 (2 years of experience, Private Practice)

"[To facilitate nutrition care in physiotherapy] when the doctor is referring for chronic back pain or something, 'Go and talk to your physiotherapist, they'll talk to you about ways to manage this; it might include exercise, and it might include dietary lifestyle changes' and [GPs should] give that lead in…"

Participant 4 (12 years of experience, Rehabilitation)

Sub-theme 9: Patient expectations and acceptance

Most participants felt that their patients would not expect them to engage in a conversation or intervention related to nutrition, and this influenced their motivation to undertake a nutrition-related conversation in their management of patients. Conversely, some participants mentioned that patients would at least expect basic healthy eating guidance or being able to triage them to the dietitian.

"[Regarding nutrition] I think they [patient] probably expect us to, I think, advocate a healthy balanced diet [but] I think the in-depth nature of nutrition [dietary intervention] from a physiotherapist is perhaps something that they don't expect but probably they do expect us to advocate that they are eating, generally healthy foods."

Participant 11 (6 years of experience, Private Practice)

"[Regarding nutrition] I don't think they [patient] necessarily expect the advice to begin with, but as clinicians, if we provide education and a reason why you are giving nutrition and dietary advice, I think they can be very grateful to receive the information. I don't think in the first instance they expect it [nutrition care], but they appear to be quite pleased when they do receive the information and see how it fits into their musculoskeletal health as well."

Participant 9 (13 years of experience, Rehabilitation)

"[Patient expectation regarding nutrition is] not very much because traditionally we are not the professionals that give advice on diet. They would expect some degree of knowledge. At least my role is to ensure that patients are aware that diet needs to be a big part of their management; their chronic management. And therefore, if they are actually aware of this, hopefully it sets the scene for who [referral to dietitian] is the best person to talk about diet."

Participant 2 (10 years of experience, Teaching University & Private Practice)

Physiotherapists in this study described their patients being quite receptive and interested when they talk about food and nutrition, with the exception of Participant 4 who discussed a contrasting experience.

"Most patients perceive us as the evidence-based practitioners as they are very willing to follow the advice that we give, and they are very confident with our exercise prescriptions. I think if we added nutrition to our list of services I think they would perceive that we are very credible, interesting and I think that most patients would follow our advice quite well."

Participant 17 (2 years of experience, Private Practice)

"They [patients] usually are very receptive actually [when nutrition is discussed]."

Participant 10 (5 years of experience, Private Practice)

"General dietary advice, they [patients] probably take on board especially if it's related to one of the musculoskeletal issues dealt with."

Participant 19 (9 years of experience, Community Health)

"I find them interested [when nutrition is discussed]."

Participant 20 (10 years of experience, Hospital)

"I guess the harder thing is [bringing up nutrition] in patient setting or chronic disease management program, where you've got people with heart disease or any sort of chronic disease; and trying to bring up with them [about] their diet and they would [reply] you a very simplistic answer and really not talk about it that much."

Participant 4 (12 years of experience, Rehabilitation)

In other instances, some of the physiotherapists expressed that their patients tended to ask them lots of questions regarding food and nutrition, perhaps indicating that patients perceive physiotherapists as healthy role models or having relevant knowledge on nutrition such as supplements.

> *"I actually do get asked to say a bit [on nutrition] because I appear fit and healthy. 'What do you do to maintain your weight or what do you eat?' We [physiotherapists] might be biased towards healthier lifestyle and a little bit crazy when it comes to eating because we don't go to McDonald's for lunch or don't eat junk food every day."*
>
> *Participant 15 (5 years of experience, Private Practice)*

> *"I do receive a lot of questions from patients about best practice nutrition, 'should I be taking my glucosamine? Should I be taking fish oil? What do you think about low GI? What is it even for optimizing performance?"*
>
> *Participant 5 (5 years of experience, Teaching University & Private Practice)*

> *"Some people just ask about what I do [as guidance] or what general things might help them."*
>
> *Participant 20 (10 years of experience, Hospital)*

4.4 Content analysis results

Some results were suited to content analysis, and the coded qualitative data were quantified according to frequency and presented numerically. Physiotherapists' practices and views relating to nutrition care, as well as their awareness of the Australian Dietary Guidelines (ADG)/ Australian Guide to Healty Eating (AGHE) are presented in Table 4.1.

In this section, the details and features of the nutrition care delivered in the physiotherapy clinical setting are described first, followed by the physiotherapists' views on the ADG/AGHE. The final section describes the barriers and facilitators to nutrition care provision identified during the interviews.

4.4.1 Nutrition Care Practices Among Physiotherapists

Given that nutrition care is inclusive of referring patients to a dietitian, all participants in this study provided nutrition care at some point during their service. All participants but one (Participant 6) reported that they have previously discussed nutrition with their patients. Participant 6 never engaged in advising patients on nutrition, instead referred patients to a dietitian.

> *"No [I have never discussed nutrition with any of my patients]. I actually have just discussed that it may be a good idea to see a dietitian because weight loss is a bit more in for you [patient]. I never told them [patient] what to eat."*
>
> *Participant 6 (1 month of experience, Community Health)*

More than half of the participants agreed that they themselves would usually initiate nutrition discussion during their clinical practice. Physiotherapists with extra training in nutrition were confident to bring up the topic as a strategy to manage their patient's condition.

> *"I think most of the time, that will be me [initiating nutrition discussion]. However, once I've broken that barrier, so once I've sort of given the patient access that I do have the knowledge base of nutrition; that I'm able to give reasonable general advice in regards to that, I think that opens up the door for a lot further question so I would be the first to bring up the topic or raise the topic."*
>
> *Participant 17 (2 years of experience, Private Practice)*

The most common practice of nutrition care among the physiotherapists was to provide verbal healthy eating advice to their patients, followed by referring them to a dietitian. Six interviewees reported providing printed materials to their patients, and only one participant mentioned providing references and resources for further reading to the patients instead of directly advising them on nutrition. Collectively, fifteen participants had previously provided advice to increase the intake of fruits and vegetables, and fibre to their patients and half of the participants advised patients to reduce intake of sugar, processed food, energy, and bladder irritants. Close to half of them also reported incorporating advice on healthy eating behaviour, for example, mindful eating and portion sizes.

Similar to the thematic results, the common context of nutrition care was weight-related followed by other physiotherapy pathology specific contexts such as pain management, anti-inflammatory, chronic disease related, urogenital, aged care and women's health. Some participants mentioned that nutrition discussion also takes place with proactive patients, who are actively exercising and motivated to follow a healthy lifestyle. While some participants reported using referral tools published by professional bodies to provide their nutrition advice, half of them reported not using any tools.

Although eighteen participants regarded nutrition care to be highly relevant to their patient population, only twelve of them perceived that providing nutrition advice was within their scope of practice. Half of the participants stated that they were very comfortable to discuss nutrition with their patients. However, four of the participants perceived that nutrition care is not within the physiotherapy scope of practice due to a lack of knowledge and training. The reasons and barriers perceived by the physiotherapists in providing nutrition care will be discussed in the final section, 4.4.3.

Table 4.1 Nutrition Care Practices

Current nutrition care (NC) practice	**Participants**	
	n	**%***
Previously discussed nutrition with patients		
Yes	19	95
No	1	5
Nutrition discussion initiated by		
Physiotherapists	11	55
Patients	3	15
Experience of both physiotherapist & patient	3	15
No data	3	15
Type of nutrition care practice:		
Verbal advice	18	N/A
Provided printed materials	6	
Providing support with resources/ reference	1	
Referring to dietitian	16	
Common content of nutrition care provided (total, n >20)		
Increasing intake of fruit & vegetable, fibre	15	N/A
Reducing intake of sugar, processed food, energy intake, bladder irritants	10 8	
Advice on healthy eating behaviour	1	
Context of nutrition care (total, n >20)		
Weight-related	10	N/A
Pain management	4	
Chronic disease related	2	
Anti-inflammatory	2	
Older group	2	
Proactive patients	5	
Gut health/ Urogenital	2	
Women's health	2	
Children with disability	1	
Nutrition tools referred to		
Life! Programme	1	N/A
ADG / AGHE	3	
Similar guidelines to ADG/AGHE	2	
Patient pathology specific	2	
Not using any tools	10	
Expressed interest in AGHE	2	

Comfortable to discuss nutrition		
Very comfortable	10	50
Moderate/ fairly	7	35
Not	3	15
Perceived that NC is within the scope of practice		
Yes	12	60
No	4	20
Not sure because of lack of training	4	20
Perceived that nutrition is important to their patients		
Very	18	90
Moderate	2	10
Aware of ADG/AGHE		
Yes	18	N/A
Not clear	2	
Assumes moderately good	7	
Not confident	5	
Using ADG as a reference for the nutrition care	5	25
Physios with nutrition training not confident with ADG	4	N/A

** Percentages were stated only when total, n=20*

N/A Not applicable

4.4.2 Physiotherapists views on ADG/AGHE

Almost all participants stated that they were aware of the Australian Guide to Healthy Eating (AGHE), although some participants were referring to the 'food pyramid' rather than the AGHE.

> *"I'm mostly [familiar] with the old pyramid, which is probably similar. I think the pyramid is visually more memorable. I do think the pyramid was better if I never heard of it [AGHE] before. "*
>
> *Participant* 3 *(40 years of experience, Special School)*

Five of the participants were not confident with the content or information portrayed on the AGHE chart.

> *"I think in general, there's a lot that we don't know about what is the best diet, and I don't think that the current guidelines are probably, knowingly and definitely the best thing. I'm not overly confident with it, I think it is a form of dietary advice, whether it's the exact right one [I'm not sure] because it's too general. I think for someone struggling with diet, it is too general to follow and to have a good effect."*
>
> *Participant 13 (1 year of experience, Private Practice)*

Some participants commented that the visuals of AGHE lack information on the number of serves or recommended intake and specific information on the amount or limitations of discretionary food.

> *"…it [AGHE] doesn't really describe how many serves of what you should be having per day in a specific context."*
>
> *Participant 10 (5 years of experience, Private Practice)*

> *"I think that the poster is missing the minimal amount of junk food that you might have."*
>
> *Participant 11 (6 years of experience, Private Practice)*

Some participants commented that it might be beneficial to give the AGHE chart as a handout to patients.

> *"I would think certainly having it (AGHE) as a handout for patients. So, I think drawing patient's attention to it and relating it to them specifically [and] giving them as a handout will be very valuable."*
>
> *Participant 11 (6 years of experience, Private Practice)*

Participants with extra qualifications in nutrition were amongst those who criticized the AGHE.

> *"So, my concern with that guidelines picture (AGHE) is that 1/3 of a diet consisting of white pasta, rice, couscous. So, it's made of predominantly from white refined grain and carbohydrate, and so that's not real food. So, we are encouraging people to eat food like pasta and couscous; I don't think that's working."*
>
> *Participant 1 (8 years of experience, Private Practice)*

Two participants trained in nutrition commented that referring AGHE as eating guidance to patients is not beneficial.

> *"I don't think that giving people dietary guidelines or giving people a photo of the guidelines very helpful at all, to be honest really."*
>
> *Participant 17 (2 years of experience, Private Practice)*

However, some of the participants have reported using AGHE/ADG or similar materials as a reference to provide dietary advice. Two participants expressed interest in using the AGHE as a reference to provide dietary advice in the future.

4.4.3 Barriers and facilitators

The barriers and facilitators to providing nutrition care, identified in this study, have been summarized in Tables 4.2 and 4.3, respectively. The barriers perceived by the physiotherapists mostly focused on nutrition training and the scope of practice. A smaller number of participants also mentioned other barriers as listed in the table. The most commonly suggested facilitator, training, was closely related to the most highly ranked barrier to providing nutrition care.

Table 4.2 Barriers identified by physiotherapists to providing nutrition care

Barriers	Participants (n)
Lack of undergraduate education & training	17
The patient expectation of scope of practice	12
Lack of clarity on the scope of practice	10
Time	5
The perception that the patient would be offended	2
Identifying patient behavioural change level	2
Influence of social media instead of professional advice	1
No barriers	1

Almost all participants perceived a lack of undergraduate education and training as the most significant barrier to engaging in nutrition care in their practice, as discussed in the thematic analysis.

> *"I would say barriers [include] lack of education and formal training within, knowing exactly what to be advising…"*
>
> *Participant 10 (5 years of experience, Private Practice)*

More than half of the participants also felt that their patients might not expect nutrition advice to be within the physiotherapy scope of practice; therefore, patients would not expect nutrition advice from their physiotherapists.

> *"I think the professional barriers, the community's [patients] perspective of what they think our [physiotherapy] profession provides care for [and] the majority people would imagine that we just sort of take people with back pain and massaged people's legs rather than understanding the scope of practice that exists in other areas as well. So, narrow community view might be a bit of a barrier [to provide nutrition care]."*
>
> *Participant* 18 (16 years of experience, Private Practice)

Two physiotherapists mentioned that they feared that the patients might feel offended or consider the nutrition-related advice as inappropriate.

> *"It might sound a bit offensive to some people as well. Like, why are you commenting on my diet, when your role is to give me exercise program. So, how is that relevant to you?"*
>
> *Participant 6 (1 month of experience, Community Health)*

Half of the physiotherapists expressed a lack of clarity in their scope of practice as a barrier, again as stated in thematic analysis.

> *"I think the main barriers are understanding what's in our scope of practice, I think its understanding what's the advice is that we should be giving. I'm not sure of the scope of physiotherapy whether that in our scope of practice [we are able] to comment on [nutrition]…"*
>
> *Participant 5 (5 years of experience, Teaching University & Private Practice)*

Some participants flagged time as a barrier to incorporate nutrition care in their clinics.

> *"I think the time is often is one of the big barriers … most physiotherapy interventions are time-limited, and other assessments in education usually take up time."*
>
> *Participant 16 (39 years of experience, Hospital)*

Two physiotherapists reported that identifying patients' motivation levels to change as a barrier and coincidently both were physiotherapists with nutrition training.

> *"…identifying someone's level for change, and that I reckon would be one of our main barriers that physiotherapist would be assessing and working out someone's behavioural change level."*
>
> *Participant 17 (2 years of experience, Private Practice)*

One of the participants even expressed that patients might not follow their advice given that nutrition information is available on social media and telecommunication. It was assumed that patients are largely influenced by information on such media compared to verbal advice from health professionals.

> *"I think that's a barrier because people don't always trust the advice that they get [from physiotherapists] maybe they're more likely to listen to some of that on Facebook or somebody that they've seen on a TV show ..."*
>
> *Participant 18* (16 years of experience, Private Practice)

One participant with 40 years of experience in the field, confidently stated no barriers at all in delivering basic dietary advice.

> *"I don't know if there are barriers, are there? Most physiotherapists would keen to look after themselves quite well, that would be a big generalization, but you would hope that a lot of them have that enact knowledge anyway to do that first line of talking [to provide nutrition care]"*
>
> *Participant 3 (40 years of experience, Special School)*

Table 4.3 Facilitators to providing nutrition care suggested by physiotherapists

Facilitators suggested/ used by physiotherapists	Participants (n)
Extra training	16
Printed materials/ resources	6
Reliable evidence-based guidance/ reference /online resources	5
Interest in nutrition/awareness about nutrition for the benefit of patients	4
Screening question on eating habits	1

Most physiotherapists stressed the need for more training to be able to provide nutrition care.

> *"Training, definitely training. I think most physiotherapists would be happy to include [nutrition care] in their practice and could find a spot for it in their practice…"*
>
> *Participant 13 (1 year of experience, Private Practice)*

Some of them suggested more printed materials and evidence-based resources guide to be available to enhance the delivery of nutrition care in their clinics.

> *"I also think having handout [printed material] available would also be helpful."*
>
> *Participant 5 (5 years of experience, Teaching University & Private Practice)*

> *"I think that it [AGHE] is a valuable tool for physiotherapist to have [and] to give to patients."*
>
> *Participant 11 (6 years of experience, Private Practice)*

A few of them felt that despite training, personal interest and awareness of nutrition care, as well as its impact on improving their clinical outcome is also vital to facilitate nutrition care.

> *"…but interest in it [nutrition care] as well because we could upskill people and we can put more emphasis as an undergraduate level into nutritional stuff. But if people don't have interest in it, they are still not [going to] explore that. So, you need people who have an interest in it."*
>
> *Participant 14 (17 years of experience, Private Practice)*

One participant explained that incorporating screening questions on the patient's food intake, and this seems to facilitate nutrition discussion in the physiotherapy setting.

> *"[Nutrition discussion is initiated when] I ask a couple of screening questions about what people are eating and drinking normally [which is] part of my initial assessment…I tend to be just led by the questions."*
>
> *Participant 16 (39 years of experience, Hospital)*

4.5 Summary of findings

Three main themes emerged from the **thematic analysis**, supported by nine subthemes. The first theme pertained to the motivation of physiotherapists to engage in nutrition care, the second theme to the perceived complexity around nutrition care, and the third theme on professional barriers to engaging nutrition care in physiotherapy settings. The findings indicated that the Victorian physiotherapists who participated in the interviews were strongly motivated to provide nutrition care given the relevance of nutrition to their patients' condition, as presented in Theme 1. However, participants suggested the complexity of nutrition care (Theme 2) and a lack of training and knowledge (Theme 3) often stopped them from promoting healthy eating in their clinical settings.

While the thematic analysis was essential to identify the essence of participants' views regarding nutrition care in physiotherapy, the **content analysis** of the qualitative data was helpful to organize the perspectives of the participants concisely and to deploy and inform the survey tool for the quantitative study for further investigation.

5.0 Quantitative Study Results

Results from the online survey are presented in seven sections including the exclusion and inclusion of surveys, participants' characteristics, participants' views on given statements, practices of nutrition care, views on Australian Dietary Guidelines as well as participants' diet score and their competence to provide nutrition care, and finally barriers and enablers to provide nutrition care in physiotherapy.

5.1 Survey participants

A total of 405 participants opened the online survey; of these, only 344 provided sufficient data for analysis (Figure 5.1). Sixty-one surveys were excluded from all analyses as the responses only included demographic details, and no questions had been answered, or respondents were not practicing as physiotherapists. 266 physiotherapists completed all questions in the instrument, and 78 participants completed some questions which could be used in specific analyses. This resulted in a total of 344 surveys used for analyses; 308 surveys used for diet score calculation and 280 surveys used for NUTCOMP scores. Only surveys with complete responses for all questions in the diet score (10 questions) and NUTCOMP (35 questions) were included for analyses of these data, respectively. For other single questions in the survey, all available data were used in the analysis, and therefore the number of responses varies as indicated in individual results.

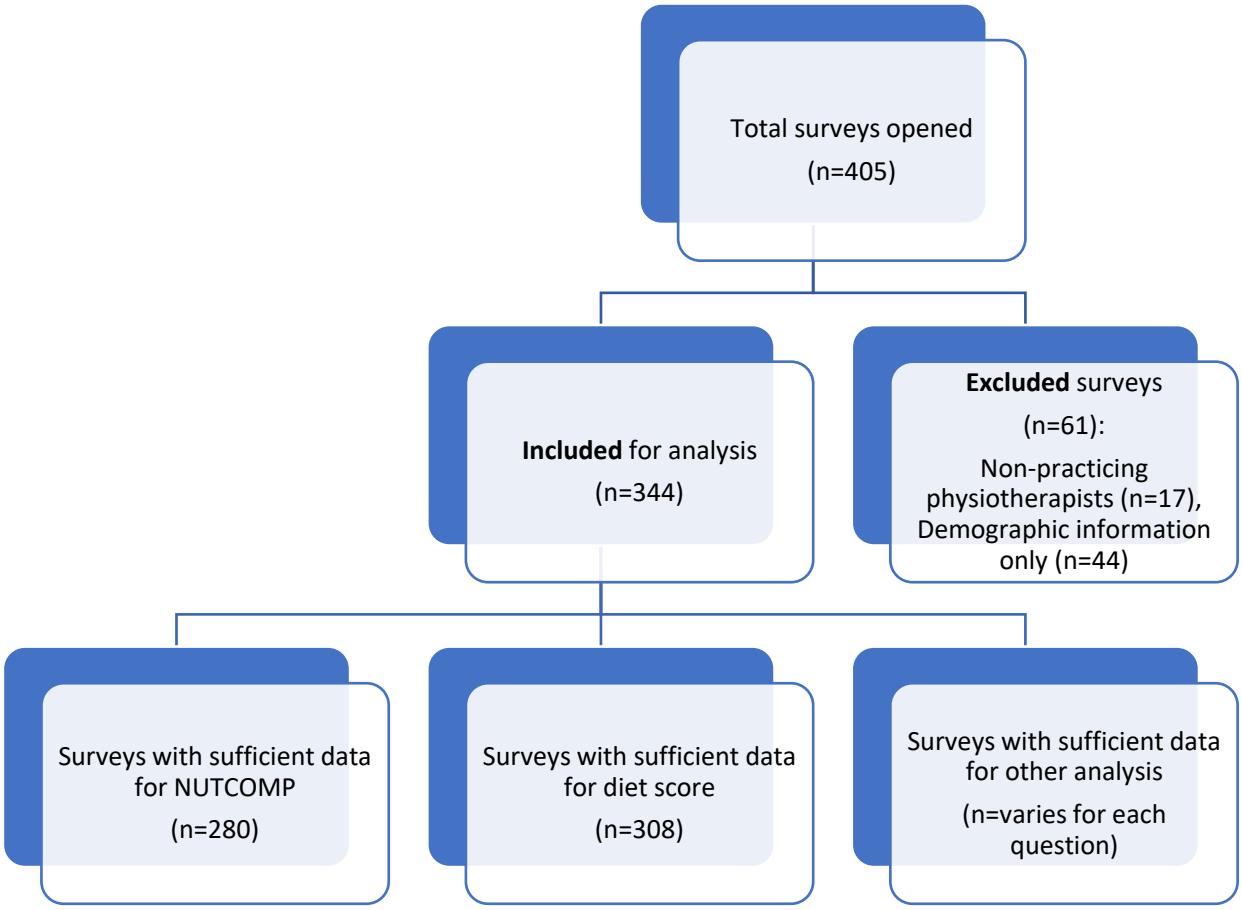


Figure 5.1 Flowchart describing the surveys excluded and included in the study

5.2 Demographics of survey participants

The demographic characteristics of the participants are presented in Table 5.1. Data is presented alongside Australian physiotherapists' registration data from the Physiotherapy Board of Australia (the Board) (78), to explore how representative the responding sample was of the national physiotherapy workforce. In comparison with physiotherapists registered in Australia, the study sample had more females (77% vs 67%; p<0.001) and participants in the 50-59 year age group (22% vs 13%; p<0.001) and the 60-69 year age group (12% vs 6%; p<0.001) with relatively fewer participants in the 20-29 year age group (15% vs 31%; p<0.001). Furthermore, in terms of geographical location, the study sample included relatively more participants from the Australian Capital Territory (ACT) (4% vs. 2%) and Victoria (VIC) (30% vs. 25%) and fewer from New South Wales (NSW) (23% vs. 30%).

Most (87.8%) of the participants had more than five years of experience working as a physiotherapist, and slightly fewer than half had pursued some nutrition training.

Table 5.1 Demographic characteristics of participants, n=344

Demographics	**n**	**%**	**Comparison with the Physiotherapy Board of Australia' data**		
			n	**%**	**p value**
Gender					
Male	76	22.1	10248	33.4	p < 0.001[a]
Female	266	77.3	20394	66.6	
Not identified	2	0.6			
Age group					
20-29	50	14.5	9445	30.8	
30-39	99	28.8	9654	31.5	
40-49	76	22.1	5512	18.0	p < 0.001[a]
50-59	75	21.8	3993	13.0	
60-69	42	12.2	1806	5.9	
>70	2	0.6	232	0.8	
State/territory of practice					
Australian Capital Territory (ACT)	13	3.8	632	2.1	
New South Wales (NSW)	80	23.3	8921	30.1	
Northern Territory (NT)	2	0.6	182	0.6	
Queensland (QLD)	65	18.9	5863	19.8	p = 0.017[a]
South Australia (SA)	30	8.7	2423	8.2	
Tasmania (TAS)	10	2.9	478	1.6	
Victoria (VIC)	105	30.5	7542	25.4	
Western Australia (WA)	39	11.3	3607	12.2	
Years of experience					
< 5 years	42	12.2			
5-10 years	74	21.5		N/A	
11-20 years	68	19.8			
21-30 years	78	22.7			
> 30 years	82	23.8			
Participated in nutrition-related professional development/further education				N/A	
Yes	149	43.3			
No	195	56.7			
Total count, N	**344**				

N/A = not applicable, data were not available for comparison.

[a] Significant Chi-squared difference between survey participants and the Board data.

5.3 Views

Four questions explored participants' agreement with provided statements regarding the importance of diet for health (statement 1-2) and the role of physiotherapists in promoting healthy eating among their patients (statement 3-4). Answer options to these questions ranged along a 5-point Likert-type scale (83) from '*completely disagree*' to '*completely agree*'. This was collapsed as described in Chapter 3, to a 3-point Likert scale.

Table 5.2 Views of participants on the statements

"How much do you agree/disagree with the following statements?"	**Total participants responding for each statement**	**Agree**	**Neither agree nor disagree**	**Disagree**
	n	**%**	**%**	**%**
1. Increasing intake of fruits/vegetables by a single serve per day is associated with reduced risk of coronary heart disease, stroke and weight gain.	**344**	83	11	6
2. Healthy diet is more effective than just increasing physical activity levels, for weight loss.	**339**	86	6	8
3. Physiotherapists serve as healthy role models for their patients and the public.	**344**	93	3	4
4. The physiotherapy profession should become more active in assisting patients to improve their dietary behaviour.	**339**	85	9	6

Almost all respondents, (93%) agreed (*somewhat agreed* or *completely agreed*) that they were or should be, healthy role models for their patients and the public. Similar percentages of respondents, between 83% and 86%, agreed (*somewhat agreed* or *completely agreed*) with statements 1, 2 & 4. The statement on fruit and vegetable consumption as a risk factor for noncommunicable diseases had the lowest level of agreement, and a slightly higher percentage of respondents were not sure whether they agreed or disagreed (11%) on this point than other questions.

5.4 Practices of nutrition care

The survey included six questions regarding the practices of nutrition care. Participants were asked about the type, frequency, and content of their nutrition care practices, as well as their confidence in skills and communication about nutrition. The questions asked in the survey are shown as the subtitles below, along with the number of respondents for each question.

5.4.1 "Which of the following do you do with your patients?", n=334

This question was asked to explore nutrition care practices in the clinical setting. Respondents were allowed to choose multiple responses from 8 options. A total of 334 participants responded to this question. These responses were categorized as verbal advice, providing support such as materials for self-reference, and lastly referral to a dietitian as detailed in Table 5.3.

The most common form of nutrition care was referring patients to a dietitian for specific dietary advice (71%), followed by encouraging patients who are eating poorly to improve their food intake (65%). Close to half of the participants (47%) reported following up with patients' attempts to improve dietary behaviours. Forty-three percent of participants report referring patients to a dietitian for general healthy eating advice. The least common response, selected by only 18% of the respondents, was encouraging patients to eat 2 serves of fruits and 5 serves of vegetables daily. Three percent of participants reported not practicing any of the listed options.

Table 5.3 Type of nutrition care provision, **n=334**

The practice of nutrition care *(options provided in the questionnaire)*	**Total count**		**Type of nutrition care practice**
	n	**%**	
I refer clients to a dietitian for specific dietary advice	237	71	Providing referral
I urge and encourage my clients who eat poorly, to increase the intake of healthy foods	217	65	Verbal advice
I follow-up with my client's attempt towards healthy eating	157	47	Verbal advice
I refer clients to a dietitian for general healthy eating advice	142	43	Providing referral
I provide self-help materials regarding healthy eating	112	34	Providing resources
I wait for the clients to bring up the topic before I mention healthy eating	68	20	Verbal advice
I ask my clients if they eat 2 serves of fruits and 5 serves of vegetables per day	59	18	Verbal advice
None of the above	9	3	

5.4.2 "How often do you encourage healthy eating with your patients?", n=334

For this question, participants could choose only one answer from five categories (Table 5.4). Thirty-eight percent of respondents reported that they provided nutrition care to their patients regularly ('all the time' or 'most times') while 29% reported doing this either 'rarely' or 'never'. One-third of the participants (33%) reported that they 'sometimes' provided nutrition care to patients (Table 5.4). Overall, most participants (97%) reported that they had provided nutrition care to patients and three percent never did. Six participants chose to answer 'none of the above' in 5.4.1 similarly answered 'never' in this section. Further analysis was undertaken to see whether training in nutrition-related topics, or years of experience in the profession was associated with the frequency of nutrition care.

Table 5.4 Frequency of encouraging healthy eating with patients, **n=334**

Encouraging healthy eating with patients	**Total count**		**Provided nutrition care (%)**
	n	**%**	
All the time (100% of the time)	37	11	97
Most times (75% of the time)	89	27	
Sometimes (50% of the time)	110	33	
Rarely (25% of the time)	88	26	
Never (0% of the time)	10	3	3
Total count, N	**334**		

Considering the frequency of encouraging healthy eating as a continuous variable, and attributing the same frequency to everyone in the category, the average frequency of encouraging patients to eat healthily for participants with nutrition training was greater; 64% of the time (95% CI 59.5, 67.5) compared to 47% of the time (95% CI 43.1, 50.1) for those without training. A two-sample t-test found this difference was statistically significant ($p<0.001$). A further examination showed that among participants who reported on encouraging patients to eat healthily all the time, 26 (26/334, 8%) of them had obtained nutrition training.

A one-way ANOVA test found increasing years of experience as a physiotherapist was positively associated ($p=0.007$) with the percentage of time that healthy eating advice was provided (Table 5.5).

Table 5.5 The average frequency of encouraging healthy eating according to years of experience, **n=334**

Experience working as a physiotherapist	**Percentage of the time providing healthy eating advice**		
	Mean	**SD**	**n**
< 5 years	42.5	23.5	40
5-10 years	52.5	24.0	71
11-20 years	52.7	25.4	65
21-30 years	56.4	27.5	78
> 30 years	60.3	25.7	80
Overall	**54.1**	**25.8**	**334**

5.4.3 "During a consultation with a patient who is obese/overweight, which of the following would you prefer to do?", n=333

To explore the content of nutrition care provided, participants were asked their preference to either discuss weight loss goals or eating healthy foods which could indirectly result in weight loss. More than half of the participants (52%) chose to discuss healthy eating with overweight patients.

Table 5.6 Preference of management among overweight patients, **n=333**

Preference with obese/overweight patients	**Total count**	
	n	**%**
Discuss weight loss goals	106	32
Discuss healthy foods which could indirectly result in weight loss	173	52
None of the above	54	16
Total count, N	**333**	

5.4.4 "Which of these, do you think should be part of 'Basic healthy eating advice'?", n=333

The participants were asked to choose elements of 'basic healthy eating advice' from the list provided with multiple responses permitted (see Table 5.7). The most popular (89%) advice was to drink water, followed by minimizing processed food and sugar intake. Around 70% of participants selected advice directly encouraging consumption of fruits and vegetables; 73% selected advice on different colours and types of fruits and vegetables, while 68% selected advising on eating 2 serves of fruits and 5 serves of vegetables. Three participants reported that none of the listed healthy eating habits should be included in general advice.

Table 5.7 Content of basic healthy eating advice, **n=333**

Content of basic healthy eating advice.	**Total count**	
	n	**%**
Drink water	297	89.2
Minimize processed food	296	88.9
Minimize sugar intake	286	85.9
Minimize alcohol intake	248	74.5
Eat fruits and veggies of different colours and types	244	73.3
Eat 2 serves of fruits and 5 serves of vegetables	226	67.9
Eat whole food	184	55.3
Eat regular meals	182	54.7
Eat lean meat and unprocessed meat	181	54.4
Minimize portion size of each meal	176	52.9
Eat more legumes and nuts	175	52.6
Eat more whole grain food	174	52.3
Minimize fatty food & saturated fat intake	162	48.6
Eat plant-based food	153	45.9
Use olive oil in preference to other oil types	101	30.3
Use low-fat dairy products	42	12.6
None of the above	3	0.9

5.4.5 "How confident are you in your ability to provide nutrition care that results in improvements in the food that an individual usually eats?", n=312

In terms of nutrition skills, the participants were asked to rate their confidence in providing nutrition care that results in improvements in patients' food intake. Almost half (47%) of the participants who responded to this question, reported that they were somewhat to extremely confident, while the other half (53%) were not confident with their skills in providing nutrition care to improve dietary habits.

Table 5.8 Confidence in nutrition skills, **n=312**

Ability to provide nutrition care that results in improvements in the food that an individual usually eats	**Total count**	
	n	**%**
Not confident at all	72	23
Not very confident	95	30
Somewhat confident	97	31
Very confident	39	13
Extremely confident	9	3
Total count, N	**312**	

5.4.6 "How confident you are to identify individuals who need additional support from other health professionals or services regarding the food they eat?", n=306

In terms of the communication and counselling about nutrition, almost all participants (91%) were confident (somewhat confident, very confident or extremely confident) with their ability to recognize the need for patients to be referred to other professionals such as dietitians when advice beyond basic nutrition care was required (see Table 5.9).

Table 5.9 Confidence in communication & counselling about nutrition, **n=306**

Ability to identify individuals who need additional support from other health professionals or services regarding the food they eat	**Total count**	
	n	**%**
Not confident at all	7	2
Not very confident	20	6
Somewhat confident	79	26
Very confident	134	44
Extremely confident	66	22
Total count, N	**306**	

5.5 Australian Guide to Healthy Eating (AGHE)

Awareness of the AGHE among the respondents, and their confidence in using the guidelines as a reference in nutrition care was explored in two questions (5.5.1 & 5.5.2) from the NUTCOMP section. Apart from the questions, participants were also allowed to comment on nutrition care and physiotherapy, and specific feedback was directed to AGHE, which is also reported in this section.

Lastly, this section includes results for 'diet score'. Diet score was calculated from responses to ten questions adapted from the summary of the Australian Dietary Guidelines (ADG). These questions were included to explore whether study participants were eating according to the guidelines, and classified into healthy or unhealthy eating.

5.5.1 "How confident are you in your knowledge of the AGHE, including the number of recommended serves of food groups and serving sizes for different ages and genders?", n=313

Around 80% of the respondents reported that they were confident (somewhat confident, very confident or extremely confident) with their knowledge of the AGHE whereas 20% did not feel confident (not very confident or not confident at all) (Table 5.10).

Values 1-5 were allocated for each response (not confident at all – extremely confident) as detailed in Table 5.10. A two-sample t-test indicated a statistically significant difference ($p<0.001$) between the participants with nutrition training regarding their confidence in their knowledge of the AGHE compared to those without training. The average confidence score for participants with nutrition training was 3.5 (95% CI 3.3, 3.6) whereas for those without training the score was 2.9 (95% CI 2.8, 3.1).

Table 5.10 Confidence regarding AGHE knowledge, **n=313**

Confidence in the knowledge of the AGHE	**Total count**		
	Value scored for the response	**n**	**%**
Not confident at all	1	16	5
Not very confident	2	47	15
Somewhat confident	3	138	44
Very confident	4	83	27
Extremely confident	5	29	9
Total count, N		**313**	

5.5.2 "How confident are you in your ability to use the AGHE to evaluate the appropriateness of an individual's food intake?", n=312

A total of 312 participants responded to this question (Table 5.11). Around 58% of respondents reported that they were confident (somewhat confident, very confident or extremely confident) to use the AGHE to evaluate the appropriateness of a patient's food intake whereas around 42% were not confident (not very confident or not confident at all).

Using a two-sample t-test, a statistically significant difference ($p=0.001$) was found between the confidence of participants with nutrition training to use the AGHE to evaluate their

patient's food intake compared to those without training. The average confidence score for participants with training was 3.0 (95% CI 2.8, 3.2), whereas, for those without training, the score was 2.5 (95% CI 2.3, 2.6).

Table 5.11 Confidence to use the AGHE to evaluate the appropriateness of an individual's food intake, **n=312**

Confidence to use the AGHE	**Total count**		
	Value scored for the response	**n**	**%**
Not confident at all	1	41	13
Not very confident	2	91	29
Somewhat confident	3	111	36
Very confident	4	52	17
Extremely confident	5	17	5
Total count, N		**312**	

5.5.3 Comments from the participants

A total of 65 participants took the initiative to write feedback on the topic of this study. In line with the research inquiry, these comments were explored with respect to AGHE/ADG and of these seven (11%) participants commented negatively on the content of the AGHE/ADG (Table 5.12). Four out of these seven participants had nutrition training.

Table 5.12 Negative comments on dietary guidelines

Comments from the participants	**Participated in nutrition training**
No trust in Healthy Eating Guidelines.	No
I have concerns with the use of healthy dietary guidelines	Yes
I don't necessarily believe the Australian Healthy Eating guidelines are consistent with the latest evidence-based research.	No
I am not convinced that the current guidelines are keeping up with the latest research.	Yes
I think the current Australian guidelines, specifically in the promotion of consumption of dairy products and lots of wholegrains is a problem	No
Specific recommendations even as per Australian guidelines are not always appropriate for everyone	Yes
The government guidelines on food are not evidence-based and out-dated	Yes

5.5.4 Diet score

A total of 308 participants answered all ten questions around their own eating behaviour; providing sufficient data for the 'diet score' calculation. According to the original scoring (81), the possible diet score ranged from 0-10 and a person with a diet score of 8-10 was considered a 'healthy eater'. The average score for the participants included for the analysis was 7.5. A two-sample t-test found a statistically significant difference ($p<0.001$) between the diet scores among males and female participants. The average diet score for male participants was 6.7 (95% CI 6.1, 7.2), whereas, for female participants, it was 7.8 (95% CI 7.6, 8.0). More than half of the respondents (57%) were healthy eaters, and a higher proportion of females (62%) were healthy eaters to 37% of the male respondents.

Table 5.13 Diet score for participants according to gender, n=308

Gender			**Diet score**		**Diet score between 8-10/ Healthy Eaters**	
	n	**%**	**(mean)**	**95% CI**	**(n)**	**%**
Male	67	22	6.7	6.1-7.2	25	37.3[a]
Female	241	78	7.8	7.6-8.0	149	61.8[a]
Total	**308**		**7.5**	**7.3-7.8**	**174**	**56.5**

[a]The healthy eaters' percentage was calculated according to the gender proportion of the total respondents. i.e: for male; 25/67*100=37.3%

Further analysis using Person's r was undertaken to see whether the diet score had any association with how participants' felt about being healthy role models for their patients and community (this response is from the 'View' section). The correlation between diet score and the response on a scale of 1-5 (role models-response) indicated a very weak but statistically significant relationship ($r=0.13$, $p=0.025$).

Additional analysis was done to see whether the diet score had any relationship with how often the respondent encouraged patients to eat healthily. Again, the correlation between these items was statistically significant ($r=0.20$, $p=0.0006$), even though indicating a weak relationship.

5.6 NUTCOMP score

A total of 280 participants responded to all 35 questions in the NUTCOMP section; and had a **NUTCOMP score** calculated. For participants who responded to some questions across the four constructs; **Knowledge** (n=308), **Skills** (n=304), **Communication** (n=297), and **Attitudes** (n=299) results were reported separately (Table 5.14). The competence scores for the four constructs are described individually before the overall **Nutcomp** score.

Table 5.14 Nutrition competence scores

Construct	n	Score (%)		Association within the four constructs[a]	Association with demographic/other characteristics[a]
		Mean	SD		
Knowledge	308	54	15	Skills Communication Attitude	Frequency of encouraging healthy eating Training
Skills	304	52	16	Communication Knowledge Attitude	Frequency of encouraging healthy eating Training
Communication	297	66	16	Skills Knowledge Attitude	Frequency of encouraging healthy eating Training
Attitudes	299	83	13	Communication Skills Knowledge	Frequency of encouraging healthy eating Training Experience
Nutcomp score	280	63	13	N/A	Frequency of encouraging healthy eating Training Diet score

[a] Only association with significant Pearson's r result reported in the table.

The score calculations were detailed in the data analysis section in the Methodology chapter. Each participant had a score summed across questions within the four constructs. The maximum possible scores for Knowledge, Skills, Communication, and Attitudes were 35, 55, 45, and 40, respectively. These scores were converted to a percentage for comparison between constructs, and the mean percentage for participants in each construct is presented in table 5.14. Participants with maximum score would obtain 100% in each construct.

Knowledge about nutrition and chronic disease, n=308

Participants' responses regarding self-perceived nutrition knowledge produced the second-lowest score among the four constructs, with 54% (mode=somewhat confident). This is an average score for 308 participants who answered all questions in this construct. Given the score for confidence level according to the Likert scale as detailed in table 3.3 (Chapter 3), participants are somewhat confident with their knowledge regarding nutrition and chronic disease.

Among the seven questions under this construct, the majority (81%) of respondents were confident (somewhat, very, or extremely confident) with their knowledge on how an individual's body composition can impact the development of chronic diseases.

Associations between participants' confidence in nutrition knowledge and the other three constructs were assessed. Confidence in nutrition knowledge was highly correlated with confidence in nutrition skills ($r=0.72$, $p<0.001$) and the ability to communicate ($r=0.60$, $p<0.001$) and counsel patients regarding nutrition. Confidence in nutrition knowledge was also correlated with favourable attitudes ($r=0.45$, $p<0.001$) towards nutrition care provision.

The percentage of time participants encouraged healthy eating with their patients ($r=0.43$, $p<0.001$) and training experience ($r=0.30$, $p<0.001$) were also correlated with confidence in nutrition knowledge. However, participants' working experience was not associated with their confidence in nutrition knowledge ($r=0.10$, $p=0.08$).

Nutrition **Skills**, n=304

Confidence in the nutrition skills-construct scored the lowest for NUTCOMP constructs, with an average rating of 52% (mode=somewhat confident). Similar to the knowledge-construct, participants were somewhat confident with their nutrition skills. Among the 11 questions under this construct, respondents were most confident (somewhat, very, or extremely confident) in interpreting an individual's biological data against reference ranges.

When participants' confidence in nutrition skills was compared to scores in other constructs, a high correlation was found between the participants' confidence in communication and counselling about nutrition ($r=0.73$, $p<0.001$). Participants' confidence with nutrition skills had a reasonable correlation ('reasonable correlation' is defined in Chapter 3) with their attitudes ($r=0.46$, $p<0.001$) towards nutrition care provision.

Confidence in nutrition skills had a low correlation with participants' training ($r=0.29$, $p<0.001$) in nutrition, and had a reasonable relationship with the percentage of time respondents encouraged healthy eating for their patients ($r=0.41$, $p<0.001$). However, confidence in nutrition skills did not show any relationship with the participants' working experience ($r=0.04$, $p=0.53$).

Communication and counselling about nutrition, n=297

Scoring the second-highest among the four constructs, with an average of 66% (mode=very confident); respondents were very confident to communicate and counsel patients regarding nutrition. From the nine questions within this construct, respondents were most confident (somewhat, very, or extremely confident) in identifying patients who needed additional support from other health professionals regarding their food choices. Conversely, the respondents were least confident of clearly describing what their patients could expect from their discussion regarding food.

A reasonable relationship was found between the respondents' confidence in communication about nutrition ($r=0.53$, $p<0.001$) and attitudes towards nutrition care provision. The confidence score in communication about nutrition had a low correlation with the respondents' participation in nutrition-related training ($r=0.29$, $p<0.001$) and a low correlation with the percentage of time healthy eating was encouraged ($r=0.38$, $p<0.001$). However, respondents' working experience was not associated with ($r=0.08$, $p=0.19$) their confidence in communicating regarding nutrition.

Attitudes Towards Nutrition Care, n=299

Finally, the attitudes of respondents towards providing nutrition care recorded the highest score, with an average of 83% (mode=completely agree) for 299 participants. Amongst the eight statements within the construct, three statements had collective agreement from almost all respondents. Nearly all (98%) participants agreed (somewhat & completely agreed) that it is vital that all individuals usually eat healthy foods regardless of age, body weight and physical activity levels. Likewise, most respondents (97%) collectively agreed (somewhat or completely agreed) that it is important to encourage patients to eat healthy foods and get support from other health professionals if the physiotherapists themselves were not able to meet patients' nutrition-related needs, and to encourage patients to eat healthy foods whenever the topic arises. Further, more than half of the respondents (61-77%) agreed (somewhat or completely agreed) that encouraging the patient to eat healthy foods is an effective use of their professional time and within their scope of practice.

Among the four constructs, the attitude-construct was the only one with a significant, albeit weak, association with the participants' working experience ($r=0.13$, $p=0.03$). Similarly, participants' training experience in nutrition topics also showed a low correlation with the attitude towards nutrition care ($r=0.25$, $p<0.001$). However, the percentage of time respondents encouraged healthy eating had a reasonable relationship with their favourable attitudes towards nutrition care ($r=0.50$, $p<0.001$).

Nutcomp score, n=280

The self-perceived competence of participants (n = 280) in providing nutrition care for their patients derived by summing the scores from all four constructs above (35 questions); was an average of 63% (mode=very confident) with the individual scores across all four constructs exceeding 50% (somewhat confident). Overall, this score indicates that the respondents were generally very confident in their nutritional-related knowledge, skills, communication, and expressed favourable attitudes towards providing nutrition care to their patients.

The Nutcomp score had a low correlation ($r=0.24$, $p=0.0001$) with the respondent's diet score but had a reasonable relationship with the percentage of time respondents encouraged healthy eating ($r=0.52$, $p<0.001$). In contrast, respondents' Nutcomp score had a statistically significant but relatively weak association ($r=0.36$, $p<0.001$) with their training experience. The participants' working experience was not associated ($r=0.11$, $p=0.06$) with their self-perceived competence.

5.7 Barriers and facilitators

The participants were asked to identify the barriers and facilitators to providing nutrition care in their clinical settings. A total of 321 participants responded in identifying both the barriers and facilitators, as shown in Table 5.15 & 5.16. Multiple responses were permitted to each question.

Table 5.15 Barriers in providing nutrition care, **n=321**

"D1. Which of these is a barrier to YOU in providing nutrition care to patients? (Tick all that apply)"	**Total count**	
	n	**%**
Perceived lack of clarity of the scope of practice/overlap with other health professionals in nutrition care	191	59.5
Lack of undergraduate education/ training	168	52.3
Lack of time (assuming you are motivated to provide basic dietary advice)	155	48.3
The patient perception that it is not within the scope of physiotherapy	137	42.7
Lack of resources and materials	130	40.5
Lack of patient compliance	57	17.8
Intrusion into the patient's privacy	50	15.6
Personal discomfort addressing dietary issues	33	10.3
Lack of interest in addressing nutrition	9	2.8
None of the above	24	7.5

Table 5.16 Facilitators to providing nutrition care, **n=321**

"D2. Which of these would be a facilitator for YOU in providing nutrition care to patients? (Tick all that apply)"	**Total count**	
	n	**%**
Professional development in providing nutrition care after completion of physiotherapy degree	249	77.6
Encouragement or statement from the Australian Physiotherapy Association (APA) that nutrition care is within the scope of practice	244	76.0
Resources for patients (both printed and online)	224	69.8
Undergraduate education/training in providing nutrition care	141	43.9
Change in practice policy to enable consultations including nutrition care	116	36.1
Encouragement from Practice Manager or Head of Department to include nutrition care in daily practice	99	30.8
None of the above	15	4.7

Barriers

Perceived lack of clarity on the scope of practice or whether they were overlapping with other health professionals' scope of practice when encouraging healthy eating among patients was identified as a barrier by 60% of respondents. Almost half of the respondents selected a lack of training or undergraduate education (52%) in nutrition topics and lack of time during their clinical practice (48%) as barriers to providing nutrition care. Close to 43% of the respondents assumed that their patients would not expect physiotherapists to provide nutrition care, and close to 41% noted lack of resources and materials as a barrier in providing nutrition care.

One-tenth of the respondents reported on personal discomfort addressing nutrition with their patients.

Twenty-four participants selected none of the listed options as barriers in providing nutrition care. Twenty-one of these participants were above 50-years of age, and nine-teen of them had more than 30 years of experience in physiotherapy.

Facilitators

More than 70% of the respondents reported that professional development training in nutrition-topics, and encouragement or a policy statement from the APA that nutrition care is within physiotherapists' scope of practice would help them to provide nutrition care. About 70% of the respondents reported that they need printed or online materials as resources for their patients. Close to 44% of the respondents noted that nutrition-related training included in undergraduate education could enhance nutrition care provision. More than 30% of the participants nominated for change in practice policy to include nutrition care in their consultations as well as encouragement from their leaders to facilitate nutrition care provision. Less than 5% of the respondents reported that they did not consider any of the measures as facilitators to providing nutrition care.

5.8 Summary of findings

Demographics

- The participant sample was significantly older with more females and was focussed on some eastern states of Australia compared to the national physiotherapist registration data.

Views

- Results suggest the majority of participants have knowledge regarding diet, non-communicable diseases (NCDs), and health, as well as being current with evidence-based information.
- Almost all participants in this study agreed that physiotherapists serve as healthy role models for their patients and slightly lower proportion agreeing that they should actively assist in improving patients' dietary behaviour.

Practice of nutrition care

- The most common practice of nutrition care by participants in this study was providing a referral to a dietitian, followed by verbal advice directly discussing and advising patients towards healthy eating. Among the listed options on types of nutrition care practices, participants selected enquiring patients if they were eating 2 serves of fruits and 5 serves of vegetables as the least common.
- All participants reported encouraging healthy eating with patients and close to 40% of them reported doing this on a regular basis.
- Within the preference for weight loss management, 52% of the participants opted to discuss healthy eating with overweight patients.
- Apart from water intake, participants preferred to advise on minimizing intake of less healthy food such as processed and sugary food slightly more compared to increase intake of fruits and vegetables.

AGHE and diet score

- Although participants were aware of AGHE, they were not as confident to use AGHE as a tool to assist them in assessing patients' food intake.
- More than half of the participants were healthy eaters; they were following national healthy eating recommendations reasonably closely.

NUTCOMP

- With the overall competency score of 63% (mode=very confident), the respondents reported feeling confident with their nutrition knowledge, skills, communication and counselling practices as well as expressing favourable attitudes towards providing nutrition care for their patients.

Barriers and facilitators

- The majority of participants (40-60%) reported on the lack of clarity on the scope of practice as the main barrier in providing nutrition care, followed by lack of training, lack of time, the patient perception that nutrition care is not within the scope of physiotherapy and lack of resources and materials.
- 70-77% of participants selected professional development in providing nutrition care, encouragement from the APA, and resources as facilitators of nutrition care in physiotherapy.

6.0 Discussion and Conclusion

6.1 Discussion

This thesis explored the potential of Australian physiotherapists to provide nutrition care to patients; in other words, to encourage healthy eating. Healthy eating is fundamental in preventing chronic diseases as well as managing chronic conditions. Although dietitians are the health professionals specializing in advising on dietary matters, their numbers and geographic spread limit their accessibility and thus their impact on healthy eating. Other health professionals may promote healthy eating by using the Australian Dietary Guidelines (ADG) as a reference. Previous research among primary health professionals, such as general practitioners (GPs), has indicated 'time' as the most significant barrier to promoting healthy eating or providing nutrition care. Given the limitations on these health professionals in providing nutrition care, physiotherapists are primary care health professionals who often have repeated and extended visits with their patients, and as such, may provide a better opportunity for nutrition care. However, given the limited evidence regarding the role of physiotherapy in nutrition care, three research questions (below) were designed to explore physiotherapists' practices, views, and barriers to providing nutrition care, their knowledge, and awareness of the ADG, and their personal adherence to these evidence-based guidelines.

Research question 1

What are the current practices of providing nutrition care by Australian physiotherapists in primary care settings?

- *If physiotherapists are providing nutrition care, what is the content of nutrition care?*
- *Are Australian physiotherapists aware of the Australian Dietary Guidelines (ADG) and are they using this as a reference to provide nutrition care?*

Research question 2

Are physiotherapists confident in providing nutrition care to patients in primary care settings in Australia?

- *What are the barriers to providing nutrition care?*

Research question 3

Do Australian physiotherapists themselves adhere to the recommended guidelines for healthy eating?

This pioneering study used both qualitative and quantitative methods to explore nutrition care provision by physiotherapists. Semi-structured interviews investigated the perspective of physiotherapists on their practice of nutrition care with their patients, their awareness and use of ADG, as well as barriers and facilitators to providing this care. The findings from the qualitative study were used to inform a national online survey to explore further the perspective of Australian physiotherapists on these aspects of nutrition care.

Together, the results of the studies showed physiotherapists in Australia were highly motivated to provide nutrition care to patients, but they identified significant barriers to engage in healthy eating promotion relating to the scope of practice and lack of nutrition-training. The majority of physiotherapists were aware of the ADG but not highly confident in

using this as a reference to assist in providing nutrition care. The results suggested the majority of physiotherapists were confident to provide nutrition care to their patients based on their knowledge, skills, communication and counselling practices along with encouraging attitudes. The findings also showed the majority of participants were eating according to the recommended guidelines for healthy eating. These findings are discussed in relation to the research questions; section 6.1.2 to 6.1.4 after considering the strength and limitations of this study, below.

6.1.1 Strengths and limitations

To date, this is the first study to investigate the perception of physiotherapists with regard to providing nutrition care to patients in Australia. The mixed-methods study design is a key strength that provided an opportunity to examine the issues in detail before exploring how broadly these issues applied. The self-perceived nutrition care competence data based on NUTrition COMPetence (NUTCOMP); a validated questionnaire among health professionals is an added strength for this study.

The quantitative study included 344 participants, fewer than the 380 physiotherapists required in the sample size calculation. However, the high completion rate, 66%, for the extensive 66-questions quantitative survey, without any incentives offered to respondents, is also one of the strengths of this investigation. For example, a recent online survey with a similar number of questions among Australian Physiotherapists achieved a 44% completion rate despite offering the respondents a $20 gift card upon completing the survey (84).

The qualitative study included participants from rural and urban practices, representing different health settings as well as teaching universities, along with a broad range of experience in the profession. This breadth of experience likely results from the professional networks in facilitating the recruitment of physiotherapists. The same recruitment strategy also facilitated the inclusion of participants without a specific interest in nutrition.

Physiotherapists who participated in the quantitative survey likely had a greater interest in nutrition compared to non-responders. However, the responding physiotherapists had similar representation of the national physiotherapy workforce with regards to gender, geographical location and age. The national statistics based on the data from the Health Workforce Australia show the average age of physiotherapists in Australia (27) as 39 years. Similarly, both the qualitative and quantitative study participants were mostly in their 30s. Although the age of participants of this study shows similarity with the average age of physiotherapists in Australia, we are not sure that our sample represents all Australian physiotherapists.

This thesis is written from the perspective of a researcher who does not have qualifications in nutrition or physiotherapy, thus providing some objectivity regarding nutrition care in physiotherapy. However, the advisory committee for this research comprised a professor in primary care research, an associate professor with qualifications in nutrition and epidemiology, and a practicing academic physiotherapist, thus providing content expertise.

This study also has some limitations. The study findings are based on self-reported data. There may have been selection bias in the national survey participants towards membership of the

Australian Physiotherapy Association (APA), given the main source of study recruitment was through the APA's newsletter. In addition, the qualitative study participants were limited to physiotherapists practicing in Victoria.

6.1.2 Current practices of nutrition care: addressing research question one

Nutrition care was defined to participants as features of nutrition assessment, nutrition advice, and counselling as well as referral to nutrition professionals and relevant services (31). Given this definition, all interview participants had engaged in nutrition care with their patients at some point during their careers. Some interview participants provided nutrition care in the form of referral of patients to a dietitian, and others offered verbal advice. These findings were replicated in the survey suggesting that most physiotherapists are already engaging in some level of nutrition care. The most common nutrition care practice was providing a referral to a dietitian, undertaken by 71% of survey participants. This was followed by verbal advice to encourage healthy eating with patients, which was offered by 65% of survey participants. These nutrition care practices are consistent with the international advocacy and recommendation of Dean et al. for health promotion and non-communicable disease (NCD) prevention competency standards in contemporary physiotherapy practice(56).

The findings of nutrition care practices in this thesis differed from those of other studies. A previous survey focussing on weight management among a small sample of Australian physiotherapists showed that 42% of participants provided dietary advice, and less than 20% regularly referred to a dietitian (68). Less than half of Nigerian physiotherapists studied by Abaraogu et al. (66) reported providing a referral, and 55-70% regularly encouraged patients with poor diet to increase their intake of fruits, vegetables, and fibre. A study of Irish physiotherapists reported that 23% of the participants regularly assessed dietary status with patients (65). In comparison to these studies (65, 66, 68), our data indicated a higher proportion of Australian physiotherapists were providing nutrition care for patients.

Reasons behind the common nutrition care – Referral to a dietitian

Physiotherapists commonly provided a referral to a dietitian, suggesting they recognize the importance of nutrition care in their patient management. This was evident with our qualitative findings, which indicated physiotherapists were strongly motivated to provide nutrition care (Theme 1, Chapter 4). Participants' views indicated that addressing nutrition is vital in a physiotherapy setting, especially when it is weight and energy intake related, and weight was relevant for a presenting pathology. Participants also reflected on their professional identity and role in health promotion and discussed nutrition care in this context.

Participants' motivation to provide nutrition care was closely related to their perception of being primary care professionals who integrate holistic care for their patients. This is in line with the existing literature reported in studies with General Practioners (GPs) (85) and Practice Nurses (PNs) (86). This notion is also in parallel with the World Health Organization's Framework on integrated people-centred health services. According to this report, health professionals should empower and support patients engaging in healthy behaviours and caring for themselves (87, 88), making nutrition care a critical component of primary health care.

Physiotherapists' preferences to provide referral compared to giving general dietary advice suggests a reluctance to venture outside their scope of practice and their perceived professional boundaries. Similar reservations have been reported by Australian physiotherapists concerning weight management advice for patients with knee osteoarthritis (89) and in other disciplines, including from a cohort of PNs in Australia (86). However, an alternative narrative was provided by some participants in the present study, specifically those working in rural or remote areas where patients had limited access to nutrition specialists or dietitians. Although providing a referral to a dietitian is essential for those in need of tailored nutritional intervention, providing referral for patients for general healthy eating as part of health promotion could delay the patients' adoption of lifestyle modification. Given that we have publicly available resources, including evidence-based nutrition guidelines (ADG), physiotherapists may be well placed in some settings as first contact practitioners to begin a healthy eating discussion.

6.1.2.1 Content and context of verbal advice: addressing research question one

Verbal advice, in this context, refers to physiotherapists discussing nutrition or promoting healthy eating directly to patients. The qualitative results demonstrated the content and context of such verbal advice, while quantitative findings showed the focus on particular types of verbal advice.

Participants perceived a lack of clarity on the most accurate or reliable source of information on nutrition care. Variability in the recommended content of 'basic healthy eating advice' among the interview participants indicates that this was based on their own constructed understanding of healthy eating rather than the national dietary guidelines. Similarly, various interpretations of 'basic' nutrition care were reported in a study with PNs (86). Variability in basic healthy eating advice could be avoided if physiotherapists followed an evidence-based general recommendation for a healthy diet. For example, the Royal Australian College of General Practitioners (RACGP) has published the Smoking, Nutrition, Alcohol and Physical Activity (SNAP) document (34) for General Practitioners (GPs) in Australia. Given that such references are designed exclusively for the profession by their professional bodies, a similar resource from APA might boost the confidence for physiotherapists not trained in nutrition to advise patients on healthy eating.

When the survey participants were provided a list of options for 'basic healthy eating advice' based on the outcome of the interviews, the majority selected 'drinking water,' followed by 'minimizing intake of processed and sugary food.' Participants preferred to advise on reducing intake of less healthy food such as processed and sugary food slightly more compared to advice to increase consumption of fruits and vegetables. This is in line with a recent report on Australians consuming too much discretionary food at the expense of nutritious food (90).

The survey also explored the content of nutrition care relating to weight loss. Weight loss discussions with patients, especially with overweight patients, can be difficult, particularly if patients felt they were a target of 'weight stigmatization' (91). The survey participants were asked if they preferred discussing the consumption of healthy food, which could result in weight loss, rather than weight loss goals with patients, and more than half (52%) preferred to discuss nutrition. Desirable benefits such as optimal weight are possible using lifestyle

approaches such as a healthy diet with increased intake of fruit and vegetables (92). In contrast, Setchell et al. (91) suggested that focussing on diet and exercise to manage overweight patients in physiotherapy could have many implications, including weight stigmatization, and suggested emphasis beyond the lifestyle factors in managing such patients.

Any nutrition discussion undertaken by the interview participants was primarily based on their patients' presenting problems. Some participants had the experience of discussing nutrition with patients who were active and focussed on a healthy lifestyle, such as athletes. Other specific advice to improve dietary behaviour was provided by participants who had pursued extra training in nutrition and related to the pathological condition of the patient. For example, a participant who had nutrition-training and was specializing in women's health and incontinence advised patients to avoid caffeine consumption.

What should be the content of nutrition care?

There is substantial evidence of the benefits of fruit and vegetable consumption in reducing the risks of most chronic diseases (31, 93). Surprisingly, this evidence was not commonly considered by the survey participants to be incorporated in their advice to patients. For instance, among the listed types of nutrition care practices, participants' least common communication was enquiring of patients if they were eating two serves of fruits and five serves of vegetables daily.

Our qualitative findings showed that generally, the topic of nutrition was not included in physiotherapy training. Hence, physiotherapists may be unsure of the exact content of advice to deliver to patients in terms of healthy eating. Being health professionals, physiotherapists can use collaborative communication and health behaviour change skills to work with patients to support healthy choices and improve their dietary behaviours using simple principles of healthy eating, such as encouraging patients to eat two serves of fruits and five serves of vegetables (9) or minimize processed food consumption.

Simple, accurate, evidence-based dietary messages are essential (94-98) so that people are clear about healthy choices. Further, patients need to be supported to make sense of and identify inaccurate sources of information, such as those provided by people with a social profile rather than a medical background. Some of our interview participants also expressed their concern about clarifying the evidence-based information to patients as the exposure to freely available anecdotal information in mass media, could mislead patients' food choices. Thus, health professionals should be clear on fundamental information on healthy eating so that they can convey sound and evidence-based messages to their patients. This is consistent with the suggestion from the recent Australian Medical Association (AMA) position statement, in promoting simple and easy to understand messages for healthy eating (99).

Participants' nutrition care practices in providing verbal advice were also affected by nutrition-training and other complexities in providing nutrition care.

Impact of nutrition-training

Almost all survey participants reported giving verbal advice or encouraging healthy eating with patients, and close to 40% were practicing this regularly. The frequency of encouraging healthy eating with patients was significantly higher among participants with nutrition-training as well as for those with more work experience. Similar findings were reported by Snodgrass et al. (68) in the study of weight management by physiotherapists; the provision of dietary advice was significantly higher for participants with extra training. The results in this thesis suggest a need for nutrition-training for physiotherapists if they are to enhance nutrition care provision for patients.

Complexity around delivering nutrition care

Participants acknowledged the complexity of nutrition care from the perspective of supporting patients' behaviour change. It is widely acknowledged that long term sustained changes to dietary behaviour are difficult and complicated for patients (100), and requires behaviour change support. The futility of information provision in nutrition care, without establishing a patient's health literacy or level of motivation to engage with the material was highlighted by participants. Some interview participants commented that patients are aware of healthy eating or what constitutes a healthy diet and are saturated with this information, therefore educating patients on basic nutrition is unnecessary.

Participants thought that it would be useful to provide patients with strategies to improve their dietary behaviour instead of focussing on knowledge transfer on food choices. This notion of supporting nutrition care as a behavioural management issue fits within the contemporary physiotherapy paradigm of patient-centered care (57, 58, 101-103). The participants' views on nutrition care as a complex process is in line with the findings reported by GPs in changing patients' nutrition-related behaviour (85). In a recent national report, GPs suggested that the 'Shaping a Healthy Australia' project should focus on assisting in developing techniques to make small lifestyle changes or motivating patients (104) to make behavioural changes.

Participants' beliefs in patients' health literacy surrounding nutrition are in contrast to data presented in the recent AMA Position Statement (99). According to this report, Australians have a low level of health literacy; therefore, nutrition education and food literacy are central in guiding and supporting them to make healthier dietary choices. Moreover, the Australian Institute of Health and Welfare has recently reported that Australian adults surveyed in 2011/12 were found to consume discretionary food for 33-36% of their daily energy intake (105). Discretionary food items are unhealthy choices, high in energy, and lacking in essential nutrients (105). People either do not know about healthy food choices or do not have the capacity or desire to change their behaviour. Given these insights, perhaps it is incorrect to assume that the patient population is well aware of nutrition facts, and there is no need to educate them. The complexity of this issue could be a demotivating factor for health professionals to engage in nutrition discussions.

6.1.2.2 Awareness of ADG / Australian Guide to Healthy Eating (AGHE): addressing research question one

The ADG and AGHE were designed and developed based on the latest evidence to advise the public on health and wellbeing (10). We sought to investigate participants' awareness of the national dietary guidelines and if they found them useful in providing nutrition care. Although almost all interview participants were familiar with the ADG, when they were asked if they were aware of the pictorial representation of the guidelines, AGHE, some referred to the 'food pyramid.' Similar findings were reported in a recent study among Australian personal trainers (106). The food pyramid was never part of the pictorial guidance from the government authority (107). A non-government organization, Nutrition Australia, introduced the Healthy Eating Pyramid in alignment with the ADG (108).

Not a single participant with extra training in nutrition agreed with AGHE's content. They criticized some information portrayed on the diagram as not evidence-based; for instance, the inclusion of processed and non-wholegrain foods. Both interview and survey participants with nutrition training commented negatively on the guidelines. The latest national survey among GPs in Australia found similar results; GPs felt that the current guidelines were outdated (104), and refused to refer to the ADG to advise their patients. However, other results of the same survey reported that some GPs use the SNAP document more than the ADG, indicating that health professionals might prefer documents explicitly designed for them instead of commonly available materials, even though the source and content of nutrition information are identical (34, 104).

The majority of survey respondents (80%) were confident with their knowledge regarding the AGHE, including the details on servings and sizes according to food groups, different ages, and genders. However, this dropped to 58% who were confident to use the guidelines to assess the appropriateness of patients' food intake. Further analysis of the data showed participants with nutrition-training were significantly more confident with their knowledge on AGHE compared with those without training. These findings suggest that although participants were confident with their knowledge of AGHE, nutrition-training is still essential if they are to use AGHE as a tool to assist them in assessing patients' food intake.

Snodgrass et al. (68) suspected that the physiotherapists who participated in their study might not be providing dietary advice in line with ADG, given that they reported a low level of knowledge with best practice dietary management. In our study, participants showed a higher level of knowledge in terms of acknowledging the impact of nutrition on health, chronic diseases, and weight loss. Nevertheless, based on the self-reported confidence assessment, fewer participants were confident to use AGHE to provide nutrition care.

6.1.3 Confidence in the provision of nutrition care: addressing research question two

Findings from the qualitative study indicated that views on the scope of practice were a key factor in determining nutrition care practices among the participants. Most participants in both studies considered providing nutrition care to be within their scope of practice. Participants who did not believe nutrition care to be within their scope indicated a lack of nutrition-training as the main reason. However, even those without training in nutrition agreed with other participants that nutrition care is vital for their patients.

All participants were cognizant that they should not be stepping outside their scope of practice to include nutrition care in a physiotherapy setting. Participants' perceptions of whether discussion of nutrition care is within their scope of practice largely depended on:

i) clarity on whether nutrition care is considered as falling within the promotion of healthy eating
ii) whether nutrition was included in their professional training
iii) whether they were practicing in rural or regional areas.

According to NHMRC guidelines, health professionals in Australia could provide healthy eating advice by referring to the ADG (9, 109) without going outside their scope of practice. Most of the interview participants were not clear about this, although they were very motivated to provide nutrition care for their patients.

The lack of nutrition-training was closely related to participants' perspectives on the scope of practice and led some to believe that they should not discuss nutrition with their patients. This notion strongly contributes to professional silos or demarcations (44) although, the physiotherapy professional bodies in Australia have encouraged their health professionals to follow a holistic approach in patient management (40, 63) as detailed in the Introduction Chapter. Hence, some participants pursued extra training in nutrition to enable them to provide nutrition care and expand their scope of practice.

Survey participants' confidence to provide nutrition care was evaluated using NUTCOMP; a validated questionnaire for assessing self-perceived nutrition competence, designed especially for primary health professionals (33). Two questions from NUTCOMP specifically analyzed participants' confidence in nutrition and communication skills; results were presented in Chapter 5 (sections 5.4.5 and 5.4.6).

Participants were almost equally split between confident (47%) and not confident (53%) in their ability to provide nutrition care that could improve patients' food intake. Similar results were reported by Snodgrass et al. (68) with 48% physiotherapists feeling confident and 52% not confident in making dietary recommendations. O'Donoghue et al. (65) reported that although 74% of physiotherapists in their study acknowledged the importance of promoting a healthy diet, they were not confident that their counselling in nutrition would be effective. However, almost all respondents (91%) in the current study were confident with their ability to recognize the need for referral for dietary advice among their patients. Together these findings indicated that in general, participants were only partially confident to provide nutrition care or verbal advice that may improve patients' dietary behaviour; but they seemed more confident to refer patients to dietitians who are experts in providing nutritional advice.

Overall the NUTCOMP scores indicated that the participants were confident with their nutrition knowledge, skills, communication and counselling practices as well as having favourable attitudes towards providing nutrition care for their patients. Given that physiotherapists are primary health professionals with prolonged contact- time with patients (110), they are well-positioned to provide nutrition care to patients. Participants' nutrition-training experience showed a statistically significant association with the overall nutrition competency score. This finding strongly suggests that nutrition-training could enhance provision as well as the confidence to provide nutrition care.

Although the NUTCOMP score suggested that the participants were confident in providing nutrition care, it should be acknowledged that the assessment has limitations. Given that the score was based on a self-perceived confidence scale, participants could have over-rated their competence. Nevertheless, almost half of the physiotherapists in this study also reported that they had undergone nutrition-training, and the average score could be genuinely demonstrating their capability to provide nutrition care. Personal trainers, who are clinically less trained than physiotherapists, reported higher scores on the NUTCOMP survey compared to participants in this study, suggesting that personal trainers were more confident to provide nutrition care (80). However, compared to the pilot study tested among dietitians who are specialists in providing nutrition care and speech pathologist who are less experienced in nutrition services (33), physiotherapists in this study scored higher than speech pathologists and lower than dietitians. The actual competence of physiotherapists to provide productive nutrition care to patients needs further investigation.

6.1.3.1 Barriers and enablers: addressing research question two

Most barriers identified by the participants in both qualitative and quantitative studies were closely related to the scope of practice. These included lack of nutrition-training, concerns about patient perception, and lack of clarity on whether promoting healthy eating is an appropriate role for physiotherapists. The qualitative investigation indicated that these barriers influenced participants' beliefs of what constitutes their scope of practice, which impacted their provision of nutrition care in the clinical setting.

Almost all interview participants saw a lack of nutrition education and training as the main barrier to nutrition care provision and consistently suggested extra nutrition-training as central to enhance this. Both this barrier and the facilitator relating to nutrition-training is in line with the findings from PNs (86). Survey participants also highlighted that encouragement or statements from APA would be as important as nutrition-training. This suggests that the participants were hoping to get some form of confirmation from their professional body that nutrition care is accepted as health promotion and regarded within their scope of practice.

Although physiotherapists are internationally recognized as having prolonged contact hours with patients (53), participants highlighted time as a barrier to provide nutrition care. Given that health professionals not specialized in nutrition have time limitations in their practice, perhaps non-complicated and straightforward messages would be ideal, as found in this study and similarly highlighted in a national survey with GPs in Australia (104). 'Time pressure' was the main barrier identified by the GPs as a reason for not offering nutrition advice in the national study (104).

The length of time spent practicing in physiotherapy might be a factor in determining the barriers as well as facilitators in performing nutrition care. A senior interview participant with 40 years of experience as a physiotherapist did not list any barriers to providing nutrition care. Another participant with similar working experience shared her strategy of using dietary screening questions as part of the routine physiotherapy assessment, conducted at the beginning of a consultation, which usually initiated a nutrition discussion. Similar findings were noted in the survey results, with older participants who had long working experience reporting no barriers to providing nutrition care.

Besides extra nutrition-training, the majority of participants suggested evidence-based reference materials and resources as facilitators to providing nutrition care in physiotherapy. While pursuing nutrition-training might be time-consuming, the availability of such materials could benefit the patients and help to initiate health promotion with brief intervention. Some interview participants reported using reference materials from professional bodies such as the Continence Foundation Australia and *Life!* Program; such reliable reference tools boost participants' confidence to provide nutrition care to their patients. However, a recent national survey among GPs found that less than half of the participants were aware of the nutrition guidelines, including the SNAP guidelines (104). The availability of reference materials alone may not be enough, and personal interest in integrating nutrition care might be essential. Some participants suggested personal interest as a facilitator for nutrition care.

In terms of nutrition-training for physiotherapists, quantitative findings indicated that the majority of participants preferred to engage in such training via professional development rather than as part of their undergraduate education. Computer-based or internet-based education would be an excellent opportunity to overcome barriers in pursuing nutrition-training (111), especially for health professionals with time-constraints to engage in extra training while practicing.

6.1.4 Physiotherapists knowledge and health behaviours: addressing research question three

We sought to explore how much physiotherapists are aware of evidence-based information, their perspective on being healthy role models for their patients, and how this relates to their eating habits. Survey findings indicated that the majority of participants have knowledge about the impact of diet on NCDs and health, as well as being cognizant of recent evidence-based information.

The majority of participants agreed that increased intake of fruits and vegetables is associated with reduced risk of heart disease, stroke, and weight gain, while only 6% of participants disagreed. Thus the majority of participants in this study are in line with the current evidence (13), in contrast to American physiotherapists who participated in Black et al. 's study (69), where almost 25% disagreed with the statements that eating more fruits and vegetables is a recommended behaviour.

Most participants, 86% agreed with the statement '*Healthy diet is more effective than just increasing physical activity levels for weight loss*,' demonstrating that the majority of participants in the study recognized the importance of diet for weight loss. This is in contrast to the report by Snodgrass et al. (68), from a small sample (n=65) of physiotherapists, almost

62% disagreed with a similar statement. The number of participants in the present study (n=339) is nearly fivefold higher than the number in Snodgrass et al. 's study (68), which came from a single region in NSW. Furthermore, our participants were from all states in Australia, including those practicing in regional, urban, and mixed areas; therefore, the difference in findings of both studies is not surprising.

Although almost all participants (93%) in this study agreed that physiotherapists serve as healthy role models for their patients, the proportion decreased slightly (85%) for those agreeing that physiotherapists should actively assist in improving patients' dietary behaviour. Similar findings were seen in an American study (69), where more than 90% of participants agreed to general statements on role modeling for healthy behaviours, but when the statements were specifically on eating behaviour, only about 73-77% of participants agreed.

A simple diet score was calculated for participants who responded to all ten questions in this section. All items in the diet score-segment were modified from a quick quiz (10), testing how closely food consumption accords with the national guidelines. Based on the original rating (10), more than half of the respondents were healthy eaters. When the findings were checked for association with participants' responses in role modeling for healthy behaviours and their frequency of encouraging healthy eating with patients, both aspects were weakly but statistically significantly associated. This means that participants' own health behaviours were significantly related to their promotion of healthy eating with their patients; i.e., they practiced what they preached.

Fifty-seven percent of our participants were healthy eaters, and similarly, 60% of a sample of American physiotherapists (69), reported consuming sufficient fruits and vegetables. Healthy eating behaviour among the American physiotherapists (69) was only determined based on fruit and vegetable consumption, whereas, in this study, intake of all food groups was considered to determine if the participants were eating healthily.

Implication for practice

The findings of this study indicate that Australian physiotherapists have the potential to provide nutrition care as part of a holistic approach with patient treatment and management. This capability and their current practices of nutrition care are parallel with the health promotion advocacy and NCDs prevention by Dean et al. (53, 103, 112) and Morris et al. (62) as detailed in the introduction chapter (section 1.5.1). Dean and colleagues on behalf of the World Confederation for Physical Therapy (WCPT) have repeatedly stated that all health professionals should be advocating for and prioritizing healthy lifestyle measures to their patients for long-term health outcomes and reduced risks for NCDs. Considering the barriers highlighted by participants in this study, this could be rapidly implemented via professional development training in nutrition alongside encouragement from APA, stating that nutrition care is within the physiotherapy' scope of practice.

Dean et al. have published recommendations for the minimum health competency standards that can be readily integrated into practice to enhance health and reduce the risk of NCDs in every patient (56). These broadly address lifestyle behaviours on smoking cessation, healthy nutrition, weight maintenance, reduced sitting, increased physical activity, optimal sleep, and

stress management. Previous studies have examined interventions by physiotherapists in smoking cessation (79, 113) and physical activity (114-116). The novel findings of this thesis complement the evidence for the recommendation by Dean et al. (56) addressing 'healthy nutrition.'

This study shows that Australian physiotherapists are indeed very committed to providing nutrition care, and this could be further improved by policy guidance from their national professional body, APA. For example, The American Physical Therapy Association (APTA) has published on its web page that the role of the physiotherapist is to screen and provide diet and nutritional information to patients as part of their scope of practice (117). The APTA website also clearly provides information for its members regarding the questions that may arise in terms of providing nutrition care within their capabilities.

Health promotion content, such as basic nutrition, is not covered in most health professional programs (118), as reported by our interview participants. Curriculum crowding is a significant barrier to integrating basic nutrition into the curriculum (119). However, given the priority and importance of the topic relating to modifiable risk factors for NCDs, Dean and colleagues argued that a crowded curriculum for physiotherapy education is not an acceptable excuse to ignore this topic (53). Regarding incorporating basic nutrition into physiotherapy curricula, lessons could be learnt from earlier efforts (120) to integrate nutrition education into medical curricula in Australia. Given the critical role of nutrition in health promotion, Nowson et al. developed a web-based Nutrition Competency Implementation Toolkit (121) to embed nutrition competencies in medical curricula (118). Perhaps a similar approach can be used to integrate basic nutrition content into physiotherapy curricula as an effort to increase physiotherapists' confidence and expand the scope of practice in providing nutrition care actively.

6.2 Conclusion

This pioneering research provides evidence of Australian physiotherapists' nutrition care practices, knowledge of, their confidence and barriers in providing nutrition care. The primary findings of the study are that participants saw nutrition care as vital to addressing their patients' conditions and an essential element of holistic treatment. Nutrition care was considered to be relevant to all patients regardless of their presenting conditions. The main practices of nutrition care undertaken by participants in this study were referring patients to a dietitian for specific advice, and encouraging patients with poor diet to increase the intake of healthy foods. Almost all survey participants encouraged healthy eating for patients, with close to 40% reporting this as a regular practice. Participants opted to offer 'basic healthy eating advice' on drinking water and minimizing the intake of less healthy food, i.e., processed and sugary food, as well as alcohol reduction. Less commonly offered was advice on increasing the intake of healthy foods such as fruits and vegetables. Although the majority of participants were confident with their own knowledge of AGHE, fewer participants were confident to use the guidelines as a tool to assess the appropriateness of patient's food intake.

Physiotherapists who participated in this study were confident with their nutrition-related knowledge, skills, communication, and expressed favourable attitudes towards the provision of nutrition care to their patients. The majority of participants reported barriers to providing nutrition care were mainly due to a lack of clarity on whether nutrition care is within their scope of practice. Other barriers were lack of nutrition-training or education, lack of time, patient-perception that nutrition care is not within the scope of physiotherapy, and lack of resources. The findings of this study indicate that although participants were highly motivated to provide nutrition care, they felt that nutrition-training would be vital to enhance this. Furthermore, they also highlighted that encouragement or position statements from their professional body, APA, is equally important for them to engage in nutrition care.

More than half of the participants reported eating healthily, adhering to the national dietary guidelines. Physiotherapists' eating behaviour showed a significant association with their frequency of encouraging patients to eat healthily and their perception of being a healthy role-model for their patients. Participants in this study have demonstrated that besides recognizing the significance of a holistic approach in patient management, which is evident with their current practice of delivering nutrition care, their own health behaviours provide further support that they are credible to engage in nutrition care with their patients. For physiotherapists who are motivated to provide nutrition care but hesitating due to lack of clarity with their scope of practice, potentially, policy statements from their professional association, APA and inclusion of basic nutrition training could rapidly enhance nutrition care provision in physiotherapy settings.

Suggestions for future research

Some participants in this study saw that incorporating nutrition components in their tertiary education might be difficult due to the crowded curriculum. However, there is an opportunity to include nutrition care training under professional development or as a final year training component. This could be included as part of health promotion or as part of an

interprofessional topic. Exploring physiotherapy academics' perception of integrating basic nutrition topics into physiotherapy curricula would be very valuable for future investigation.

Likewise, exploring patients' perceptions concerning nutrition care provision in physiotherapy settings will also be important for future research. Some participants of this study thought that patients would not assume nutrition care to be part of physiotherapists' scope of practice and considered it as a barrier to discussing healthy eating. Future studies investigating patients' opinions would provide further guidance to incorporate nutrition care in physiotherapy.

REFERENCES

1. World Health Organization. STATEMENT BY THE UNION FOR INTERNATIONAL CANCER CONTROL Hanoi, Vietnam2012 [Available from: http://apps.who.int/iris/bitstream/10665/137791/1/WPR_RC063_Statement_UICC_2012_en.pdf?ua=1.
2. World Health Organization. Noncommunicable diseases 2018 [updated Jun 2018. Fact sheet]. Available from: https://www.who.int/en/news-room/fact-sheets/detail/noncommunicable-diseases.
3. World Health Organization. Noncommunicable Diseases (NCD) Country Profiles 2018 Geneva, Switzerland: World Health Organization 2018; 2018 [Available from: http://www.who.int/nmh/countries/aus_en.pdf?ua=1.
4. AIHW. Australian Burden of Disease Study 2015: Interactive data on risk factor burden. Canberra: Australian Institute of Health and Welfare 2019.
5. Vorster HH. Introduction to Human Nutrition: A Global Perspective on Food and Nutrition. In: Gibney MJ, Lanham-New SA, Cassidy A, Vorster HH, editors. Introduction to Human Nutrition: John Wiley & Sons; 2009.
6. National Public Health P. Eat Well Australia: An Agenda for Action for Public Health Nutrition, 2000-2010. Canberra Instant Colour Press; 2001.
7. Rayner M, Scarborough P. The Burden of Food Related Ill Health in the UK. Journal of Epidemiology and Community Health. 2005;59(12):1054-7.
8. Whitney EN, DeBruyne LK, Pinna K, Rolfes SR. Nutrition for health and health care / Ellie Whitney ... [et al.]: USA : Wadsworth, 2011. 4th ed.; 2011.
9. National Health and Medical Research Council. Australian Dietary Guidelines. Canberra: National Health and Medical Research Council; 2013.
10. National Health and Medical Research Council. Eat for Health, Australian Dietary Guidelines Summary. In: Department of Health and Ageing, editor. Canberra: NHMRC; 2013.
11. van Dokkum W, Frølich W, Saltmarsh M, Gee J. The health effects of bioactive plant components in food: results and opinions of the EU COST 926 action. Nutrition Bulletin. 2008;33(2):133-9.
12. Australian Bureau of Statistics. National Health Survey: First Results, 2017-18. Canberra2018.
13. National Health and Medical Research Council. A review of the evidence to address targeted questions to inform the revision of the Australian dietary guidelines. In: Department of Health and Ageing, editor. Canberra2011.
14. Field AE GM, Rosner B, Rockett HR, Colditz GA. Association between fruit and vegetable intake and change in body mass index among a large sample of children and adolescents in the United States. International journal of obesity. 2003(7).
15. He FJ, Nowson CA, MacGregor GA. Fruit and vegetable consumption and stroke: meta-analysis of cohort studies. Lancet. 2006;367 North American Edition(9507):320-6.
16. Dauchet L, Amouyel P, Dallongeville J. Fruit and vegetable consumption and risk of stroke: a meta-analysis of cohort studies. Neurology. 2005;65(8):1193-7.
17. Ball L, Lee P, Ambrosini GL, Hamilton K, Tuffaha H. How often should general practitioners provide nutrition care to patients? A forecasting activity to determine the target frequency for chronic-disease management in Australia. Australian Journal of Primary Health. 2016;22(5):383-7.
18. VicHealth. Obesity and healthy eating in Australia-Evidence summary. In: Foundation VHP, editor. Melbourne: VicHealth; 2016.
19. Segal L, Opie R. A nutrition strategy to reduce the burden of diet related disease: access to dietician services must complement population health approaches. Frontiers in Pharmacology. 2015;6(160).
20. Dietitians Association of Australia. Chronic Disease Prevention and Management in Primary Health Care2015.

21. World Cancer Research Fund International. NOURISHING framework 2017 [updated 18 October 2017. Available from: http://www.wcrf.org/int/policy/nourishing-framework.
22. LiveLighter. LiveLighter 2017 [Available from: https://livelighter.com.au/About/Background.
23. Australian Institute of Health and Welfare. Australia's Health 2014. Canberra: AIHW; 2014.
24. McElwaine KM, Freund M, Campbell EM, Bartlem KM, Wye PM, Wiggers JH. Systematic review of interventions to increase the delivery of preventive care by primary care nurses and allied health clinicians. Implementation science : IS. 2016;11:50.
25. Institute of Medicine (US) Committee on Nutrition Services for Medicare Beneficiaries. The role of nutrition in maintaining health in the nation's elderly : evaluating coverage of nutrition services for the medicare population: National Academy Press; 2000.
26. Health Workforce Australia. Australia's Health Workforce Series -Dietitians in Focus. In: Australia HW, editor. Adelaide: Health Workforce Australia; 2014.
27. Health Workforce Australia. Australia's Health Workforce Series - Physiotherapists in Focus. Health Workforce Australia; 2014.
28. Australian Bureau of Statistics. Population Projections, Australia, 2017 (base) - 2066 Canberra2018 [Available from: https://www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/3222.0Main%20Features52017%20(base)%20-%202066?opendocument&tabname=Summary&prodno=3222.0&issue=2017%20(base)%20-%202066&num=&view=.
29. Dietitians Association of Australia. Annual Report 2017-2018: Dietitians Association of Australia; 2018 [
30. National Health Workforce Dataset. Health Workforce Data 2019 [updated 5 March 2019. Available from: https://hwd.health.gov.au/summary.html#part-6.
31. Ball L, Leveritt M, Cass S, Chaboyer W. Effect of nutrition care provided by primary health professionals on adults' dietary behaviours: a systematic review. Family Practice. 2015;32(6):605-17.
32. Ball L, Desbrow B, Leveritt M. An exploration of individuals' preferences for nutrition care from Australian primary care health professionals. Australian Journal Of Primary Health. 2014;20(1):113-20.
33. Ball LE, Leveritt MD. Development of a validated questionnaire to measure the self-perceived competence of primary health professionals in providing nutrition care to patients with chronic disease. Fam Pract. 2015;32(6):706-10.
34. Royal Australian College of General Practitioners (RACGP). Smoking, nutrition, alcohol, physical activity (SNAP): A population health guide to behavioural risk factors in general practice. 2nd ed. Melbourne2015.
35. Harris J, Felix L, Miners A, Murray E, Michie S, Ferguson E, et al. Adaptive e-learning to improve dietary behaviour: a systematic review and cost-effectiveness analysis. Health technology assessment (Winchester, England). 2011;15(37):1-160.
36. Australian Bureau of Statistics. Australian Health Survey: Users' Guide, 2011-13 - Dietary behaviours. Canberra: Australian Bureau of Statistics; 2013.
37. Crowley J, O'Connell S, Kavka A, Ball L, Nowson CA. Australian general practitioners' views regarding providing nutrition care: results of a national survey. Public Health. 2016:7.
38. Caryl AN, Stella LOC. Nutrition Knowledge, Attitudes, and Confidence of Australian General Practice Registrars. Journal of Biomedical Education, Vol 2015 (2015). 2015.
39. Martin L, Leveritt MD, Desbrow B, Ball LE. The self-perceived knowledge, skills and attitudes of Australian practice nurses in providing nutrition care to patients with chronic disease. Fam Pract. 2014;31(2):201-8.
40. Australian Physiotherapy Association. Position Statement: Chronic Disease and Physiotherapy 2009 [Available from: https://www.physiotherapy.asn.au/DocumentsFolder/Advocacy_Position_Chronic_Disease_2009.pdf.

41. The Department of Health. Chronic Disease Management - Individual Allied Health Services under Medicare - Provider Information 2014 [updated 24 March 2014. Available from: https://www1.health.gov.au/internet/main/publishing.nsf/Content/health-medicare-health_pro-gp-pdf-allied-cnt.htm.
42. Health Workforce Data. Health Workforce Summaries 2019 [updated 5 March 2019. Available from: https://hwd.health.gov.au/summary.html#part-3.
43. Australian Physiotherapy Association. Physiotherapy in Australia Hawthorn [Available from: https://www.physiotherapy.asn.au/APAWCM/Physio_and_You/physio/APAWCM/Physio_and_You/physio.aspx?hkey=25ad06f0-e004-47e5-b894-e0ede69e0fff.
44. Samantha A, Carole J, Ronald P, Clare C, Maya G, Ashley K, et al. Survey of Australian practitioners' provision of healthy lifestyle advice to clients who are obese. Nursing and Health Sciences. 2012(2):189.
45. Rea BL, Marshak HH, Neish C, Davis N. The role of health promotion in physical therapy in California, New York and Tennessee. Physical Therapy. 2004;84(6):510-23.
46. Black B, Ingman M, Janes J. Physical Therapists' Role in Health Promotion as Perceived by the Patient: Descriptive Survey. Physical Therapy. 2016;96(10):1588-96.
47. Australian Health Practitioner Regulation Agency. 2015/16 Annual Report Summary of the work of the Physiotherapy Board of Australia. Australian Health Practitioner Regulation Agency 2017.
48. Setchell J, Watson BM, Gard M, Jones L. Physical therapists' ways of talking about overweight and obesity: clinical implications. 2016:865.
49. Australian Physiotherapy Association. Australian Physiotherapy Association Scope of Practice Explainer 2017 [Available from: https://www.physiospot.com/2017/03/15/australian-physiotherapy-association-scope-of-practice-explainer/.
50. Australian Physiotherapy Association. APA Position Statement: Scope of practice2009. Available from: http://www.physiotherapy.asn.au/DocumentsFolder/Advocacy_Position_Scope_of_Practice_2009.pdf.
51. World Confederation for Physical Therapy. About WCPT 2019 [Available from: https://www.wcpt.org/about.
52. World Health Organization. International Classification of Functioning, Disability and Health. Geneva, Switzerland2001 [Available from: http://www.who.int/classifications/icf/en/.
53. Dean E, Bruno S, Olsén MF, Umerah G, Moffat M. "Best" Inter-Professional Practice in Healthcare: Bridging the Knowledge Translation Gap in Relation to Non-Communicable Diseases. International Journal of Health, Wellness & Society. 2015;5(4):123-33.
54. World Confederation for Physical Therapy. Non-communicable diseases 2016 [Available from: http://www.wcpt.org/node/100043.
55. World Confederation for Physical Therapy. WCPT Network for Health Promotion in Life and Work (HPLW) 2016 [Available from: http://www.wcpt.org/node/100327.
56. Dean E, Skinner M, Myezwa H, Mkumbuzi V, Mostert K, Parra DC, et al. Health Competency Standards in Physical Therapist Practice. Physical Therapy. 2019.
57. Dean E. Physical therapy in the 21st century (Part I): Toward practice informed by epidemiology and the crisis of lifestyle conditions. Physiotherapy Theory & Practice. 2009;25(5/6):330-53.
58. Dean E. Physical therapy in the 21st century (Part II): Evidence-based practice within the context of evidence-informed practice. Physiotherapy Theory & Practice. 2009;25(5/6):354-68.
59. Bury T, Moffat M. Physiotherapists have a vital part to play in combatting the burden of noncommunicable diseases. Physiotherapy. 2014;100(2):94-6.
60. Schoeb V. Non-communicable diseases are the biggest challenges of the 21st century: What is the physiotherapist's role in global health? Hong Kong Physiotherapy Journal. 2016;35:A1-A2.

61. Dean E. Physical Therapy Practice in the 21st Century: A New Evidence-informed Paradigm and Implications'. Foreword from the special issue editor. Physiotherapy theory and practice. 2009;25(5-6):328-9.
62. Morris DM, Kitchin EM, Clark DE. Strategies for optimizing nutrition and weight reduction in physical therapy practice: the evidence. Physiotherapy Theory & Practice. 2009;25(5/6):408-23.
63. Physiotherapy Board of Australia & Physiotherapy Board of New Zealand. Physiotherapy practice thresholds in Australia and Aotearoa New Zealand. 2015.
64. Milton Keynes Primary Care Trust. 11 questions to help make sense of a descriptive/cross-sectional studies (n.d) [Available from: https://reache.files.wordpress.com/2010/03/cross-sectional-appraisal-tool.pdf.
65. O'Donoghue G, Cunningham C, Murphy F, Woods C, Aagaard-Hansen J. Assessment and management of risk factors for the prevention of lifestyle-related disease: a cross-sectional survey of current activities, barriers and perceived training needs of primary care physiotherapists in the Republic of Ireland. Physiotherapy. 2014;100(2):116-22.
66. Abaraogu UO, Mary O. Ogaga, Eric Odidika, Jose Frantz. Promotion of healthy nutrition in clinical practice: A cross-sectional survey of practices and barriers among physiotherapists in southeast Nigeria. Hong Kong Physiotherapy Journal, Vol 35, Iss C, Pp 21-29 (2016). 2016(C):21.
67. Abaraogu UO, Ogaga MO, Dean E. Practices of Nigerian physiotherapists with respect to lifestyle risk factor assessment and intervention: A national cross-sectional survey. Physiotherapy theory and practice. 2017:1-11.
68. Snodgrass SJ, Carter AE, Guest M, Collins CE, James C, Kable AK, et al. Weight management including dietary and physical activity advice provided by Australian physiotherapists: a pilot cross-sectional survey. Physiotherapy theory and practice. 2014;30(6):409-20.
69. Black B, Marcoux BC, Stiller C, Xianggui Q, Gellish R. Personal Health Behaviors and Role-Modeling Attitudes of Physical Therapists and Physical Therapist Students: A Cross-Sectional Study. Physical Therapy. 2012;92(11):1419-36.
70. Macfarlane DJ, Thomas GN. Exercise and diet in weight management: updating what works. British Journal of Sports Medicine. 2010;44(16):1197-201.
71. Merriam SB, Tisdell EJ. Qualitative research : a guide to design and implementation: San Francisco, CA : Jossey-Bass, [2016] Fourth edition.; 2016.
72. Creswell JW. A Concise Introduction to Mixed Methods Research. Los Angeles: SAGE; 2015.
73. Bowen GA. Naturalistic inquiry and the saturation concept: a research note. Qualitative research. 2008;8(1):137.
74. Vaismoradi M, Turunen H, Bondas T. Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. 2013. p. 398-405.
75. Braun V, Clarke V. Using thematic analysis in psychology. Qualitative Research in Psychology. 2006;3(2):77-101.
76. Grbich C. Qualitative data analysis : an introduction. 1st ed. ed: SAGE; 2007.
77. Green J, Thorogood N. Qualitative methods for health research. Third edition. ed: SAGE; 2014.
78. AHPRA. Physiotherapy Board of Australia Annual report summary 2017/2018. Melbourne: Australian Health Practitioner Regulation Agency; 2019.
79. Bodner ME, Miller WC, Rhodes RE, Dean E. Smoking Cessation and Counseling: Knowledge and Views of Canadian Physical Therapists. Physical Therapy. 2011;91(7):1051-62.
80. Barnes K, Desbrow B, Ball L. Personal trainers are confident in their ability to provide nutrition care: a cross-sectional investigation. Public Health. 2016:39.
81. National Health and Medical Research Council. Australian Dietary Guidelines Summary. Canberra: National Health and Medical Research Council; 2013.
82. Harris M, Taylor G, Harris M, Taylor G. Medical Statistics Made Easy 2e - now superseded by 3e. 2nd ed. ed: Scion Publishing; 2008.
83. Allen IE, Seaman CA. Likert Scales and Data Analyses. Quality Progress. 2007;40(7):64-5.

84. Kunstler BE. The self-reported factors that influence Australian physiotherapists' choice to promote non-treatment physical activity to patients with musculoskeletal conditions. Journal of science and medicine in sport. 2019;22(3):275.
85. Pomeroy SEM, Worsley A, editors. Nutrition care for adult cardiac patients: Australian GPs' perceptions of their roles2008 2008: Oxford University Press.
86. Cass S, Ball L, Leveritt M. Australian practice nurses' perceptions of their role and competency to provide nutrition care to patients living with chronic disease. Aust J Prim Health. 2014;20(2):203-8.
87. World Health Organization. Framework on integrated, people-centred health services Sixty-Ninth World Health Assembly [Internet]. 2016 September 2019; A69/39. Available from: http://apps.who.int/gb/ebwha/pdf_files/WHA69/A69_39-en.pdf?ua=1&ua=1.
88. World Health Organization. Essential nutrition actions: mainstreaming nutrition through the life-course2019. Available from: https://apps.who.int/iris/bitstream/handle/10665/326261/9789241515856-eng.pdf?ua=1.
89. Allison K, Setchell J, Egerton T, Delany C, Bennell KL. In Theory, Yes; in Practice, Uncertain: A Qualitative Study Exploring Physical Therapists' Attitudes Toward Their Roles in Weight Management for People With Knee Osteoarthritis. 2019. p. 601-11.
90. Australian Institute of Health Welfare. Nutrition across the life stages Canberra: AIHW; 2018 [Available from: https://www.aihw.gov.au/reports/food-nutrition/nutrition-across-the-life-stages.
91. Setchell J, Watson BM, Gard M, Jones L. Physical Therapists' Ways of Talking About Overweight and Obesity: Clinical Implications. Physical Therapy. 2016;96(6):865-75.
92. Walls HL, Peeters A, Proietto J, McNeil JJ. Public health campaigns and obesity - a critique. BMC Public Health. 2011;11(1):136.
93. Willett W, Rockström J, Loken B, Springmann M, Lang T, Vermeulen S, et al., editors. Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems2019 2019; Great Britain: Elsevier Science B.V., Amsterdam.
94. Arheiam A, Brown SL, Higham SM, Albadri S, Harris RV. The information filter: how dentists use diet diary information to give patients clear and simple advice. 2016. p. 592-601.
95. Booth AO. Evaluation of a brief pilot nutrition and exercise intervention for the prevention of weight gain in general practice patients. Public health nutrition (Wallingford). 2006;9(8):1055.
96. Lesser L, Mazza M, Lucan S. Nutrition myths and healthy dietary advice in clinical practice. American family physician. 2015;91(9):634-8.
97. Lombardo M. Morning meal more efficient for fat loss in a 3-month lifestyle intervention. Journal of the American College of Nutrition. 2014;33(3):198.
98. Crowley JJ, Laur C, Carter HDE, Jones G, Ray S. Perspectives from the Third International Summit on Medical Nutrition Education and Research. Frontiers in public health. 2018;6:93.
99. Australian Medical Association. AMA Position Statement: Australian Medical Association Limited; 2018 [Available from: https://ama.com.au/position-statement/nutrition-2018.
100. Hassan Y, Head V, Jacob D, Bachmann MO, Diu S, Ford J. Lifestyle interventions for weight loss in adults with severe obesity: a systematic review. Clinical Obesity. 2016(6):395.
101. Dean E, Dornelas de Andrade A, O'Donoghue G, Skinner M, Umereh G, Beenen P, et al. The Second Physical Therapy Summit on Global Health: developing an action plan to promote health in daily practice and reduce the burden of non-communicable diseases. Physiotherapy Theory & Practice. 2014;30(4):261-75.
102. Dean E, Al-Obaidi S, De Andrade AD, Gosselink R, Umerah G, Al-Abdelwahab S, et al. The First Physical Therapy Summit on Global Health: Implications and Recommendations for the 21st century. Physiotherapy Theory & Practice. 2011;27(8):531-47.
103. Dean E, Creig A, Murphy S, Roots R, Nembhard N, Rankin A, et al. Raising the Priority of Lifestyle-Related Noncommunicable Diseases in Physical Therapy Curricula. Physical Therapy. 2016;96(7):940-8.

104. Royal Australian College of General Practitioners (RACGP). Views and attitudes towards physical activity and nutrition counselling in general practice: National survey report 2019. East Melbourne: RACGP; 2019.
105. Australian Institute of Health Welfare. Poor diet [Internet] Canberra: AIHW; 2019 [Available from: https://www.aihw.gov.au/reports/food-nutrition/poor-diet.
106. Barnes K, Ball L, Desbrow B. Personal Trainer Perceptions of Providing Nutrition Care to Clients: A Qualitative Exploration. International Journal of Sport Nutrition & Exercise Metabolism. 2017;27(2):186-93.
107. Dietitians Association of Australia. A Modelling System To Inform The Revision Of The Australian Guide To Healthy Eating.2011. Available from: https://www.eatforhealth.gov.au/sites/default/files/content/The%20Guidelines/n55c_australian_dietary_guidelines_food_modelling_140121.pdf.
108. Nutrition Australia. A brief history of the Pyramid [Available from: http://www.nutritionaustralia.org/national/healthy-eating-pyramid/brief-history-pyramid.
109. NHMRC. About the Australian Dietary Guidelines Canberra: NHMRC; 2015 [updated 23/7/2015. Available from: https://www.eatforhealth.gov.au/guidelines/about-australian-dietary-guidelines.
110. Delany C, Fryer C, Kessel G. An ethical approach to health promotion in physiotherapy practice. Health Promotion Journal of Australia. 2015;26(3):255-62.
111. Mogre V, Scherpbier AJJA, Stevens F, Aryee P, Cherry MG, Dornan T. Realist synthesis of educational interventions to improve nutrition care competencies and delivery by doctors and other healthcare professionals. BMJ Open. 2016;6(10):e010084-e.
112. Dean E, Moffat M, Skinner M, Dornelas de Andrade A, Myezwa H, Söderlund A. Toward core inter-professional health promotion competencies to address the non-communicable diseases and their risk factors through knowledge translation: curriculum content assessment. BMC Public Health. 2014;14:717-.
113. Bodner ME, Rhodes RE, Miller WC, Dean E. Smoking cessation and counseling: practices of Canadian physical therapists. Am J Prev Med. 2012;43(1):67-71.
114. Kunstler B. Physical activity promotion in Australian physiotherapy practice: how do physiotherapists promote physical activity and what factors influence promotion? (PhD Academy Award). British Journal of Sports Medicine. 2020;54(5):306.
115. Shirley D, van der Ploeg HP, Bauman AE. Physical Activity Promotion in the Physical Therapy Setting: Perspectives From Practitioners and Students. Physical Therapy. 2010;90(9):1311-22.
116. Kunstler B, Fuller R, Pervan S, Merolli M. Australian adults expect physiotherapists to provide physical activity advice: a survey. Journal of Physiotherapy. 2019;65(4):230-6.
117. American Physical Therapy Association. Nutrition and Physical Therapy 2018 [updated 5/17/2018. Available from: https://www.apta.org/PatientCare/Nutrition/.
118. Penny M K-E, Sharon R A, Pauline D, Martin K, Celia L, Carine M L, et al. Nutrition Competencies in Health Professionals' Education and Training: A New Paradigm. Advances in Nutrition. 2015(1):83.
119. Crowley J, Ball L, Hiddink GJ. Nutrition in medical education: a systematic review. The Lancet Planetary Health. 2019;3(9):e379-e89.
120. Van Horn L, Lenders CM, Pratt CA, Beech B, Carney PA, Dietz W, et al. Advancing Nutrition Education, Training, and Research for Medical Students, Residents, Fellows, Attending Physicians, and Other Clinicians: Building Competencies and Interdisciplinary Coordination. Advances in Nutrition. 2019;10(6):1181-200.
121. Nowson C. A web-based nutrition competency implementation toolkit for entry-level medical courses. Final report.; 2015.
122. Fink ML, Black B, Butt SL, Fenning SM, Sharkey KM. Health Behaviors of Physical Therapists and Physical Therapist Students in South-central Pennsylvania. HPA Resource. 2014;14(4):J1.

APPENDICES

Summary of studies among the primary care professionals with the provision of nutrition care.	**APPENDIX 1**
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Summary of studies among the primary care professionals with the provision of nutrition care.

Author	Research type	N=?	Health professional studied	Barriers reported & other essential notes	Aim of study	Summary of main findings
Crowley, O'Connell (37)	National survey	322	GPs	Lack of time Lack of knowledge/ training	To describe GPs perceived interest, confidence & barriers to support patients to have a healthy diet	GPs shown interest to provide nutrition care. Educational exposure is essential to improve GP's competence to provide nutrition care.
Martin, Leveritt (39)	Cross-sectional online survey	181	PNs	Lack of time Lack of knowledge/ training Uncertainty – basic nutrition advice to deliver Only 50% referred to national dietary guidelines	To investigate PNs' perception to provide nutrition care to patients living with chronic diseases	PNs perceived key role to provide nutrition care. Further training & education is favoured to improve effectiveness.
Caryl and Stella (38)	Online nutritional survey	93	GP Registrars	Lack of time Lack of knowledge/ training	To assess GP Registrars' nutrition knowledge, perceived role GP Registrars providing nutrition advice	GP Registrars understood key dietary recommendation for reducing CVS risk and presented mixed level of confidence to provide nutrition advice. Nutrition education is recommended to improve confidence and competence of GP Registrars.

Summary of cross-sectional studies among physiotherapists (physios) relating to dietary /nutrition advice with quality assessment (Part I).

Ref	**Country/ Region**	**Study design/ Methods used**	**N=?**	**Aim of study / Type of intervention investigated**	**Summary of main findings**	**Quality of article Good/ Moderate/ Poor** (based on number of criteria met)
Abaraogu, 2017(67)	Nigeria	Cross-sectional survey Questionnaire = 23 questions	451 physios	To describe lifestyle-related risk factor assessment and intervention practices of Nigerian physios, their perceived barriers to such practices, and education needs. **Diet / dietary advice** was part of the lifestyle risk factors studied	The studied Nigerian physios inconsistently assessed lifestyle-related risks and intervened to address them. Education is required to address barriers to health promotion practices perceived by the physios.	Good (9/11)
Abaraogu, 2016(66)	Nigeria Southeast Nigeria	Cross- sectional survey Questionnaire = 23 questions	103 physios	**To determine the practices about and barriers to diet counselling practices among physios** in Southeast Nigeria. **Diet counselling** – solely studied	While physios recognised importance of incorporating diet counselling in their practice, there is need for development and implementation strategies to improve their diet counselling knowledge, competence, skills and practice.	Good (7/11)
Snodgrass, 2014(68)	Australia Hunter New England, NSW	Cross- sectional survey Questionnaire = 48 open-ended & close-ended questions	65 physios	To determine the practices, beliefs, attitudes and knowledge of physios regarding provision of weight management advice to overweight/ obese clients. **Dietary advice** was one variable in the study	Physios believe that provision of weight management advice (dietary & physical activity) is within the scope of their practice. Only a few provided dietary advice while most provided physical activity advice, and these were closely associated with their experience in weight management training. The study indicated the need for professional entry level physiotherapy education and professional development to equip them with sufficient dietary and physical activity knowledge to manage obese clients.	Good (8/11)

O'Donoghue, 2014(65)	Ireland	Cross- sectional survey Questionnaire = 23 questions	163 physios	To provide a snapshot of current activities, barriers and perceived training needs for the assessment and management of behavioural risk factors in physiotherapy practice in primary care setting in the Republic of Ireland. **Diet** was one variable in the study	The study highlighted untapped potential of physios in addressing lifestyle-related risk factors. However, strategies are needed to improve the systematic assessment and management of these risk factors.	Moderate (4/11)
Black, 2016(46)	USA 8 outpatient clinics in Michigan & Minnesota	Multicentre cross-sectional survey Questionnaire = 34 questions	230 patients	i) To determine patients' opinions regarding physios discussing the topics of physical activity, smoking, fruit and vegetable consumption, and maintaining a healthy weight during clinical visits. ii) To determine whether patients believe that physios should be role models for these behaviours. Diet (**fruit & vegetable consumption**) was a variable in the study	Most patients believed that it is appropriate for their physio to talk about and role model healthy behaviours such as physical activity, maintaining healthy weight and smoking cessation. Majority of patients did not agree on the need for physios to discuss or role model fruit and vegetable consumption.	Good (7/11)
Fink, 2014(122)	USA South-central Pennsylvania	Cross- sectional survey Online questionnaire	106 physios 157 physio' students	To describe and compare the health behaviours of physios and physio' students in south-central Pennsylvania **Diet** was one variable in the study	Physios and physio' students should exemplify the same healthy behaviours recommended to patients by involving in adequate amount of exercise, eating a balanced diet, improving sleep behaviours and managing stress.	Poor (3/11)
Black, 2012(69)	USA	Cross- sectional survey	405 physios 329 physio' students	To describe the health behaviours and role-modelling attitudes of physios and physio' students. Diet (**fruit & vegetable consumption**) was a variable in the study	Physio and physio' students were similarly engaged highly in health promoting behaviours but varied in role-modelling attitudes.	Good (8/11)

Further summary of selected studies (good/moderately good) among the physiotherapists (physios) relating to dietary /nutrition advice (Part II).

Ref	Limitation	Strength	Source of samples recruitment	Main findings relating to diet / nutrition	Relevance to the proposed study
Abaraogu, 2017 (67)	- Total physios in Nigeria not clearly described. - Author compared recruited data based on gender to a paper published 12years ago (among Nigerian university graduates) to justify that the current data was representative of all Nigerian physios. - Although good effort made to recruit physios from the whole nation, the questionnaires were distributed only by one person to 6 regions and 24 states. - Author claimed to use a validated tool from O'Donoghue 2014(65) but there is no mention of validation in this reference	- Large sample from nationwide but most of the respondents are primarily from orthopaedics who also serviced other areas as needed such as neurological, paediatric, cardiopulmonary and woman's health - Identifying information was not included to assure confidentiality of participants. - Power calculation was included	The Medical Rehabilitation Therapist Board of Nigeria & Nigerian Society of Physiotherapy Primary investigator corresponded with administrators & heads of physiotherapy departments in hospitals, medical centres & clinics	**Assessing dietary status** in new patients Usually 26% Always 30% in return patients Usually 30% Always 23% Assessing readiness to change dietary practices Usually 30% Always 29% **Advice** to increase fruit/vege Usually + always 79% **Advice** to increase fibre intake Usually + always 71% **Frequency provided written advice** for balanced diet Usually + always 26% **Referral** to other providers Usually + always 49% **Importance of counselling** patients with healthy diet Very important 86% **Professional priority** to healthy diet Very important 68%	Although the physios inconsistently assessed diet, they were more likely to advise patients to change or improve their dietary behaviours. The low percentage of physios providing written dietary advice to their clients perhaps hinted at the lack of confidence to manage diet as a risk factor although the respondents have shown high tendency to intervene verbally. Further, to those who do prescribe written advice, what was the context of this advice? Whether it is based on dietary guidelines is worth exploring. Author emphasized the limitation of available data relating to physios around the world to compare and further improve the professions' curricula and professional development; in terms of health promotion.

				Perceived patient acceptance of dietary counselling 56% **Confidence** assessing nutritional status Very confident 50% **Perceived effectiveness** of advising patients to change unhealthy diet Very confident 59% **Perceived barrier** Lack of time Significant barrier 31% Not a barrier 34% Lack of access to counsellors Significant barrier 28% Not a barrier 33% Lack of patient interest Significant barrier 27% Not a barrier 24%	
Abaraogu, 2016 (66)	- The questionnaires were distributed, followed up and collected personally by final year physiotherapy students working as Research Assistants in the study. - Most respondents were primarily from orthopaedics who also serviced other areas as	- Author have listed detailed number of registered physios available in the studied region and attained a high response rate, 73%.	Nigerian Society of Physiotherapy	**Assessing dietary status** in new patients Usually 16.6% Always 19.4% in return patients Usually 19.4% Always 14.6% **Managing patients with poor diet** Gave advice: Increase fruit/vegetable	The questions were asked based on pathophysiologic risk factors such as obesity, glucose intolerance, hypertension and hyperlipidaemia, this seems unnecessary since the main point of improving the dietary behaviour is about the same for everyone. The basic dietary advice should be standard instead of emphasizing a certain criterion to one patient and not to another. Furthermore, specific nutrition counselling for such

	needed such as neurological, paediatric, cardiopulmonary and woman's health - Author claimed using validated tool from O'Donoghue 2014 (65)but there is no mention of validation in this reference - The study team had difficulty in determining the total number of physios in the region.			Usually 28.2% Always 41.7% Increase fibre Usually 25.2% Always 30.1% Written advice – balanced diet: Usually 22.3% Always 21.4% Referred to other service Usually 24.3% Always 23.3% **Beliefs** Importance of counselling healthy diet: Very important 87% Perception of patient acceptability of diet issue during consultation: Very acceptable 53% Perception of addressing diet as part of normal clinical work: High priority 66% Perception of assessing nutritional status: Very confident 42% Perception of effectiveness of advice to improve dietary habits:	medical condition is beyond the scope of practice of physios (62) Being in a third world country, Nigerian Physios encountered several barriers to incorporate diet advice in their practice; lack of access to dietitian, health promotion officers, lack of proper education materials, lack of healthy eating guidelines. These barriers are less likely in Australia; will our physios have fewer barriers?

				Somewhat - Very effective 90% **Perception of barrier to provide dietary advice** Lack of access to health promotion staff 83% Lack of proper patient education material 61% Uncertainty of what service to provide 34% Lack of expertise in dietary assessment & management 34%	
O'Donoghue, (65)	- No information on validation of the tool used in the study although it had been piloted and amended by five experienced physios. - Did not present detailed results of the study - Did not report on power calculation - The sampling of participants looks like those who are interested in community care which means the results may suffer from selection bias	- One of the earliest studies to report on physios' perceived role in assessing & managing behavioural risk factors including diet.	Inclusion criteria: Physios currently working in primary care The physiotherapy community care managers were contacted from Irish Society of Chartered Physiotherapists' Special Interest Group in Community Care	**Assessing dietary status in new patients** Always 8% Usually 15% Sometimes 55% 39% less likely to assess dietary assessment in follow up visits. **Managing diet as risk factor** About half (53%) sometimes provided educational materials relating to dietary intake specially increase fruit, vegetable and fibre intake.	Although many participants had a special interest in community care, only 23% reported that they always or usually assessed their clients for dietary status in new visits. The author failed to clearly describe how the participants managed diet as risk factor and how they promoted to improve diet among their patients. Although the author claimed that half of the respondents reported on assessing nutritional status, this appears to be invalid assumption as this is merely based on "sometimes" frequency.

				77% reported difficulty accessing dietetic services. 74% acknowledged importance of promoting healthy diet but not confident in delivering counselling and also believed that their counselling is ineffective 70% believed that patient did not accept them to raise on diet as it is not their conventional role **Barriers to assess & manage diet as risk factor** Lack of time: 74% Lack of expertise: 73% Lack of materials: 65% Lack of personal interest: 15% Lack of interest from patient: 55% Limited access to dietitian services: 84% **Training & education** Only 21% had attended training in nutrition over the past year	
Snodgrass, 2014 (68)	- The title mentioned as 'Australian physios' but participants were recruited only from one region of NSW which	- The first Australian study with dietary advice component	Physios working in private and government practices/ hospitals,	**Practices** Provided dietary advice 41.5%	One of the main finding of the study indicated that professional entry level education and training is essential to increase provision of dietary advice among the physios.

	limits the generalizability of findings to all Australian Physios. - Small sample - Only participants with interest in weight loss might have participated. - Snowball sampling could also have contributed to selection bias among the respondents. - No clear information of validation of the tool used in the study	- Analysis of descriptive statistics described in detail. - Questions included to test whether participants were up-to date with weight management information were included	community health services within the Hunter New England region of New South Wales	Provision of dietary advice and received training in weight management OR 8.8, 95% CI 2.0-38.9 *p*=0.004 **Management of obesity** Recommend low GI foods Frequently + Always=19% Reduce caloric intake Frequently + Always=15% Refer to diet/nutrition counselling Frequently + Always=18% **Beliefs** Providing dietary advice not within scope of practice: 9.2% Limitation to time: 7.7% Not feeling qualified: 6.2% Providing dietary advice not within field of expertise: 7.7% Limited training: 9.2% Limited knowledge: 7.7% **Attitudes/Confidence:** Assessing dietary intake: Not confident: 67% Dietary recommendation: Confident: 18% Not confident: 52% **Knowledge**	However, given that nature of sampling in the study focused on those with interest in weight loss, this result might not be the same if the participants had the training but no interest in weight loss. Given that the participants reported low level of knowledge regarding dietary management of obese patients; the author suspects the possibility- provision of dietary advice not in line with the national guidelines, which further strengthens the need to confirm this.

				Low level knowledge of dietary management for obese: 61.5%	
Black, 2016 (46)	- Given that the study staff member distributed the questionnaire after describing the study, personally, the response rate of 45.6% is below adequacy to generalize the findings to the whole population. - Response bias – people participated must have been those with interest in health promotion. - No clear information of tool validation	- The first paper to report on patients on opinion about their physios' role in health promotion/ healthy behaviours. - Patients were recruited from 8 different outpatient clinics from 2 different states.	Patients from 5 physiotherapy outpatient clinics in Michigan & 3 physiotherapy outpatient clinics in Minnesota. Selection was by health care system managers from Michigan & Minnesota	**Response rate:** 45.6% **Fruit & Vegetable Consumption** Consumed ≥ 5 cups of fruits & vegetable 56.6% physios spoke about consuming fruits & vegetables 5.7% Agreed physios should advise recommended level fruits & vegetables 32.1% Agreed physios should discuss benefits of fruits & vegetables consumption 47.4% Agreed physios should suggest ways to increase fruits & vegetables consumption 41.3% Agreed physios should role-model adequate fruits & vegetables consumption 38.7%	Given the fact that, respondents are most likely to be interested in health promotion, it is discouraging to know that not many agreed to be advised to increase fruits and vegetable consumption More than half of the participants were classified as obese or overweight, and about 32% (one third) of the study participants disagreed that their physios should talk to them about weight management. Perhaps physios to focusing on promoting healthy dietary behaviour or intake of fruits and vegetable would make it easier to deal with patients who are sensitive to talk about their weight management.
Black, 2012 (69)	- Response bias - The findings only represent or were	- Questionnaire designed in detail with trans-theoretical model of	Physios and physio' students -	**Engagement in health behaviour**	Among all the four-health behaviour studied, fruit and vegetable consumption -

	generalizable among the members of American Physical Therapist Association (APTA) - Recruitment not up to study's power (76% instead of 80%) - Validation of tool used not clear	behaviour change with 5 stages of change; maintenance, action, preparation, contemplation & precontemplation. - The study reported on physios own eating behaviour and whether they agree to role model healthy eating.	members of APTA residing in US	Consuming sufficient fruits & vegetables Both physio' students & physios **60%** Compared to Physical activity (81%), Abstain from smoking (99%), Maintain healthy weight (79%) Statement with lowest level of agreement = it is important for physios to role model eating ≥ 5 servings of fruits and vegetables per day =**73%** Compared to Physical activity (88%), Abstain from smoking (89%), Maintain healthy weight (90%) Statement with lowest level of agreement = Eating ≥ 5 servings of fruits and vegetables per day is desirable & recommended behaviour for physios =**78%** Compared to Physical activity (91%), Abstain from smoking (92%), Maintain healthy weight (92%)	health behaviour repeatedly scored the lowest in every assessment in the study.

Synthesis from the literature review of the selected articles

Topics	Snodgrass	O'Donoghue	Abaraogu 16	Abaraogu 17	Black 12	Black 16
Knowledge						
On dietary management/ Best practice of dietary management	More than half of the respondents reported low level of knowledge of best practice dietary management and revealed no confidence to provide dietary recommendation. More than half of the participants believed that physical activity alone was as effective as diet alone in treating obesity. This is not supported by existing evidence (70). This also indicated gap of important knowledge among the physios.	Close to three quarter of participants perceived lack of knowledge to manage diet as a lifestyle risk factor.	No direct information on this, but almost one third of respondents perceived lack of expertise to assess and manage dietary risk factors as well as uncertainty about what service to provide; hinting at lack of knowledge.	The questionnaire included questions on how the respondents managed dietary advice for patients identified with pathophysiologic risk factors such as obesity, glucose intolerance, hypertension and hyperlipidaemia separately. Options of dietary management included; reduce calories, reduce dietary fat, increase fibre intake and set goal for weight loss, for each pathophysiologic risk factors separately.		
Whether they know that they could refer to national dietary guidelines.	NA but author suspects provision of dietary advice not in line with national guidelines based on results of the study		Author reported absence of national eating guide / healthy eating recommendation.			

	Acknowledge importance of eating healthily themselves					Nearly a quarter of participants did not agree that eating 5 or more servings of fruits and vegetables per day is desirable as well as a recommended health behaviour for physios.	
Practice		**Snodgrass**	**O'Donoghue**	**Abaraogu 16**	**Abaraogu 17**	**Black 12**	**Black 16**
	Provide dietary advice or not	Almost 42% of participants provided dietary advice. The odds of providing advice is 8.8 times more for those with training experience.	No clear details reported on provision of dietary advice but about half of the participants revealed that they sometimes provided educational materials relating to dietary intake eg; to increase fruit, vegetable and fibre consumption.	More than half of the participants reported regularly advising their patients with poor eating habits to increase fruit, vegetable and fibre intake.	More than 70% of participants regularly advised their patients to increase consumption of fruits, vegetable and fibre.		Only about 6% of patient participants reported that their physios advised about fruit and vegetable consumption.
	Assess dietary status in new & returning patients.	Detailed data not reported but only one third of the participants revealed confidence to assess dietary intake.	Only 23% reported always or usually assessed dietary status.	Only one third regularly assessed dietary status in new or returning patients.	More than half of the respondents assessed diet in new and follow up patients. Almost 82% revealed confidence to assess nutritional status.		
	Consuming adequate servings					60% of participants reported consuming	57% of patient participants

	of fruits & vegetable					5 or more servings of fruits and vegetables every day.	reported to consume 5 or more servings fruits and vegetables per day.
Barrier		**Snodgrass**	**O'Donoghue**	**Abaraogu 16**	**Abaraogu 17**	**Black 12**	**Black 16**
	Training significance /without exposure no confidence.	The odds of providing dietary advice is 8.8 times more for those with training experience.	Only 21% had training in nutrition over the past year. Almost 2/3 reported lack of expertise and acknowledged this as the main barrier to provide dietary advice.	More than one third of the participants revealed lack of expertise to assess and manage dietary risk factor as well as uncertain of what service to provide.	Barriers were reported in general not specifically per dietary as a risk factor.		
	Limited support from healthcare providers (eg: difficulty referring to dietitian)		Majority (>80%) revealed that referring their patients to dietetian is the most difficult.	Majority (>80%) respondents revealed the difficulty to access other service provider for dietary advice	Barriers were reported in general not specifically per dietary as a risk factor. NOT possible to compare with other articles.		
	Materials to refer & distribute		More than half reported lack of materials.	More than half of the respondents reported lack of proper materials to educate patient	Barriers were reported in general not specifically per dietary as a risk factor.		
Belief		**Snodgrass**	**O'Donoghue**	**Abaraogu 16**	**Abaraogu 17**	**Black 12**	**Black 16**
	It is physio's role to provide dietary advice	Less than 10% participants felt providing dietary advice either not within their scope of practice OR not qualified OR not enough training to do so.	Majority believed that it is not their role to discuss diet.	Two third of participants regarded high priority to address dietary factor as part of normal clinical practice.	About 93% perceived priority to provide dietary advice during their professional time.		

Acknowledge important role in health promotion		Majority acknowledged importance of promoting healthy diet but not confident that their counselling is effective.	Almost all participants acknowledged the importance of including dietary counselling in daily practice	Majority regarded very important to counsel patients towards healthy eating.		
Patient acceptance on dietary advice		Majority believed that patient did not want them to talk about diet	Almost all participants reported that patients have been open to the dietary advice as part of consultation.	Almost all believed that patients were acceptable with their dietary counselling.		Less than half of the patient participants agreed that physios should provide dietary advice – relating to fruits and vegetables consumption.
Role modelling to eat healthy					More than 70% of participants agreed that it is important for physios to role model eating more than 5 servings of fruits and vegetables.	Majority of patient participants were not in favour for their physios to role model fruit and vegetable consumption.

THE UNIVERSITY OF MELBOURNE

31 January 2018

Prof M.J. Temple-Smith
General Practice
The University of Melbourne

Dear Prof Temple-Smith

I am pleased to advise that the General Practice Human Ethics Advisory Group has approved the following Minimal Risk Project.

Project title: **The Role of Physiotherapists in Providing Nutrition Care to Improve Dietary Behaviours.**
Researchers: **A/Prof A Hodge, Prof M J Temple-Smith, Ms K Allison, K Somasundaram**
Ethics ID: **1850995.1**

The Project has been approved for the period: **31-Jan-2018 to 31-Dec-2018.**

It is your responsibility to ensure that all people associated with the Project are made aware of what has actually been approved.

Research projects are normally approved to 31 December of the year of approval. Projects may be renewed yearly for up to a total of five years upon receipt of a satisfactory annual report. If a project is to continue beyond five years a new application will normally need to be submitted.

Please note that the following conditions apply to your approval. Failure to abide by these conditions may result in suspension or discontinuation of approval and/or disciplinary action.

(a) **Limit of Approval:** Approval is limited strictly to the research as submitted in your Project application.

(b) **Amendments to Project:** Any subsequent variations or modifications you might wish to make to the Project must be notified formally to the Human Ethics Advisory Group for further consideration and approval before the revised Project can commence. If the Human Ethics Advisory Group considers that the proposed amendments are significant, you may be required to submit a new application for approval of the revised Project.

(c) **Incidents or adverse affects:** Researchers must report immediately to the Advisory Group and the relevant Sub-Committee anything which might affect the ethical acceptance of the protocol including adverse effects on participants or unforeseen events that might affect continued ethical acceptability of the Project. Failure to do so may result in suspension or cancellation of approval.

(d) **Monitoring:** All projects are subject to monitoring at any time by the Human Research Ethics Committee.

(e) **Annual Report:** Please be aware that the Human Research Ethics Committee requires that researchers submit an annual report on each of their projects at the end of the year, or at the conclusion of a project if it continues for less than this time. Failure to submit an annual report will mean that ethics approval will lapse.

(f) **Auditing:** All projects may be subject to audit by members of the Sub-Committee.

Please quote the ethics registration number and the name of the Project in any future correspondence.
On behalf of the Ethics Committee I wish you well in your research.
Yours sincerely

A/Prof John Furler - Chair
General Practice Human Ethics Advisory Group
Department of General Practice
Melbourne Medical School, Faculty of Medicine, Dentistry and Health Sciences The University of Melbourne
Victoria 3010 Australia

APPENDIX 5

INTERVIEW SCHEDULE

The Role of Physiotherapists in Providing Nutrition Care

to Improve Dietary Behaviours.

Preamble

Thank you so much for agreeing to talk to me. My name is Kaleswari and I am a Graduate student with the Department of General Practice at The University of Melbourne.

We are conducting this study as we would like to talk with physiotherapists about nutrition care and what training or resources may assist in enhancing provision of nutrition care.

Thank you for sending me the consent form, that's great. Just to make sure that I'm getting accurate record of your thoughts, the interview will be audio recorded and transcribed, I would like to know if you are okay with that?

PART A: DEMOGRAPHIC QUESTIONS

To begin with, I would like to ask you some basic demographic information about you and your clinical practice.

1. Can I get your age range: 30s, 40s, 50s,60s

   Age: _____ years

2. Gender: □ Male □ Female

3. Practice postcode: _____

4. In which country did you obtain your primary physiotherapy degree:

_____

5. How long have your worked in this profession: _____months _____ years

6. Could you briefly describe what kind of patients do you mostly see?

_____

7. Do you have interest in nutrition or dietary related topics?

8. If yes, have you been to any professional development training involving nutrition?

Views/knowledge of nutrition

When we talk about NUTRITION CARE we are talking about nutrition or dietary related advice given by health professionals to improve dietary behaviour of patients. Features of nutrition care may include nutrition assessment, nutrition advice and counselling as well as referral to dietitian / nutritionists.

1. What do you see the role of the physiotherapy profession in providing nutrition care to clients?

2. Do you think discussing nutrition is within your professional scope of practice?
   - Can you speak to that a little more?
   - Why do you believe this?
   - And the profession as a whole, do you think that discussing nutrition is in the general scope of practice of physiotherapists day to day?

3. Can you discuss how relevant or important you feel nutrition is for the clients you see?

4. What do you think you clients expect from you, regarding food and nutrition?
   - What about the physiotherapy profession as a whole? How do you think patients perceive physiotherapists credibility in this space?

5. Are you familiar with the ADG/AGHE? What do you think about the Australian Guide to Healthy Eating and the dietary guidelines in general?

Practice of nutrition care

6. Have you ever discussed nutrition with any of your patients?
   - Can you tell me a bit more in what context that happens? OR
   - Can you tell me a little bit more how you incorporate nutrition care into your practice? OR
   - How does nutrition first come up with a client, would you bring it up and under what circumstances would you do so?

7. Could you tell me about any nutrition principles that you advocate for all your clients? For example, do you suggest vegetarianism, or low carb diets?
   - How does this compare with your personal nutrition beliefs?
   - How does this compare with your personal nutrition practices?

8. Are there any nutrition tools that you prefer to use with your clients?
   - For example, the ADG/ AGHE?

9. How comfortable would you be discussing nutrition with your clients?

- Can you discuss how capable you feel you are to deliver nutrition care in your clinical practice?

10. Could you describe what “basic healthy eating advice” might encompass?

Further supports/resources

11. What do you see the barriers to physiotherapists being involved in nutrition care for their patients?

12. What do you see needing to happen to enable physiotherapists to be more routinely involved in nutrition care?

13. Where do you see the ideal role or position of physiotherapists in nutrition care?

14. If there was a tool, eg: AGHE that helped to apply the principles of basic healthy eating; how useful and practical do you think that could be for physiotherapists, and specifically your practice?

    - What is your opinion if you have the AGHE poster displayed where you meet your clients for your treatment?

15. Could you tell me how was nutrition covered in the physiotherapy degree when you went through?
    - Do you think if it was covered, it could enhance nutrition care provision by physiotherapist?

That’s the end of the formal interview. So, after what we have discussed today, what do you feel the three most important messages you gave me were?

- Or the three things you really feel you want to get across about this research topic?

HOUSEKEEPING

Thank you so much for your time.

If NO to question 6:

Practice of nutrition care

7. Could you discuss why this never occur in your practice?

8. How comfortable would you be discussing nutrition with your clients?

- How equipped to you feel to be able to discuss nutrition with your clients?

9. How would you see nutrition care being provided in your clinic?

10. Could you describe what “basic healthy eating advice” might encompass?
- How does this compare with your personal nutritional beliefs / practices?

Back to **Further supports/resources**


THE UNIVERSITY OF MELBOURNE
Melbourne
Medical School
"A new role for Physiotherapists?"
Please contact Kaleswari Somasundaram at:
ksom@student.unimelb.edu.au /
ksomasundara@unimelb.edu.au
Responsible researcher:
Prof Meredith Temple-Smith
Ethics ID: 1850995
We are seeking your input into a study that will look at the role of physiotherapists in providing nutrition care.
Help us to explore whether physiotherapists see a role for themselves in providing nutrition care to their clients to improve eating habits.
We are particularly looking for physiotherapists working in rural and regional Victoria.
All participants will remain anonymous in the research findings.
30 minute phone interview at a time of your choice.

Plain Language Statement

Department of General Practice, MDHS

THE UNIVERSITY OF MELBOURNE

Project:

The Role of Physiotherapists in Providing Nutrition Care to Improve Dietary Behaviours.

Professor Meredith Temple-Smith (Responsible Researcher)
Tel: +61 3 8344 3371 Email: m.temple-smith@unimelb.edu.au
Ms Kaleswari Somasundaram (MPhil student)
Tel: +61 3 90355018 Email: ksom@student.unimelb.edu.au

Introduction

Thank you for your interest in participating in this research project. The following few pages will provide you with further information about the project, so that you can decide if you would like to take part in this research.

Please take the time to read this information carefully. You may ask questions about anything you don't understand or want to know more about.

Your participation is voluntary. If you don't wish to take part, you don't have to. If you begin participating, you can also stop at any time.

What is this research about?

The aim of this research is to investigate practices, knowledge and barriers of physiotherapists in providing nutrition care. Nutrition care is nutrition or dietary related advice given by health professionals to improve dietary behaviour of patients.

What will I be asked to do?

Should you agree to participate, you will be invited to take part in a single interview with a member of the research team. The interview can be done over the phone or in person at your place of work during opening hours and will be audio-recorded so that it can be typed out later for analysis. We estimate that the interview will take about 30-45 minutes. The interview will involve some basic demographic questions and:

- Views/knowledge of nutrition care
- Practice of nutrition care
- Further supports/resources needed to assist provision of nutrition care

You do not have to answer any questions you are not comfortable answering. With your permission, we may contact you after you have completed the interview if we need further clarification or explanation about the information you have provided.

What are the possible benefits?

The information will provide current nutrition care practices of physiotherapists and their views on possible tools and resources to improve care in this area as well as the opportunity to raise awareness among physiotherapists to include nutrition

advice in their practice. Information collected by this study will inform a future competitive grant application for the development of tools and resources to enhance physiotherapists' care in this area.

What are the possible risks?

We do not anticipate any risks will be posed to you in participating in this study. You are under no obligation to answer all questions, and are free to withdraw from the study at any time. Physiotherapists involvement or non-involvement in the study will in no way impair their association with VicReN or The Department of General Practice.

Do I have to take part?

No. Participation is completely voluntary. You are able to withdraw at any time.

Will I hear about the results of this project?

A journal article will be produced from this research and the findings presented at relevant conferences. You will be able to receive a copy, or a summary of the research findings, by contacting either of the researchers listed below or by completing the tick box in the consent form indicating you would like to be emailed a copy of the study results.

What will happen to information about me?

The small sample size in this study offers potential for revealing identity so any information obtained that can identify you, will be removed from transcripts. It will be disclosed only with your permission, or in compliance with the law. All information used for the purposes of publications or conference presentations will be de-identified and you will either be referred to by a pseudonym only. Any identifying data we collect will be stored separately from coded interview data, in a locked drawer or password protected computer database at The Department of General Practice. Data access will be restricted to only those involved in this study. The Department of General Practice requires a staff allocated, authorised swipe pass to enter the buildings after hours and remains locked. Entry during business hours is managed by reception staff.

The information collected as part of this study will be destroyed after five years following the publication of the final report, resource or journal article from the research. Documents will be shredded and electronic recording material will be erased.

Where can I get further information?

If you would like more information about the project, please contact the researcher; Ms Kaleswari [Tel: +613 90355018 Email: ksom@student.unimelb.edu.au].

Who can I contact if I have any concerns about the project?

This research project has been approved by the Human Research Ethics Committee of The University of Melbourne. If you have any concerns or complaints about the conduct of this research project, which you do not wish to discuss with the research team, you should contact the Manager, Human Research Ethics, Research Ethics and Integrity, University of Melbourne, VIC 3010. Tel: +61 3 8344 2073 or Email: HumanEthics-complaints@unimelb.edu.au. All complaints will be treated confidentially. In any correspondence please provide the name of the research team or the name or ethics ID number of the research project.

Consent Form

Department of General Practice, MDHS

Project:

The Role of Physiotherapists in Providing Nutrition Care to Improve Dietary Behaviours.

Responsible Researcher: Professor Meredith Temple-Smith
Additional Researchers: Ms Kaleswari Somasundaram (MPhil student), A/Prof Allison Hodge and Dr Kim Allison.

Name of Participant: _____

1. I consent to participate in this project, the details of which have been explained to me, and I have been provided with a written plain language statement to keep.

2. I understand that the purpose of this research is to investigate practices, knowledge and barriers in providing nutrition care.

3. I understand that my participation in this project is for research purposes only.

4. I acknowledge that the possible effects of participating in this research project have been explained to my satisfaction.

5. In this project, I will be required to take part in a single interview with a member of the research team.

6. I understand that my interviews may be audio-taped.

7. I understand that my participation is voluntary and that I am free to withdraw from this project anytime without explanation or prejudice and to withdraw any unprocessed data that I have provided.

8. I understand that the data from this research will be stored at the University of Melbourne and will be destroyed after 5 years.

9. I have been informed that the confidentiality of the information I provide will be safeguarded subject to any legal requirements; my data will be password protected and accessible only by the named researchers.

10. I understand that given the small number of participants involved in the study, it may not be possible to guarantee my anonymity.

11. I understand that after I sign and return this consent form, it will be retained by the researcher.

Participant Signature: _____ **Date:** _____

APPENDIX 8

26 June 2018

Prof M.J. Temple-Smith
General Practice
The University of Melbourne

Dear Prof Temple-Smith

I am pleased to advise that the General Practice Human Ethics Advisory Group has approved the following Minimal Risk Project.

Project title: **The Role of Physiotherapists in Providing Nutrition Care to Improve Dietary Behaviours : Survey**
Researchers: **A/Prof A Hodge, Prof M J Temple-Smith, Ms K Allison, K Somasundaram**
Ethics ID: **1852192.1**

The Project has been approved for the period: **26-Jun-2018 to 31-Dec-2018.**

It is your responsibility to ensure that all people associated with the Project are made aware of what has actually been approved.

Research projects are normally approved to 31 December of the year of approval. Projects may be renewed yearly for up to a total of five years upon receipt of a satisfactory annual report. If a project is to continue beyond five years a new application will normally need to be submitted.

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(f) **Auditing:** All projects may be subject to audit by members of the Sub-Committee.

Please quote the ethics registration number and the name of the Project in any future correspondence.

On behalf of the Ethics Committee I wish you well in your research.

Yours sincerely

A/Prof John Furler - Chair
General Practice Human Ethics Advisory Group

Department of General Practice
Melbourne Medical School, Faculty of Medicine, Dentistry and Health Sciences The University of Melbourne Victoria 3010 Australia

Physiotherapy & Nutrition Care

Thank you for your interest in participating in this research project!

The aim of this research is to investigate practices, knowledge, barriers and facilitators of physiotherapists in providing nutrition care.

Nutrition care is nutrition or dietary related advice given by health professionals to improve dietary behaviour of patients. Features of nutrition care may include nutrition assessment, nutrition advice and counselling as well as referral to dietitian / nutritionist.

You can save and return to the questionnaire later if you can not complete it in one sitting. Please note that it is easier to complete the questionnaire via computer to a mobile phone.

Please download and read the Plain Language Statement (PLS) for more information about the

study. [Attachment: "Plain Language Summary.pdf"]

Are you currently practicing as a physiotherapist? ◯ Yes ◯ No

(By choosing YES, you mean that you are registered with the Physiotherapy Board of Australia and have a current patient load.)

Section A: Demographic

A1. What is your age range?

- ◯ 20-29
- ◯ 30-39
- ◯ 40-49
- ◯ 50-59
- ◯ 60-69
- ◯ >70

A2. Do you identify as:

◯ Male ◯ Female ◯ Other ◯ Prefer not to identify

A3. In which country did you obtain your primary physiotherapy degree?

◯ Australia ◯ Other

What country did you get your degree in?

_____

A4. Which state/ territory is your practice in?

- ◯ ACT
- ◯ NSW
- ◯ NT
- ◯ QLD
- ◯ SA
- ◯ TAS
- ◯ VIC
- ◯ WA

A5. How would you categorize your practice:

☐ Urban ☐ Rural/Regional ☐ Mixed

A6. In what type of practice, do you currently work?

- ☐ Aged care facility
- ☐ Community/ homecare
- ☐ Industry
- ☐ Public rehabilitation centre
- ☐ Private rehabilitation centre
- ☐ Public hospital
- ☐ Private hospital
- ☐ Private practice
- ☐ Defence forces
- ☐ General practice/ Primary care
- ☐ Other

Please state what type of practice you work in.

_____

A7. Field of specialization:

- ☐ Cardiorespiratory
- ☐ Neurology
- ☐ Continence & Women's Health
- ☐ Occupational Health
- ☐ Gerontology
- ☐ Pediatric
- ☐ Musculoskeletal
- ☐ Sports
- ☐ Other

Please state your field of specialization. _____

A8. How long have you worked as a physiotherapist?

- ◯ < 5 years
- ◯ 5-10 years
- ◯ 11-20 years
- ◯ 21-30 years
- ◯ > 30 years

A9. Do you have an interest in nutrition or dietary topics?

◯ Yes ◯ No

A10. Have you ever participated in any professional development or continuing education on the topic of nutrition?

◯ Yes ◯ No

Section B: VIEWS

Please indicate how much you agree/disagree with the following statements.

	Completely disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Completely agree
Increasing intake of fruits/vegetables by a single serve per day is associated with reduced risk of coronary heart disease, stroke and weight gain.	○	○	○	○	○
Healthy diet is more effective than just increasing physical activity levels, for weight loss.	○	○	○	○	○
Physiotherapists serve as healthy role models for their patients and the public.	○	○	○	○	○
The physiotherapy profession should become more active in assisting patients to improve their dietary behavior.	○	○	○	○	○

Section C: PRACTICE

C1. Which of the following do you do with your patients?
(Tick all that apply)

- ☐ I ask my clients if they eat 2 serves of fruits and 5 serves of vegetables per day
- ☐ I urge and encourage my clients who eat poorly, to increase intake of healthy foods
- ☐ I wait for the clients to bring up the topic before I mention healthy eating
- ☐ I follow-up with my client's attempt towards healthy eating
- ☐ I provide self-help materials regarding healthy eating
- ☐ I refer clients to dietitian for specific dietary advice
- ☐ I refer clients to dietitian for general healthy eating advice
- ☐ None of the above

C2. How often do you encourage healthy eating with your patients?

- ○ All the time (100% of the time)
- ○ Most times (75% of the time)
- ○ Sometimes (50% of the time)
- ○ Rarely (25% of the time)
- ○ Never (0% of the time)

C3. During a consultation with a patient who is obese /overweight, which of the following would you prefer to do?
(Tick only one)

- ○ Discuss weight loss goals
- ○ Discuss eating healthy foods which could indirectly result in weight loss
- ○ None of the above

C4. We asked a few physiotherapists about elements of basic healthy eating' advice and their responses are listed below. Which of these, do YOU think should be part of 'Basic healthy eating advice'?
(Tick all that apply)

- ☐ Eat 2 serves of fruits and 5 serves of vegetables
- ☐ Eat fruits and veggies of different colors and types
- ☐ Eat more whole grain food
- ☐ Eat lean meat and unprocessed meat
- ☐ Eat more legumes and nuts
- ☐ Eat plant based food
- ☐ Use low-fat dairy products
- ☐ Minimize processed food
- ☐ Eat whole food
- ☐ Minimize sugar intake
- ☐ Minimize fatty food & saturated fat intake
- ☐ Minimize portion size of each meal
- ☐ Drink water
- ☐ Eat regular meals
- ☐ Use olive oil in preference to other oil types
- ☐ Minimize alcohol intake
- ☐ None of the above

C5. Please tick the responses according to your daily food consumption.
In general, do YOU...

	No	No, but I'm aware I should	No, but I try to	Yes, and I've done so for less than 6 months	Yes, and I've done so for longer than 6 months
Eat at least 5 serves of vegetables every day? A serve is ½ cup cooked vegetables (hot chips don't count!) or 1 cup of salad?	○	○	○	○	○
Eat at least 2 serves of fruit every day? A serve is 1 medium piece or 2 small pieces of fresh fruit, or one cup of chopped or canned fruit (no added sugar)?	○	○	○	○	○
Eat mostly wholegrain varieties? (such as high fibre breakfast cereal and wholemeal bread)	○	○	○	○	○
Eat at least a small serve of lean meat or chicken (fat and/or skin cut off) or fish or eggs or some nuts or legumes (e.g.: lentils, chickpeas, kidney beans, baked beans) every day?	○	○	○	○	○
Choose water instead of drinks with added sugars (such as soft drinks, cordial, energy drinks and sports drinks)?	○	○	○	○	○
Limit fast foods (eg: pizzas, burgers & hot chips) or other deep fried foods to once a week or less?	○	○	○	○	○
Limit cakes, muffins, pastries, pies and biscuits to once a week or less?	○	○	○	○	○
Limit salty foods like processed meats (eg: salami & bacon), crisps and salty snacks to once a week or less, and avoid adding salt during cooking or at the table?	○	○	○	○	○

Have at least 2 serves of reduced fat milk, yoghurt, cheese or alternatives every day (eg: 1 slice of reduced fat cheese, a small tub of reduced fat yoghurt & no added sugar, 1 cup of milk or 1 cup of soy milk)?	○	○	○	○	○
Drink no more than 2 standard drinks containing alcohol on any one day?	○	○	○	○	○

Section D: Barriers & Facilitators

We interviewed a small group of physiotherapists, and they identified the following as barriers or facilitators in terms of providing nutrition care to their patients.

D1. Which of these is a barrier to YOU in providing nutrition care to patients?
(Tick all that apply)

- ☐ Lack of undergraduate education/ training
- ☐ Patient perception that it is not within the scope of physiotherapy
- ☐ Lack of time (assuming you are motivated to provide basic dietary advice)
- ☐ Lack of patient compliance
- ☐ Lack of resources and materials
- ☐ Intrusion into patient's privacy
- ☐ Lack of interest in addressing nutrition
- ☐ Perceived lack of clarity of scope of practice / overlap with other health professionals in nutrition care
- ☐ Personal discomfort addressing dietary issues
- ☐ None of the above

D2. Which of these would be a facilitator for YOU in providing nutrition care to patients?
(Tick all that apply)

- ☐ Undergraduate education/training in providing nutrition care
- ☐ Professional development in providing nutrition care after completion of physiotherapy degree
- ☐ Resources for patients (both printed and online)
- ☐ Encouragement or statement from Australian Physiotherapy Association (APA) that nutrition care is within scope of practice
- ☐ Encouragement from Practice Manager or Head of Department to include nutrition care in daily practice
- ☐ Change in practice policy to enable consultations including nutrition care
- ☐ None of the above

D3. What areas of physiotherapy practice do you believe nutrition training would be most relevant and valuable for?
(Tick all that apply)

- ☐ Chronic obstructive pulmonary disease
- ☐ Cancer
- ☐ Post-stroke
- ☐ Weight loss
- ☐ Osteoporosis
- ☐ Osteoarthritis
- ☐ Cystic fibrosis
- ☐ Pagets
- ☐ Strength/ conditioning
- ☐ Rheumatoid arthritis
- ☐ High level athletes/ performance
- ☐ Recreational athletes
- ☐ Post ICU syndrome
- ☐ Chronic pain
- ☐ None of the above

Section E

E1. Confidence in Knowledge about Nutrition and Chronic Disease

Please rate how confident you are in your knowledge of...

	Not confident at all	Not very confident	Somewhat confident	Very confident	Extremely confident
How different body systems are affected by foods and nutrients	○	○	○	○	○
How foods and nutrients influence the development and management of chronic disease	○	○	○	○	○
How an individual's body composition (including size, shape, weight) can impact on the development of chronic disease	○	○	○	○	○
The Australian Guide to Healthy Eating, including number of recommended serves of food groups and serving sizes for different ages and genders	○	○	○	○	○
Guidelines for the nutrition-related management of specific chronic diseases (including type 2 diabetes and cardiovascular disease)	○	○	○	○	○
How foods and nutrients interact with medications	○	○	○	○	○
The most recently published peer-reviewed evidence regarding nutrition and chronic disease	○	○	○	○	○

E2. Confidence in Nutrition Skills

Please rate how confident you are in your ability to...

	Not confident at all	Not very confident	Somewhat confident	Very confident	Extremely confident
Interpret data about height, weight and body composition against reference ranges	○	○	○	○	○
Interpret an individual's biological data (e.g. blood pressure, cholesterol levels) against reference ranges	○	○	○	○	○
Collect information on the food that an individual usually eats (e.g. diet history, food frequency questionnaire)	○	○	○	○	○
Use the Australian Guide to Healthy Eating to evaluate the appropriateness of an individual's food intake	○	○	○	○	○
Determine appropriate food or nutrition goals for an individual with chronic disease	○	○	○	○	○
Formulate a meal plan for an individual with chronic disease	○	○	○	○	○
Recommend changes in food choices for an individual with chronic disease	○	○	○	○	○
Monitor and evaluate changes over time regarding the food an individual usually eats	○	○	○	○	○
Maintain clear and concise records regarding the nutrition-related assessment and advice you provide to individuals	○	○	○	○	○
Access the most recently published peer-reviewed evidence regarding nutrition and chronic disease	○	○	○	○	○
Provide nutrition care that results in improvements in the food that an individual usually eats	○	○	○	○	○

E3. Confidence in Communication and Counselling about Nutrition

Please rate how confident you are in your ability to...

	Not confident at all	Not very confident	Somewhat confident	Very confident	Extremely confident
Clearly describe what patients/clients can expect from their discussions with you about food or nutrition	○	○	○	○	○
Check a patient's/client's understanding of the influence of food and nutrients on their health	○	○	○	○	○
Work with patients/clients to identify possible ways to improve the food they usually eat	○	○	○	○	○
Demonstrate genuine empathy to patients/clients about their food-related experiences and goals	○	○	○	○	○
Maintain a non-judgemental attitude in discussions with patients/clients about the food they eat	○	○	○	○	○
Communicate with clients about food and nutrition using culturally appropriate language	○	○	○	○	○
Consider how personal, social, cultural, psychological, and economic factors may influence the foods that a patient/client eats	○	○	○	○	○
Identify individuals who need additional support from other health professionals or services regarding the food they eat	○	○	○	○	○
Communicate with other health professionals about the discussions you've had with patients/clients regarding food	○	○	○	○	○

E4. Attitudes Towards Nutrition Care

Please rate your agreement with the following statements:

	Completely disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Completely agree
It is important that all individuals usually eat healthy foods regardless of age, body weight and physical activity levels	○	○	○	○	○
If the topic arises, it is importantthat I encourage my patients/clients to eat healthy foods	○	○	○	○	○
It is important that I take every opportunity possible to encourage my patients/clients toeat healthy foods	○	○	○	○	○
Encouraging my patients/clients to eat healthy foods is an effective use of my professional time	○	○	○	○	○
Providing specific nutrition recommendations to my patients/clients that can assist with managing their chronic disease is an effective use of my professional time	○	○	○	○	○
Encouraging my patients/clients to eat healthy foods is within my scope of practice	○	○	○	○	○
Providing specific nutrition recommendations to my patients/clients that can assist with managing their chronic disease is within my scope of practice	○	○	○	○	○
It is important that I encourage my patients/clients to seek support from other health professionals if I am unable to meet their nutrition-related needs	○	○	○	○	○

THE END of Survey!!!

Thank you so much for completing our survey!

If you would like to contact us please email:
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Please provide us your email address if you are interested in receiving a summary of our final results.

Please feel free to let us know what you want to get across this research topic.