

What is Known about Experiences, Perceptions, and Impacts on Practitioners and Patients due to Sex and Gender in the Chiropractic, Osteopathy and Physiotherapy Professions: A Scoping Review.

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Declaration

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This thesis entitled "What is known about experiences, perceptions, and impacts on practitioners and patients due to sex and gender in the chiropractic, osteopathy and physiotherapy professions: A scoping review" is submitted in partial fulfilment for the requirements for the Unitec degree of Master of Osteopathy

Candidate's declaration

I confirm that:

This thesis represents my own work;

Research for this work has been conducted in accordance with the Unitec Research Ethics Committee Policy and Procedures, and has fulfilled any requirements set for this project by the Unitec Research Ethics Committee.

Research Ethics Committee Approval Number: n/a

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Abstract

Background:

There are complex expressions of gender and sex inherent within the three professions of chiropractic, osteopathy, and physiotherapy. These professions commonly use the body of the practitioner to provide treatment for the body of the patient (more so than most other regulated healthcare modalities), yet the application of a sex and gender lens in this context seems to have received scant attention within the literature.

Objectives:

To examine the nature, range and extent of research investigating the impacts of sex and/or gender on patients and practitioners within the professions of chiropractic, osteopathy and physiotherapy, to identify areas for further research.

Method:

A scoping review based on the Arksey and O'Malley (2005) framework was conducted. Sixteen online databases were searched, with no date or geographical restrictions.

Results:

Forty-eight papers from eight countries, including peer reviewed publications and grey literature, were selected for inclusion. Thirty-five of the papers used related to physiotherapy, nine to chiropractic, one to osteopathy, and three to a combination of these professions. Ten themes were identified. Thirteen textbooks used to teach technique skills to student chiropractors, osteopaths and physiotherapists in New Zealand were also included. Technique textbooks used within these three professions in New Zealand demonstrate a significant under-representation of females as practitioners, compared to males.

Conclusion:

There are numerous opportunities to address significant gaps in research utilising various methodologies and covering a wide range of topics applying a sex and gender lens, relating to the professions of chiropractic, osteopathy and physiotherapy. It seems the proportions of males and females employed within chiropractic, osteopathy and physiotherapy have greatly influenced the volume and direction of research undertaken to date. This scoping review has also highlighted a need for a comprehensive audit of teaching resources for chiropractic, osteopathy and physiotherapy as there are currently few textbooks showing female

practitioners demonstrating techniques, particularly high-velocity, low-amplitude thrusts (HVLATs).

Keywords:

chiropractic, osteopathy, physiotherapy, gender, sex, feminism, masculinity, femininity.

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Preface

The catalyst for this project was the experience of being a female osteopathy student, of smaller stature, being taught commonly used practical techniques which sometimes did not seem to be entirely suitable for either female practitioners or female patients. There were issues such as patients' breast tissue being uncomfortably or painfully compressed (Figure 1), or for example, being required as a practitioner to place breasts very close to the patient's face (Figure 2). Some techniques were problematic in terms of requiring a longer reach, or seeming to require a great deal of physical strength if the practitioner was significantly smaller than the patient (Figure 2).



Figure 1. High velocity, low-amplitude thrust (HVLAT) technique set-up position (Hartman, 1997, p. 123). This HVLAT set-up demonstrates potentially uncomfortable compression of the patient's breast tissue.



Figure 2. An alternative set-up for a thoracic spine HVLAT technique (Hartman, 1997, p. 124). If this practitioner were female, her breasts would be placed very close to the patient's face. If the practitioner were a smaller build than the patient the practitioner would potentially have difficulty in terms of reach.

Initial enquiries via osteopathic textbooks and online instructional videos did not reveal satisfactory alternative technique variations for these situations. Few textbooks showed female practitioners, or male practitioners demonstrating on patients larger than themselves.

Anecdotal evidence uncovered alarming solutions to these issues. Several female osteopaths recounted instances of requesting physical assistance from male colleagues, for patients who were larger than the practitioner. Some female osteopaths and students described avoiding particular techniques completely, due to feeling uncomfortable with how the practitioner would have to be positioned in relation to the patient. Informal additional enquiries revealed these were not uncommon experiences, and furthermore led to recounting of other incidents of both blatant and subtle sexism within the osteopathic community, both in New Zealand and internationally.

An initial search uncovered minimal peer reviewed literature applying a gender or sex lens to osteopathy. Widening the search to include other search terms such as physiotherapy, chiropractic, and complementary and alternative medicine (CAM) also uncovered limited research. It appears the professions of osteopathy, chiropractic and physiotherapy are not well served in this area of research, making it difficult to assess the effects of gender and sex on these professions, or identify trends in relation to these topics.

Due to the apparently limited amount of research applying a sex and gender lens to musculoskeletal healthcare, it was decided a scoping review would be a suitable starting point to address this issue, as “scoping reviews can be used to examine the extent, range and nature of research activity ... and identify research gaps in the existing literature” (Arksey & O’Malley, 2005, p. 21).

Thesis structure

This thesis is presented in three main sections. Section One consists of two chapters. Chapter One comprises a literature review describing the context within which this scoping review is situated. Chapter Two describes the scoping review methodology and research methods used in this project.

Section Two is presented as a manuscript, prepared for submission to the *International Journal of Osteopathic Medicine* (IJOM) utilising the “Your paper, your way” format (Appendix A), and directed by the PRISMA-ScR (scoping review) guidelines (Appendix B). The IJOM guidelines specify a 5000-word limit, however this word limit has been disregarded for the purposes of meeting the requirements of this thesis. The word count will be reduced to the required level prior to submission of the manuscript to IJOM.

Section Three contains appendices and includes the IJOM “Your paper, your way” guidelines (abridged)(Appendix A), the PRISMA-ScR checklist (Appendix B), an example of the data extraction and charting process used in this scoping review, and an example of a critical review tool used in this review.

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Section One

Chapter One

Literature Review

Introduction

A scoping review by definition cannot include literature supporting what has not yet been comprehensively researched, therefore this literature review provides background to inform the question: What is known about experiences, perceptions and impacts on practitioners, patients and professions due to sex and gender, in the regulated musculoskeletal healthcare setting of chiropractic, osteopathy and physiotherapy?

Variations within the three professions of chiropractic, osteopathy and physiotherapy offer an opportunity to compare and contrast the effects of sex and gender on musculoskeletal healthcare. There are similarities in how these professions are practiced, as well as an opportunity to consider the unique development of each profession and the varied historical influences which largely determined the proportion of men and women employed in chiropractic, osteopathy and physiotherapy. Therefore, a brief history of the chiropractic, osteopathy and physiotherapy professions will be outlined, alongside a description of similarities and differences between these professions relating to education, registration requirements and income in the New Zealand context.

This literature review will also clarify commonly used definitions of sex and gender within the healthcare literature, and discuss some of the difficulties inherent within those terms. It will present an overview of liberal and socialist feminist critiques, with particular focus on the health sector, and will outline the importance of applying a feminist lens to the professions of chiropractic, osteopathy and physiotherapy. Sexism and its common variants will be described, and the value of reducing sexism within healthcare will be explained. There will be a brief introduction to the concept of the performance of gender: that is, ‘doing’ masculinities and femininities, with an example from a study investigating sex and gender issues within complementary and alternative medicine (CAM).

There are important discussions to have around the topics of non-binary gender, sexual orientation, sexuality, and sexual harassment, and their relationship to musculoskeletal healthcare. Although there is overlap between these topics and this scoping review, due to the complexities and depth required to explore them adequately it was decided these would be better served by separate studies, so these issues will not be covered in this literature review.

Regulated Healthcare in New Zealand

Regulated healthcare in New Zealand is practiced within any profession covered by the Health Practitioners Competence Assurance Act 2003 (New Zealand Government, 2003). Regulated professions which are primarily concerned with musculoskeletal (dys)function include chiropractic, osteopathy, and physiotherapy.

It can be both challenging and controversial to delineate clearly the three professions of chiropractic, osteopathy and physiotherapy, which are essentially variations of (primarily) musculoskeletal, manual therapy healthcare (Fornasier, 2017; Harvey, Burton, Moffett, & Breen, 2003; Norris, 2001; Pincus, Vogel, Breen, Foster, & Underwood, 2006). However, these three professions evolved separately, with historically distinct philosophies (Fornasier, 2017; Meeker & Haldeman, 2002). Some of these evolutionary differences have contributed to physiotherapy traditionally being an occupation with a mostly female workforce, chiropractic being a male dominated occupation, and osteopathy evidencing a more even mix of male and female practitioners (DiGiovanna, Schiowitz, & Dowling, 2009; Leach, 2013; Ottosson, 2011; Short, 1986). These differences present an opportunity to compare and contrast the effects of sex and gender on musculoskeletal healthcare, a topic which has received little, and apparently non-systematic attention in the literature to date (Dahl-Michelsen, 2015; Hammond, 2013; Öhman, 2001).

Chiropractic

Definition of chiropractic

The World Federation of Chiropractic (2009) cites the Association of Chiropractic Colleges 1996 definition:

Chiropractic is a healthcare discipline that emphasizes the inherent recuperative power of the body to heal itself without the use of drugs or surgery. The practice of chiropractic focuses on the relationship between structure (primarily the spine) and

function (as coordinated by the nervous system) and how that relationship affects the preservation and restoration of health. In addition, doctors of chiropractic recognize the value and responsibility of working in cooperation with other health care practitioners when in the best interest of the patient. (World Federation of Chiropractic, 2009, para. 3)

History of chiropractic

In 1895 Daniel David Palmer claimed to have made a spinal adjustment and cured a man of his deafness (Keating, Cleveland, & Menke, 2004). This apparent success provoked Palmer to investigate this phenomenon further, leading to the formation of the first chiropractic school, in the United States of America (USA) (Keating et al., 2004). Palmer was happy to admit women to his school (Gromala, 1983) (whether this was due to liberal views or business acumen is unclear). The chiropractic profession began with a strong business model, and Palmer stated “those who wanted to learn chiropractic should pay him well” (cited in Gromala, 1983, p. 60). The first class of 15 students included three women, including Palmer’s wife Mabel, who went on to instruct anatomy following her graduation in 1904 (Gromala, 1983). As preparations were made for what would become World War One, Palmer realised his pool of potential male students would be severely reduced, so actively sought to recruit female students (Gromala, 1983). However, this trend did not continue, as Gromala (1983, p. 59) writes, “[o]f the 23000 chiropractors in the USA over [only] 6% are women.” Female chiropractic graduates from the 1950s noted women were not particularly supported, and that the “men in power were not prepared for women to take a lead role” (cited in Gromala, 1983, p. 62). The chiropractic profession has remained male dominated; for example in the USA between 1991 and 2009 the percentage of women in the chiropractic profession increased from 13.3% to only 22.4% (Johnson & Green, 2012).

It has been stated that the “early and middle years of chiropractic were dominated by charismatic and authoritarian figures [men] who often disagreed with one another” (Meeker & Haldeman, 2002, p. 217). Much of the 20th century was a controversial and litigious time for the chiropractic profession, which was defending itself against medical professionals who claimed chiropractic was quackery and should be banned (Meeker & Haldeman, 2002). Chiropractic was licenced as an independent profession in at least one state in the USA as early as 1905, as chiropractors recognised the importance of self-regulation and independent legal status (Meeker & Haldeman, 2002). In response to ongoing attacks from the medical profession, 1944 saw the establishment of the Foundation for Chiropractic Education and

Research, with a heavy focus on research showing validation of chiropractic techniques (Meeker & Haldeman, 2002). Chiropractic retains a strong business model today and encourages regular treatments to maintain health (Gleberzon, 2010).

Osteopathy

Definition of osteopathy

Osteopathy is a system of diagnosis and treatment for a wide range of medical conditions. It works with the structure and function of the body, and is based on the principle that the well-being of an individual depends on the skeleton, muscles, ligaments and connective tissues functioning smoothly together. To an osteopath, for your body to work well, its structure must also work well. So osteopaths work to restore your body to a state of balance, where possible without the use of drugs or surgery. Osteopaths use touch, physical manipulation, stretching and massage to increase the mobility of joints, to relieve muscle tension, to enhance the blood and nerve supply to tissues, and to help your body's own healing mechanisms. They may also provide advice on posture and exercise to aid recovery, promote health and prevent symptoms recurring. (General Osteopathic Council, 2018, para. 2)

History of osteopathy

Andrew Taylor Still founded the first school of osteopathy (American School of Osteopathy) in the USA in 1892 (DiGiovanna et al., 2009). The original class of 22 students included five women, one expression of Still's liberal values (Quinn, 2011). The school actively encouraged women to train as osteopaths at a time when education options for women were almost non-existent, particularly in healthcare, and by 1897 there were over 100 female students (Quinn, 2011).

Although Still was a trained Doctor of Medicine (MD), he became disillusioned with the limitations of allopathic medicine after losing three of his children to meningitis, and while serving as an MD on the battlefields of the American Civil War (DiGiovanna et al., 2009). He believed there had to be a more effective pathway towards health than what was then available (DiGiovanna et al., 2009). To contextualise his view, this era was known as the Age of Heroic Medicine, due to what patients were forced to endure in the name of treatment (Keating et al., 2004). The 'medicine' was often as fatal as the original disease, with mercury

being a commonly used treatment choice within allopathic medicine (DiGiovanna et al., 2009).

Still believed in the inherent power of the body to heal itself, so set about expanding his anatomical knowledge and working systematically through the musculoskeletal, lymphatic and vascular systems to develop treatments (Quinn, 2011). During the early 20th century many osteopathic schools were set up all over the USA, with varying degrees of success (DiGiovanna et al., 2009). As with chiropractic and physiotherapy, there was resistance against osteopathy from the medical profession, and in 1910 all medical (including osteopathic) schools were audited as to the quality of their education with many found to be substandard (DiGiovanna et al., 2009; Quinn, 2011). A number of osteopathic schools decided to remediate the negative findings and raise their curricula standards to those required (DiGiovanna et al., 2009). Despite this initiative, there followed many years in which the medical profession was prohibited from collaborating with the osteopathic profession, until the 1960s when a paradigm shift saw the state of California embrace the osteopathic profession and assimilate it, paving the way for other states to follow (Quinn, 2011). There were osteopaths who rejected this development, and worked to retain the distinct role of Doctor of Osteopathy (DO), rather than MD (Quinn, 2011). This alliance between the mainstream medical and osteopathy professions remains a distinct difference between osteopaths in the USA and the rest of the world: in the USA osteopaths are also MDs but take the title of DO, with the ability to prescribe drugs and perform surgery (Fornasier, 2017). By contrast, osteopaths outside of the USA do not generally take the title of ‘doctor’ and cannot prescribe drugs or perform surgery (Fornasier, 2017; Quinn, 2011).

J. Martin Littlejohn, an early graduate, and later faculty member of the American School of Osteopathy, eventually returned to his home country of the UK, and set up the British School of Osteopathy (BSO). From there osteopathy spread to other parts of the world (DiGiovanna et al., 2009).

In 2017 40% of osteopaths actively practising in the USA were women (Quinn, 2017) and proportions in New Zealand, Australia and the United Kingdom (UK) are similar (Leach, 2013).

Physiotherapy

Definition of physiotherapy

Physiotherapy helps restore movement and function when someone is affected by injury, illness or disability. Physiotherapists help people affected by injury, illness or disability through movement and exercise, manual therapy, education and advice. They maintain health for people of all ages, helping patients to manage pain and prevent disease. The profession helps to encourage development and facilitate recovery, enabling people to stay in work while helping them to remain independent for as long as possible. Physiotherapy is a science-based profession and takes a ‘whole person’ approach to health and wellbeing, which includes the patient’s general lifestyle. At the core is the patient’s involvement in their own care, through education, awareness, empowerment and participation in their treatment. (Chartered Society of Physiotherapy, 2018, para. 1-6)

History of physiotherapy

‘Modern’ physiotherapy evolved from practices which developed separately and concurrently in Sweden and the UK in the latter part of the 19th and earlier part of the 20th centuries (Ottosson, 2011).

In Sweden, Pehr Henrik Ling started the Royal Central Institute of Gymnastics in 1813, and developed a system of exercises, or ‘gymnastics’ to promote health, incorporating an education in anatomy, physiology and pathology (Ottosson, 2011). He divided ‘gymnastics’ into four branches: pedagogical, aesthetic, military and medical. It is from the latter that ‘modern’ physiotherapy evolved (Fornasier, 2017; Ottosson, 2011). During this early phase of the vocation, to be a physiotherapist was intimately associated with being physically strong, psychologically powerful, and ‘masculine’ (Dahl-Michelsen, 2015). Only men were accepted for training between 1813-1934 (Dahl-Michelsen, 2015). There was much emphasis placed on utilising a strong scientific base (Ottosson, 2011). Despite legislation introduced in 1887 requiring physiotherapists to work under medical supervision, the medical profession felt threatened by, refused to collaborate with, and actively opposed physiotherapy (Dahl-Michelsen, 2015; Ottosson, 2011). This battle for dominance within healthcare was won by physicians who orchestrated further legislative changes which became effective in 1934, and essentially discouraged men, whom physicians viewed as professional competition, from

training to become physiotherapists (Fornasier, 2017). This triumph by the medical establishment over physiotherapists was achieved by requiring men to complete more education than women. Men had to graduate as physical education instructors to become eligible to train as physiotherapists, while women needed to train as physiotherapists only (Dahl-Michelsen, 2015). As a result, from 1934 onwards, the number of female physiotherapists increased while male physiotherapists all but disappeared, and physiotherapists became progressively subordinate to physicians (Dahl-Michelsen, 2015).

During the same period in the UK, what would become physiotherapy was developing along a different trajectory, with a renaissance of ‘nursing massage training’ being offered to women (Fornasier, 2017). To combat the problem of prostitutes posing as masseurs to avoid prosecution, the ‘Society of Trained Masseurs’ was established to legitimise the vocation, with an educational focus on anatomy, massage techniques, and appropriate conduct of masseurs (Nicholls & Cheek, 2006; Ottosson, 2011). Men were excluded from training to become masseurs as massage was considered to be primarily a service for women, by women (Nicholls & Cheek, 2006). Men could receive massage only under specific medical circumstances, and such massage had to be supervised by a male physician (Nicholls & Cheek, 2006).

The early 20th century saw an amalgamation of Swedish ‘gymnastics’ and UK ‘nursing massage’ in response to the need for rehabilitation of the large numbers of returning war veterans, and this merged offering is what became known as ‘physiotherapy’ (Nicholls & Cheek, 2006). During the latter half of the 20th century there were ongoing struggles to gain professional autonomy, with varying degrees of success (Fornasier, 2017). In the 1970s Australia became the first country to allow physiotherapists to work autonomously, without medical referral, and other countries followed this trend in subsequent decades (Carr, 2011).

Physiotherapy as a profession is subject to a curious paradox. Although there has historically been a much higher proportion of women involved as practitioners, physiotherapy is not especially perceived as a ‘female’ profession, and is often considered more a ‘male’ profession due to the high visibility of, for example, male physiotherapists of elite sports teams (Hammond, 2013). Between 1988 and 2007 the percentage of males working as physiotherapists in the UK increased from 5% to 18%, and internationally, 30% of the physiotherapy workforce is male (Dahl-Michelsen, 2015). Men work more in the private sector, occupational care and sports medicine, while women favour the public sector,

geriatrics, paediatrics, long term rehabilitation and teaching (Öhman, 2001; Öhman, Solomon, & Finch, 2002).

Chiropractic, Osteopathy and Physiotherapy in Contemporary New Zealand

In New Zealand (NZ) the curricula for chiropractic, osteopathy, and physiotherapy education have much in common. The 2018 educational requirements in New Zealand are completion of a chiropractic- osteopathic- or physiotherapy-specific tertiary education programme of 3-5 years' duration (New Zealand Chiropractic Board, n.d.; Osteopathic Council of New Zealand, n.d.; Physiotherapy Board of New Zealand, 2018). These qualifications all include similar papers covering foundational health science topics such as anatomy, physiology, pathology, pharmacology, rehabilitation, neuroscience, medical imaging, communication, Māori health, and practical/technique skills, with a requirement for supervised clinical experience (Auckland University of Technology, n.d.; NZ College of Chiropractic, 2018; Unitec Institute of Technology, 2018). Each discipline includes education around their respective philosophies, and over recent years there has been a move towards critical thinking and the adoption of evidence based practice, rather than strict adherence to historical professional dogma (Fryer, 2008; Hammond, 2013; Shreeve, 2008).

The annual income range in New Zealand for chiropractors is \$NZ40K-200K, osteopaths \$NZ40K-100K, and physiotherapists \$NZ47K-99K (Careers NZ: New Zealand Government, 2018a, 2018b, 2018c). In New Zealand, physiotherapists can practice in the public or private sector, while chiropractors and osteopaths operate within the private sector, although all three professions can access public funding from the Accident Compensation Corporation (ACC). ACC is a nationalised insurance scheme funded by all New Zealanders which provides subsidised rehabilitation focused healthcare to people who have sustained an injury as a result of an accident (ACC: New Zealand Government, 2018).

Definition of Sex and Gender, and the Value of Considering Sex and Gender within a Healthcare Context

The words 'sex' and 'gender' require clarification because they are commonly used interchangeably, and either word can elicit complex and controversial discussion around biology versus social norms and influences (Butler, 1986; Lips, 2008; West & Zimmerman, 1987). Furthermore, a range of authors acknowledge there are potential misunderstandings when using the terms 'sex' and 'gender' within a healthcare context, which has a history of

using these terms inconsistently (Alex, Fjellman Wiklund, Lundman, Christianson, & Hammarström, 2012). One study investigating “what the concepts of ‘sex’ and ‘gender’ meant for gender researchers based in a medical faculty” found that “the concepts of ‘sex’ and ‘gender’ are complicated and hard to define, even among researchers with quite extensive experience in gender issues in health” (Alex et al., 2012, "Discussion," para. 1). The study describes the relationship between sex and gender in terms of the continuous loop of a Mobius band:

The outside of the Mobius band is related to as biology/sex and if you follow the band, suddenly you are on the inside of the band and it has become gender...you follow the band and end upon the outside again and gender has gone back to biology. (Alex et al., 2012, "Sex and Gender as Interwoven," para. 2)

Despite (or because of) this uncertain demarcation between the terms ‘sex’ and ‘gender’, a commonly used definition of ‘sex’ within healthcare research refers to male or female physical attributes, while ‘gender’ refers to the social constructs of being ‘masculine’ or ‘feminine’ (Butler, 1986; Heidari, Babor, De Castro, Tort, & Curno, 2016; Nowatzki & Grant, 2011; Unger & Crawford, 1993). It must be remembered this is a dichotomous approach to something which is in reality not binary.

Due to this inherently complicated situation of trying to tease apart and apply definitions of sex and gender, and the way these terms are often used inconsistently within scientific literature, it can be asked why it is useful to consider the value of studying a health related topic in terms of sex or gender at all? Öhman (2001) provides perspective on this question in relation to physiotherapy: while many aspects of physiotherapy are not necessarily directly related to gender, if viewed through a gender lens they can highlight issues of inequality not previously considered or identified. This point could also apply to the professions of chiropractic and osteopathy. Öhman’s research highlights the influence of gender on “various aspects of career choice, attitudes towards health care work, development of the professions and professional strategies within the profession” (Öhman, 2001, p. 92). These issues are pertinent to both student and professional populations.

Sex and Gender in the Wider Healthcare Landscape

Several themes concerning gender have been identified in the wider healthcare and biological sciences literature, covering a range of perspectives including those of practitioners, patients and professions.

Women publish academic papers less often than men (Fridner et al., 2015; Kaufman & Chevan, 2011); at the start of their tertiary education, male students have higher expectations than female students of what they will achieve after graduation (Johanson, 2007; Newman, 2014); male and female patients are treated differently for pain even when they exhibit identical symptoms (FitzGerald & Hurst, 2017; Govender & Penn-Kekana, 2008; Hirsh, Hollingshead, Bair, Matthias, & Kroenke, 2013; Paulose-Ram et al., 2003; Stenberg & Ahlgren, 2010); and men progress more quickly through institutional ranks, and to a higher level than women, even if they are in the minority (Henley, 2015; Newman, 2014; Sabus, 2010). Differences in professional achievement of all types cannot be attributed to seemingly obvious causes such as women taking time out of their careers to raise a family (Kaufman & Chevan, 2011).¹

Sexism

One definition of sexism is “all those attitudes and actions which relegate women to a secondary and inferior status in society” (Goodman Zimet 1976, as cited in Morgan, Plaisant, Lignier, & Moxham, 2014, p. 352). Another is “individuals’ attitudes, beliefs, and behaviours, and organizational, institutional, and cultural practices that either reflect negative assessments of individuals based upon their gender or support unequal status of women and men” (Swim & Hyers, 2009, p. 407). Although at least one author states men are also subjected to systematic sexism (Benatar, 2003), the majority of authors consider sexism to impact women more negatively. Legislation introduced in response to the rise of feminism and the push for gender equality means traditional overt expressions of sexist behaviour are no longer officially endorsed in many Western societies (Valentine, Jackson, & Mayblin, 2014). This deliberate shift in intention by law makers has not necessarily been embraced at a societal level (Valentine et al., 2014). It has been suggested sexism and sexist attitudes have

¹ This disparity is consistent with a 2017 report commissioned by the New Zealand government which highlighted that the gender pay gap is still present, and is in fact increasing (Pacheco, Li, & Cochrane, 2017). The gender pay gap is a quantifiable manifestation of inequality and while approximately 20% of this gap can be accounted for, 80% is for ‘unexplained’ reasons (Pacheco et al., 2017).

been pushed underground, which makes identification and redress more difficult (Huber, 2016; Valentine et al., 2014).

In addition to the issues with identifying sexism, there are significant concerns about sexism and sexist behaviour and the consequences for an individual should they confront it (Becker, Zawadzki, & Shields, 2014). There is research suggesting sexism can be reduced if confronted, by means of educating the perpetrator(s) (Good, Moss-Racusin, & Sanchez, 2012). However, there is also research supporting the view that confronting sexism can result in negative outcomes for the person who confronts it (Becker et al., 2014). Consequences can vary depending on whether a man or woman is doing the confronting (Drury & Kaiser, 2014). In general, a woman who is subjected to sexism has the least amount of power, and therefore a corresponding potential for serious negative consequences (Drury & Kaiser, 2014). The most effective tools against sexism involve interventions which are proactive rather than reactive: that is, an intervention is developed using appropriate theory, rather than an individual's spontaneous and potentially emotion-laden reaction to a sexist situation (Becker et al., 2014).

Neosexism, Hostile Sexism, and Benevolent Sexism

A variant of sexism is neosexism. The term neosexism, which emerged during the 1990s, refers to situations in which the continued existence of discrimination based on sex is denied (Glick & Fiske, 2001). Subsequent research has uncovered subcategories of neosexist behaviours which have been termed hostile sexism and benevolent sexism (Glick & Fiske, 2011). Neosexism describes covert, and sometimes subconscious sexist behaviour (Glick & Fiske, 2001). Hostile sexism, as the name suggests, encompasses hostile attitudes such as strongly agreeing with the statement “women seek to gain power by getting control over men” (Glick & Fiske, 2001, p. 118). Benevolent sexism is a concept metaphorically placing women on a pedestal (Fraser, Osborne, & Sibley, 2015), and can be summed up with the comment “women should be cherished and protected by men” (Glick & Fiske, 2001, p. 118). It is postulated that benevolent sexism and hostile sexism are “two sides of the same coin” which when combined and measured can show levels of ambivalent sexism (Glick & Fiske, 2011, p. 532). Much research has been done on hostile sexism, benevolent sexism and ambivalent sexism (Hirsh et al., 2013; King et al., 2010), phenomena which are of course more nuanced and complex than this brief description suggests.

Sexist behaviour is not restricted to men: women also exhibit both benevolent sexism and hostile sexism towards women, although to a lesser extent (Hirsh et al., 2013). An example of this gender issue, which has received little attention in the healthcare literature to date, was highlighted by a 2016 exploratory study of expectations women have of their female managers (Hurst, Leberman, & Edwards, 2017). Although participants initially reported they expected the same behaviour from their managers irrespective of the manager's sex, further investigations revealed expectations that female managers would behave in a more nurturing, supportive manner than their male counterparts. Consequences of these unmet gender expectations sometimes resulted in such extremes as termination of employment (Hurst et al., 2017). It is feasible these types of expectations exist within musculoskeletal healthcare professions, and could have implications for patients and practitioners, although literature investigating this topic is currently lacking.

Manifestations of sex and gender issues such as inequality can affect individuals, plus the development, growth and effectiveness of professions (Govender & Penn-Kekana, 2008; Newman, 2014). Although not an exhaustive list, examples of potential consequences of sex and gender discrimination within healthcare are: compromised patient safety and/or comfort, compromised practitioner safety and/or comfort, reduced practitioner/treatment efficacy, barriers within educational curricula, barriers within professions, practitioner attrition, negative public perception of the integrity of the professions, and lost opportunities for innovation within professions (FitzGerald & Hurst, 2017; Hammond, 2009; Morgan et al., 2014; Newman, 2014). Without research into the influence and impacts of sex and gender within professions it is impossible to know the status of inequality within a given profession, identify and remedy any need for educational and/or professional support to combat inequality, identify and measure trends of any gender discrimination discovered, or provide meaningful outcome measures against which to assess change.

It has been acknowledged within the literature that sex and gender are important, yet often ignored, considerations within healthcare research (Heidari et al., 2016; Nowatzki & Grant, 2011). One recommendation to mitigate this issue is the adoption of gender based analysis (GBA), described as a process to consider the “sources and consequences of inequalities between women and men and to develop strategies to address them ... [which focuses] on gender differences in health and health care and appropriate policies” (Heidari et al., 2016, p. 4). The value in considering GBA when conducting healthcare research is to highlight instances of systemic inequality and discrimination (Heidari et al., 2016). Importantly, this

process of GBA can identify not only differences between men and women, but also similarities between men and women, differences amongst women, and opportunities for innovation (Nowatzki & Grant, 2011). Such a process benefits all. In 2016, Sex and Gender Equity in Research (SAGER) guidelines were published, recommending researchers and journal publishers commit to considering and reporting on sex and gender within all healthcare research (Heidari et al., 2016). As an active step towards encouraging positive changes, the SAGER guidelines recommend that if researchers do not report on sex and gender within a given study they should clearly justify why these factors are not considered pertinent (Heidari et al., 2016).

Feminism

Feminist theories put women and gender at the forefront (Rosser, 2012). A feminist framework can be used to investigate many aspects of society, including the development of and cultures within professions (Nowatzki & Grant, 2011; Rosser, 2012). Feminism is an umbrella term, encompassing numerous iterations and progressions. Different interpretations of feminism offer alternative viewpoints through which multiple aspects of a situation may be considered. Each type of feminist critique has strengths and weaknesses, which must be considered in relation to the topic being studied, however it is beyond the scope of this review to discuss these fully.

A liberal feminist view is one promoting the idea that no particular privileges are expected for women, but discrimination on the basis of sex should be removed (Tong, 2008). However, this view does not address gender bias which may pervade the community being studied, and assumes a high level of personal autonomy and rational behaviour (Rosser, 2012). A liberal feminist lens is inadequate when studying a health related topic where bias could occur during any or all stages of selection and design of a study, and could impact the outcomes and conclusions reached (Rosser, 2012). For example, a study investigating reasons for women in academia publishing less often than men could exhibit bias if it is assumed the women have a high level of autonomy and no consideration is given to these women's social, cultural and historical contexts.

Socialist feminist critiques offer an alternative view developed in part from Marxist philosophies, which consider gender and class as equally important, reject individualism, and consider that knowledge cannot be separated from the society in which it was developed and resides (Rosser, 2012; Tong, 2008). According to this perspective, Western society operates

largely within a capitalist socio-political framework which favours the dominant class, and there are many examples of health research which favours the ‘normative male’ (Ikemoto, 2013). One example of bias where ‘male as normative’ has become apparent is within pharmaceutical trials (Ikemoto, 2013). Historically, women have been largely excluded from pharmaceutical trials to protect companies from litigation if pharmaceutical testing conducted on females resulted in foetal abnormalities (Rosser, 2012). One outcome of this under-representation of women within drug trials is inappropriate dosage recommendations for some medications (Ikemoto, 2013; Rosser, 2012). This outcome affects not just women, but also, for example, the elderly and also Asian men whose stature is generally smaller than that of the ‘normative male’ (Rosser, 2012). Applying a feminist lens to the process of preparing pharmaceutical products for use by the general population has identified tangible and measurable negative health outcomes when the ‘normative male’ is the yardstick by which all else are measured (Ikemoto, 2013). Potentially, applying a feminist lens to the development of techniques used within musculoskeletal healthcare could reveal that many techniques may have been developed without consideration of the average differences in size between males and females, or for example between different groups of men.

Existentialist feminism proposes that “the value that society assigns to biological differences between males and females has led women to play the role of ‘other’” (Rosser, 2012, p. 13). An example of women being assigned this role of ‘other’ within manual therapy can be seen with HVLA techniques which require compression directly on breast tissue of the patient (Figure 1). While this technique is likely to be acceptable to male patients, it will probably not be suitable for many female patients, especially those with breast implants or painful breasts, or those who are lactating.

There are arguments against the use of some feminist theories. These arguments centre around feminism being historically relevant predominantly for white, middle class women, ignoring the influence of, and intersections between, gender, race, ethnicity and/or culture (FitzGerald & Hurst, 2017; Rosser, 2012). Feminist critique has developed and grown over time, reinterpreting previous iterations and remedying deficits found within previous feminist theories with the aim of providing deeper understanding of the complexities inherent within societal constructs such as gender and race (Ikemoto, 2013; Rosser, 2012). It can be argued that this peeling back of layers, and subsequent investigations into the intricately complex relationships between these layers can *only* occur iteratively. Discrimination based on gender is arguably the most complex form of discrimination to dissect, as it is all-pervasive and

almost impossible to dissociate from its cultural, societal and historical context. This difficulty should not preclude gender discrimination from being a topic of research however, and this topic could be seen as a useful basis from which to develop further research investigating other types of discrimination such as those based on race.

‘Doing’ Gender

Manifestations of gender occur with the performance of masculinities and femininities (West & Zimmerman, 1987). As Paechter (2006) discusses, the practising of masculinities and femininities, or ‘doing gender’ is an ongoing, fluid and dynamic process, influenced by social, historical, and cultural norms to which we are exposed, and in which we are immersed, throughout life.

One author influential in some fields of study around gender is Michel Foucault. A full exposition of Foucault’s theories is beyond the scope of this literature review but there are two Foucauldian concepts which can be useful to consider when examining the performance of masculinities and femininities. One key concept is that of the ‘panopticon’, a model prison designed so one guard can view all prisoners, but prisoners cannot see the guard, or even know if the guard is present; prisoners know they will be punished for unacceptable behaviour, but as they are unable to tell when they are under direct surveillance, every prisoner self-monitors their behaviour to, in effect, become their own prison guard (Foucault, 1979). Foucault considered the panopticon to illustrate the concept of a disciplinary society, in which disciplinary practices honed in prisons are pervasive. The panopticon model provides a method by which an immense amount of power can be held over people (prisoners), to ensure docile and ‘appropriate’ (prisoner) behaviour, with minimal effort on behalf of (prison) administrators (Foucault, 1979). A second key Foucauldian concept is that of discourse, which for Foucault involves relationships amongst bodies, language, and power. This concept signals that many behaviours are determined and controlled more by society than by individual actors (Paechter, 2003, 2006).

Considering these two concepts together, expressions of masculinity or femininity are determined and moderated by a combination of local context and the ‘self-policing’ effects of disciplinary practices (Foucault, 1979; Paechter, 2003). ‘Local’ can be a ‘community’, not necessarily geographical: for example the professions of osteopathy, physiotherapy and

chiropractic (Paechter, 2006). Gender thus becomes a modern form of power that animates identity formation.

Within Western society masculinity and the inter-related concept of male-as-norm has assumed a higher status than femininity and the ‘otherness’ of being female (Rosser, 2012). Masculinities have been afforded higher priority and prestige within both healthcare and wider society. For example, consider comparisons of embodied knowledge and disembodied knowledge, concepts which are especially relevant to musculoskeletal healthcare practices (Alex et al., 2012; Paechter, 2006). Disembodied knowledge is knowledge *about* the body, and embodied knowledge is knowledge *through* the body (Alex et al., 2012; Paechter, 2006). Western culture has long associated the mind with masculinity and the body with femininity, with embodied knowledge therefore being relegated lower status: “it is as if ‘facts’ come out of our heads, and ‘fictions’ out of our bodies” (Simmonds 1999 as cited in Ellingson, 2006, p. 301).

The relative disavowal of embodied knowledge has broad implications for healthcare research. As Paechter (2006, p. 23) notes, “knowledge of others’ bodies and the use of this to control others takes place in a context of denial of one’s own body and the relevance of its experiences”. And as Alex et al. (2012, p. 5) write,

... our study showed that for a gender researcher in medical sciences it seems impossible to transcend the body in the field of medicine, because in practice the health care workers meet the body, which wants to be cured and cared for. Just looking at the human being as historically, culturally and socially constructed and leaving the body out of account was seen as problematic.

This quote highlights the point that there are many and complex aspects of both gender and sex that could be understood to be within the three professions of chiropractic, osteopathy, and physiotherapy, which, more than most other healthcare modalities, commonly use the body of the practitioner to provide treatment for the body of the patient. It appears that while disembodied knowledge and its association with masculinity has been afforded higher esteem within the realms of chiropractic, osteopathy and physiotherapy literature, embodied knowledge seems to have received less attention as a result of the cultural link between femininity and embodied knowledge.

Complementary and Alternative Medicine

The World Health Organisation (WHO) and Cochrane Collaboration have attempted to provide a working definition of complementary and alternative medicine (CAM), although both organisations acknowledge there are difficulties with furnishing an accurate definition (Cochrane Complementary Medicine, n.d.; World Health Organisation, 2018). One current working definition describes the terms ‘complementary medicine’ or ‘alternative medicine’ as referring to “a broad set of health care practices that are not part of that country’s own tradition or conventional medicine and are not fully integrated into the dominant health-care system. They are used interchangeably with traditional medicine in some countries” (World Health Organisation, 2018, para. 2). It is worth noting while chiropractic and osteopathy are generally included as CAM, physiotherapy is not. This distinction exists despite numerous techniques specifically listed as CAM being utilised by physiotherapists, as well as chiropractors and osteopaths, such as massage and neuromuscular techniques (Cochrane Complementary Medicine, n.d.). The blurring of lines between which musculoskeletal healthcare practices should be considered CAM and which should not, becomes relevant when considering sex and gender within musculoskeletal healthcare, as it has been proposed that women, as both users and practitioners, may engage with CAM to challenge the patriarchy of mainstream medicine (Gale, 2010). The point is made by Brenton and Elliott (2014, p. 92) summarising Sointu (2011) that “CAM is considered a socially feminised form of healthcare [which] does not enjoy the scientific legitimacy afforded to standard biomedical practices”.

The hypothesis that both women and men may use CAM to challenge traditional gender expressions is equivocal. Several studies present various views regarding the extent to which the choice to use CAM challenges traditional gender norms (Flesch, 2007, 2010; Sointu, 2011). One study found men who use CAM focus on its scientific and rational (disembodied, ‘masculine’) aspects (Brenton & Elliott, 2014). The same study found women feel empowered by their selection of CAM in preference to mainstream medicine, and that their reasons for this choice are driven by emotional (embodied ‘feminine’) factors. The authors of this study therefore urge caution when considering CAM to be a vehicle through which the ‘undoing of gender’ occurs, and conclude women and men do use CAM in a distinctly gendered way although not necessarily via traditional expressions of masculinity and femininity. They propose men and women who use CAM have found a way of ‘redoing’ rather than ‘undoing’ gender, and, as such are perpetuating gender inequality (Brenton & Elliott, 2014).

Summary

This literature review introduces concepts relating to sex and gender, and discusses the inconsistent usage and definitions of the terms sex and gender within the scientific literature. The relevance and value of applying a gender or feminist lens to the professions of chiropractic, osteopathy and physiotherapy is proposed. A summary of the origins and evolution of the chiropractic, osteopathy and physiotherapy professions shows the effect of history on the proportion of males and females employed within each workforce, and how these proportions may have influenced the direction of research undertaken.

Chapter Two

Methodology

Scoping reviews are a relatively recent variation of literature review, often used to map existing research on a topic, prepare for a systematic review, or identify gaps in the literature and inform further research (Arksey & O'Malley, 2005).

In contrast to a systematic review, which aims to summarise and synthesise the best available evidence concerning a specific topic, aiming for depth of topic, a scoping review aims for breadth (Pham et al., 2014). A scoping review can be used as a standalone study to identify gaps in the literature, or as one stage within an ongoing review process. It is a valuable methodology when the nature, range and extent of existing literature is unknown, as it allows for a broad question, and inclusion of both peer reviewed and grey literature (Arksey & O'Malley, 2005; Levac, Colquhoun, & O'Brien, 2010).

Arksey and O'Malley (2005) proposed a five-stage framework for the execution of scoping reviews, with an optional sixth consultation stage, and invited discussion to further develop the methodology. The five stages, as proposed by Arksey and O'Malley, are as follows:

Stage 1: Identifying the research question

Stage 2: Identifying the relevant studies

Stage 3: Study selection

Stage 4: Charting the data

Stage 5: Collating, summarising and reporting the results

Stage 6 (optional): Consultation

In response to the increasing use of scoping reviews, a PRISMA extension was published in 2018 to be used as a guideline for conducting scoping reviews which are robust, transparent and replicable (Tricco et al., 2018). Although Arksey and O'Malley (2005) suggest use of the term 'scoping study' in preference to 'scoping review', Pham et al. (2014) recommend 'scoping review' as being more indicative of the review feature of the methodology, and less likely to cause confusion due to the term 'scoping study' being used to describe other types

of methodologies. ‘Scoping review’ has been adopted as the appropriate nomenclature within the PRISMA guidelines (Tricco et al., 2018).

The scoping review framework as described by Arksey and O’Malley (2005), and subsequently reviewed, critiqued, and refined by Levac et al. (2010) and Pham et al. (2014), is described in more detail below.

Framework Stage 1: Identifying the Research Question

Compared to the specificity of systematic review research questions, scoping review questions must remain broad (Arksey & O’Malley, 2005). The Joanna Briggs Institute scoping review protocol recommends consideration of ‘target Population, Concept and Context’ (PCC) as a structure to guide development of the research question (Joanna Briggs Institute, 2015). Levac et al. (2010) suggest this first stage is an appropriate phase within which to consider the overall justification for the scoping review and that this additional consideration can further guide development of critical aspects of the potential question.

Framework Stage 2: Identifying the Relevant Studies

During the second stage decisions are made concerning which databases and other sources will be searched, which search terms will be used, and other considerations such as language(s) and time frame (Arksey & O’Malley, 2005). It is often appropriate to include grey literature in a scoping review (Tricco et al., 2016). Due to varying definitions of grey literature, and lack of consensus on a standardised search process for it, it is necessary during this stage to develop a grey literature definition and search strategy appropriate to the aims of the scoping review (Aromataris & Riitano, 2014).

The necessity for the search strategy to remain broad means it is also necessary to take a pragmatic approach and consider the limitations of resources available for conducting the review, such as personnel as well as financial and time constraints, and develop the search strategy accordingly. Resource limitations should be justified and made explicit. Levac et al. (2010) recommend constructing a research team with both methodological and topic specific knowledge.

Grey literature

Originally the term grey literature was used to describe a wide range of publications which were not easily accessible to the general public, including documents such as government reports, theses and dissertations (Aromataris & Riitano, 2014; Schopfel & Rasuli, 2018).

According to one source the definition of grey literature is:

A field in library and information science that deals with the production, distribution, and access to multiple document types produced on all levels of government, academics, business, and organisation in electronic and print formats not controlled by commercial publishing i.e. where publishing is not the primary activity of the producing body. (GreyNet International, 2018, para. 2)

There is some discussion around whether theses and dissertations should remain categorised as grey literature due to widespread availability via the internet (Schopfel & Rasuli, 2018). It is also important to note that not all articles which appear in peer reviewed journals are guaranteed to be peer reviewed (Portland State University Library, 2018). Some examples of writing which may not be peer reviewed but which are published in peer reviewed journals include summaries of conference proceedings, viewpoint papers, or book reviews (Portland State University Library, 2018). The value of including grey literature in a scoping review is to incorporate relevant information which would be excluded in, for example, systematic reviews.

Framework Stage 3: Study Selection

In contrast to a systematic review, inclusion and exclusion criteria in scoping reviews are developed post hoc, and iteratively, as familiarity with the subject matter is acquired from reading the studies (Arksey & O'Malley, 2005). Ideally this stage should involve multiple reviewers to develop inclusion and exclusion criteria, with ongoing communication between reviewers to refine the abstract review process and search strategy as challenges are identified (Levac et al., 2010).

Framework Stage 4: Charting the Data

The nature and volume of data determines the most appropriate form of charting the data (Daudt, van Mossel, & Scott, 2013). "A 'narrative review' or 'descriptive analytical' method is used to extract contextual or process oriented information from each study" (Levac et al.,

2010, p. 3). Multiple reviewers should decide collaboratively which variables should be extracted as determined by relevance to the scoping review question (Levac et al., 2010).

Framework Stage 5: Collating, Summarising and Reporting the Results

Levac et al. (2010) build on the Arksey and O'Malley framework and recommend breaking down the fifth stage into three discrete sub-stages: analysis, reporting the results, and reflection on the value of the findings as they relate to the original research question. Levac et al. recommend a qualitative model or theory such as thematic analysis be used, in combination with a descriptive numerical summary analysis, as a viable option to guide the process of summarising and reporting results.

Inductive thematic analysis

The qualitative model of thematic analysis can be defined as finding patterns and themes across a dataset (Vaismoradi, Turunen, & Bondas, 2013). Thematic analysis has been described as a “highly flexible approach that can be modified for the needs of many studies, providing a rich and detailed, yet complex account of data” (Nowell, Norris, White, & Moules, 2017, p. 2). It has also been noted that thematic analysis can be a useful method for highlighting unexpected findings, and comparing and contrasting qualitative and quantitative data (Nowell et al., 2017), which clearly aligns with the aims of a scoping review. However, it has also been noted that the flexibility inherent within a thematic analysis process can be problematic in terms of exhibiting a robust methodological process (Nowell et al., 2017). Nowell et al. have attempted to redress the inconsistencies with the use of thematic analysis by suggesting a structured approach, with improved reporting. Their proposed framework entails: the researcher becoming very familiar with the data, creating preliminary codes, searching for themes, reviewing themes, defining and naming themes, and reporting. Themes can be identified using an inductive approach, in which themes relate strongly to the data, or a deductive approach, where the data must fit into predetermined categories. An inductive approach could be appropriate within a scoping review, for example where ‘orphaned’ data which do not fit with any previously identified theme become part of a newly identified theme and highlight an unexpected finding.

Descriptive numerical analysis

Arksey and O'Malley (2005) recommend including a descriptive numerical summary of aspects of the included studies such as total number of studies included, types of study

design, years of publication, characteristics of study populations and countries where the studies were conducted. Levac et al. (2010) develop this point further, suggesting that results be reported in a manner pertinent to the goals of the scoping review, such as by use of tables to highlight both gaps and strengths in the literature.

It is important to remember a scoping review does not provide a synthesis of the literature as would be the case in a systematic review, but rather an overview of the extent, nature and range of the literature. The purpose is to identify gaps and opportunities for potential subsequent research topics.

Framework Stage 6: (optional) Consultation

Arksey and O'Malley (2005) consider stage six to be optional, conversely Levac et al. (2010) consider consultation essential, with preliminary findings used to inform consultation during subsequent research. There is agreement however that there should be a clearly established purpose for any consultation (Arksey & O'Malley, 2005; Levac et al., 2010). Consultation may be used when there is a risk of missing essential information if stakeholders are not consulted, to inform preparation of keywords for a search strategy, to assist with interpretation of research results or to provide input to suggestions for future research (Pham et al., 2014).

Criticism of Scoping Reviews

At least one paper has criticised the scoping review as a methodology on the grounds that it may not be robust (Grant & Booth, 2009). While Grant and Booth (2009) acknowledge that scoping reviews can “be systematic, transparent and replicable” (p. 101), they highlight the potential for bias from the lack of critical review, suggesting this bias could skew results if conclusions are based on the mere existence of studies rather than consideration of whether the studies included in the scoping review are themselves of acceptable quality.

This concern has been addressed in the literature with a pertinent recommendation arising from critique of the Arksey and O'Malley framework: namely, the inclusion of critical review (Daudt et al., 2013; Pham et al., 2014). While Arksey and O'Malley (2005) argue that critical review is not an essential aspect of a scoping review, the decision to include critical review depends on the purpose of the project. Scoping reviews aim to map the extent and breadth of existing literature so could be in danger of drawing misleading conclusions if the

quality of the literature is not considered (Levac et al., 2010). It must be remembered that critical review within a scoping review does not lead to the exclusion of lower quality research, as would be the case in a systematic review. All research included in a scoping review has potential value when identifying gaps in the literature; for example, while a study may be flawed in its execution it may raise important questions, or highlight previously unidentified areas for research.

Critical Review Process

Although Arksey and O'Malley (2005) originally considered critical review to not be an essential element of a scoping review, subsequent authors have recommended critical review should be included (Daudt et al., 2013; Grant & Booth, 2009; Pham et al., 2014).

The process of creating a formalised structure for the critical review of health-related research papers began in earnest in 1996 with the development of a tool for reviewing randomised controlled trials, which became known as the Consolidated Standards of Reporting Trials, or more commonly, CONSORT guidelines (Begg et al., 1996). The intention was to provide a framework for researchers to use, with the standardised process hopefully improving the quality of study design and reporting (Begg et al., 1996). It was anticipated this improved level of design and reporting would also facilitate more accurate assessments of research quality, assisting reviewers with assessment of important aspects of study design and execution such as levels of validity, reliability and replicability (Begg et al., 1996). During the subsequent decades this set of priorities gained impetus, and other groups have developed systems for facilitating comprehensive critical review of numerous types of studies within healthcare, for example, the EQUATOR² network (Simera et al., 2010). Critical review tools take the form of a checklist or flowchart, with questions pertinent to a specific methodology (Simera et al., 2010). Readers can assess each element of a study design, execution and reporting against the relevant checklist to determine the quality and relevance of a study (Moher, Simera, Schulz, Hoey, & Altman, 2008; Simera et al., 2010). The act of working methodically through a checklist reduces opportunities for reader bias when interpreting the quality of a study (Moher et al., 2008). These checklists also provide researchers with reporting guidelines to follow when designing, executing and reporting on studies (Moher et al., 2008; Simera et al., 2010).

² Enhancing the Quality And Transparency Of health Research

It must be noted that a critical review tool is just that: a tool which remains dependent on the proficiency of the operator for utility. Critical review tools provide a prompt to the reader to consider aspects of each study which may otherwise be missed, and remain reliant on a certain amount of reviewer interpretation (Moher et al., 2008).

Conclusion

A main concern of Arksey and O'Malley (2005) is that poorly designed and executed scoping reviews would devalue a research method with much potential, if scoping reviews came to be seen only as 'lazy' systematic reviews. However, the several papers subsequently published which critiqued and refined the Arksey and O'Malley framework support judicious use of the scoping review as a robust, structured and legitimate methodology (Daudt et al., 2013; Levac et al., 2010; Peters et al., 2015; Pham et al., 2014). Scoping reviews are becoming an increasingly popular choice as a legitimate methodology. The 2018 publication of PRISMA guidelines specifically for scoping reviews is one indication of support for further use of this methodology (Tricco et al., 2018).

Method

The methods section will discuss how the framework as described in the methodology section was applied in this scoping review.

The purpose of this scoping review is to identify gaps within the literature relating to sex and/or gender within the regulated healthcare professions of chiropractic, osteopathy and physiotherapy. It is hoped the findings will highlight specific areas of limited or no research, to guide future research and to draw attention to the considerations that sex and gender have received in general within these three professions. The value, for example, of applying a feminist lens can result in gains for all; the benefits are not constrained to females. It is envisioned this scoping review can be used by researchers to consider the value of investigating sex and/or gender for many applications. These applications could include but are not limited to: raising awareness amongst education providers and professional bodies and so encouraging change of any systemic discriminatory cultures within the three professions; identifying perceptions of discrimination from the perspective of patients in order that any resulting service quality issues can be mitigated; or using the findings from this scoping review as the first stage towards investigating the effects of other types of discrimination within musculoskeletal healthcare, for example due to ethnicity, sexuality, or non-binary gender. It is hoped this scoping review could guide the direction of future research towards developing a comprehensive and therefore more useful understanding of the effects of sex and gender on chiropractic, osteopathy and physiotherapy.

The process by which a scoping review came to be considered a potentially suitable methodology for this thesis followed a preliminary search of peer reviewed literature which uncovered few papers utilising a gender or sex lens within research concerning the osteopathic profession. Often, sex was recorded for demographic purposes only. Widening the search terms to encompass other healthcare modalities such as physiotherapy, chiropractic, and complementary and alternative medicine (CAM) also uncovered limited research using a sex and/or gender lens. Relevant research from this preliminary search seemed to vary widely in terms of quality, and research questions rarely seemed to build on previous research, with one paper for example providing only six references (Davies, 1990). It was concluded that musculoskeletal healthcare modalities are not well served in research targeting the influence of sex and/or gender, making it difficult to assess the status of these

aspects of healthcare from the perspectives of practitioners, patients, the profession, or educational domains, or to identify trends.

It was therefore decided a scoping review would be a suitable first step towards reducing the haphazard nature of existing literature concerning sex and gender within musculoskeletal healthcare. A scoping review could provide an audit of the breadth and depth of existing scientific literature, and identify areas needing further investigation (Arksey & O'Malley, 2005).

Framework Stage 1: Identifying the Research Question

‘What is known about experiences, perceptions, and impacts on practitioners and patients due to sex and gender in the chiropractic, osteopathy and physiotherapy professions?’

The research question needs to remain broad, and guides the remainder of the scoping review (Arksey & O'Malley, 2005; Levac et al., 2010). ‘Population, Concept, Context’ (PCC) was used to guide development of the question. Consideration of the target population was driven by identifying the different parties involved in therapeutic relationships: practitioners, patients, education providers, and professional bodies. The likely influences each of these could feasibly exert on each other, as shown in Figure 3, was also considered.

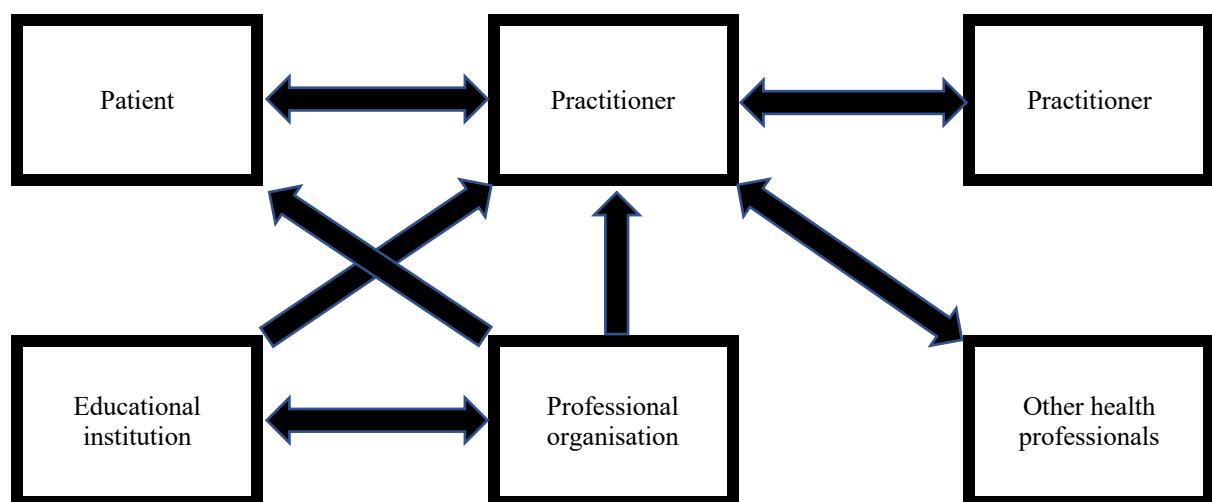


Figure 3. Potential directions of influence and relationships between stakeholders in healthcare relationships

It was decided by defining the target population as practitioners and patients, this definition would by default include educational providers and professional organisations including

regulatory bodies, due to the necessarily intimate regulatory relationships between these entities.

The ‘concept’ was captured by considering implications of the potential effects of sex and gender on the target population, and the importance of keeping these potential effects as open as possible, to avoid inadvertently limiting the extent of the scoping review. Therefore the decision was made to include experiences, perceptions and impacts.

Context was considered in terms of which professions to include. The decision was made to include musculoskeletal healthcare professions which are regulated in New Zealand, as regulation provides clear boundaries for inclusion criteria plus an opportunity to compare and contrast three similar but different professions. A further consideration relates to outcomes from the scoping review; in theory it should be easier to apply generalisability of findings to professions which have a formalised and relatively consistent structure in terms of standards of education and professional conduct.

Regulated healthcare in New Zealand is any profession covered by the Health Practitioners Competence Assurance (HPCA) Act 2003 (New Zealand Government, 2003). Regulated professions which are primarily concerned with musculoskeletal (dys)function include chiropractic, osteopathy, and physiotherapy. In New Zealand these healthcare professionals must maintain registration with the relevant professional body and hold recognised qualifications to a specified level. These discrete qualifications allow practitioners to clearly identify as, and align themselves with, their particular healthcare modality: for example, although in some cases there may be significant overlap between how a chiropractor, an osteopath and a physiotherapist practice (Norris, 2001), these professional titles are protected and only those holding the relevant qualification may identify as such. The decision to include only those professions which are regulated in New Zealand was pragmatic, with different countries having diverse regulatory requirements, so although other musculoskeletal therapists may be registered in other countries they are excluded from this review. For example, as of November 2018 acupuncture remains a self-regulated profession in New Zealand, although attempts are being made to change this (New Zealand Acupuncture Standards Authority Inc, 2017). Massage therapy, yoga and other exercise prescription activities are also self-regulated (Pollock, n.d.). The implications for this scoping review are that unregulated practitioners may have any level of education, and may not even identify

with a specific modality, lessening the opportunities for a robust comparison of any data collected.

Framework Stage 2: Identifying the Relevant Studies

In addition to a search of peer reviewed literature, it was decided an audit of textbooks used within chiropractic, osteopathy and physiotherapy education to teach practical skills was warranted. The purpose of the text book audit was to compare and contrast one aspect of the current resources used to support the teaching of osteopathic, chiropractic and physiotherapy manual therapy techniques in New Zealand in 2018. The aim was to identify any potential sex and/or gender issues and to establish if there is a potential need for a comprehensive audit of technique education resources. It was decided an audit of the photographs demonstrating technique skills in the most commonly used technique books would be a pragmatic initial step towards ascertaining if there is a potential need for an in-depth audit of teaching resources.

It was therefore necessary to develop two search strategies to manage:

1. Peer reviewed and grey literature
2. The textbook audit.

Search strategy 1: Peer reviewed and grey literature

The peer reviewed literature search used an iterative snowball technique, refining search terms as relevant papers were identified, and manually searching reference lists for further, potentially relevant literature. Although the scoping review framework endorses use of multiple reviewers for this stage, resourcing constraints rendered this recommendation unfeasible for this review.

Databases

The following databases were searched following consultation with a librarian and a clinical researcher, during November 2017- January 2018: ScienceDirect, Ebsco (Academic Search Complete, AMED, CINAHL, Health Source: Nursing/Academic, MEDLINE, SportDiscus), NCOR, Index to chiropractic literature (ICL), nzresearch, PEDro, Cochrane Library, Informit, Ostmed, Google Scholar, Scopus.

Initial search terms and key phrases

Title, abstract, and/or keywords included any combination of:

Category A: Sexism, sexist, male, female, woman, man, women, men, gender, gender discrimination, sex differences, gender inequality, sex inequality, gender pay gap, neosexism, harassment, glass ceiling, gender concordance/discordance, abuse, aggression, paternalism, paternalistic, paternal.

AND

Category B

Chiropractic, chiropractor, osteopath, osteopathy, osteopathic, physiotherapy, physiotherapist, physical therapy, physical therapist, musculoskeletal.

Development of search terms and key phrases

There were an unmanageably high number of results irrelevant to this study due to the terms ‘gender’ and ‘sex’ commonly being used interchangeably. A related complication with the search terms ‘gender’ and ‘sex’ is that they were often used simply as a record of the demographic of the population being studied, so the search strategy was altered.

A Microsoft® Excel (version 16.18) [Excel] spreadsheet was created, and the number of papers identified from each combination of search terms was recorded. Titles, abstracts and keywords of these papers were then manually searched, and the total number of potentially relevant papers identified from each combination of search terms was also recorded, allowing progressive identification of the most successful and unsuccessful search terms.

From this process it became apparent the most effective search strategy would be labour intensive, involving a largely manual search of databases using the most successful search terms. These terms were eventually identified as ‘osteopathy’ (and related terms such as osteopathic, osteopath), ‘chiropractic’ (and related terms), and ‘physiotherapy’ (and related terms). In the smaller databases, an ‘all text’ search was used. In the larger databases, searches were of title, abstract, and keywords. Boolean operators were utilised and the searches were kept broad, for example ‘osteopath* AND gender’. A sample of this search process and results are shown in Appendices C and D respectively.

It was decided to include literature from any geographical region, and no date restrictions were applied.

Grey literature

It was decided that for this scoping review grey literature would be defined as any paper published in a peer reviewed journal which could not be guaranteed to have been peer reviewed, including for example letters to the editor, transcripts of conference presentations, working party reports, and opinion pieces identified during the search for peer reviewed articles. Grey literature was critiqued using a relevant critical review tool (McArthur, Klugarova, Yan, & Florescu, 2015).

While it is not clear whether theses and dissertations should be classified in general as grey literature (Schopfel & Rasuli, 2018), for the purpose of this scoping review the decision to define a thesis or dissertation as grey literature was only to determine which critical review tool was most appropriate to use. Sections of the theses and dissertations included in this scoping review were published as independent studies, and therefore were peer reviewed and clearly not grey literature. For example the dissertation by Öhman (2001) encompassed five studies. Three of these studies were published separately (Öhman, Stenlund, & Dahlgren, 2001; Öhman, Hägg, & Dahlgren, 1999; Öhman, Solomon, & Finch, 2002) and independently met the inclusion criteria for this scoping review so were treated as entities distinct from the dissertation.

Search strategy 2: Textbook audit

A list of titles of technique textbooks recommended by three New Zealand educational institutions, representing one each of chiropractic, physiotherapy and osteopathy, was collated.

The New Zealand College of Chiropractic was contacted and a list of required and recommended textbooks for the 2018 cohort of chiropractic students was acquired via email. Titles selected from this list for inclusion suggested the book was primarily concerned with the teaching of technique skills. If this criterion was not clear from the title then further investigation via the internet and/or Unitec Library was undertaken to ascertain the subject matter of the book.

Osteopathy titles were compiled from recommendations from three experienced practical technique tutors (two female, one male) at Unitec Institute of Technology, as there are no required textbook lists for practical components of the programme. The tutors were not made

aware of the purpose of acquiring this list; they were asked via email for their preferred technique textbooks. All recommendations were included for audit.

The physiotherapy title selection was taken on the 18th January 2018 from the University Bookshop website which holds the list of required and recommended textbooks for students attending the University of Otago School of Physiotherapy in 2018 (<http://books.unibooks.co.nz/lists.ihtml>). The University of Otago School of Physiotherapy was selected in preference to the Auckland University of Technology to reduce the opportunity for any regional bias. The same process used for the chiropractic selection was applied to the physiotherapy title selection.

Framework Stage 3: Study Selection

Peer reviewed and grey literature

Inclusion and exclusion criteria were developed iteratively, post hoc, and in addition to the above criteria a set of screening questions were developed and utilised. If the screening questions could not be answered adequately from the title and/or abstract, the full text was assessed, and the same screening questions applied. Again, the scoping review framework endorses use of multiple reviewers for this stage, but resourcing constraints rendered that recommendation unfeasible for this review.

Screening questions and inclusion criteria

Do(es) the title/abstract/keywords include any combination of search terms from Category A+B?

OR

Does the paper apply a gender or feminist lens to any aspect of the physiotherapy, chiropractic and/or osteopathy profession(s)?

OR

Does the paper investigate practical manual therapy techniques commonly used by physiotherapists, chiropractors and/or osteopaths which may be influenced by the sex of the practitioner and/or patient?

Exclusion criteria

Papers primarily concerned with sexuality.

Papers primarily investigating aspects of non-binary gender and/or sex.

Papers primarily concerned with sexual harassment.

Papers investigating specific medical conditions reporting sex differences, not using a gender or feminist lens.

Papers not published in English.

Papers in which the inclusion of sex and/or gender details is primarily for demographic purposes.

The references of all literature identified during this process were exported to Mendeley Desktop (version 1.18) [Mendeley]. All screened papers which met the inclusion criteria were downloaded in full, and the reference lists of those papers were manually searched for further, potentially relevant research.

To highlight any peer reviewed research not yet identified, and to be satisfied saturation had been reached and no relevant papers had been missed, all papers identified to this point were entered into Scopus and Google Scholar. The purpose of this step was to identify any additional papers which had cited an already identified paper, a function to which the Scopus and Google Scholar databases are particularly suited. These links were manually searched for further, potentially relevant papers by applying the same screening questions and inclusion and exclusion criteria. This process identified one possibly relevant paper (Sudmann, 2009), but as only the title was available in English this paper was not included. One erratum to a paper already identified was the only other paper highlighted during this process, which suggests saturation had been achieved.

Critical appraisal

To increase the utility of this scoping review it was decided to include critical review as recommended by Levac et al. (2010). The purpose of this scoping review is to identify gaps in the literature, and without critical review of the papers included, there is a risk of misleading conclusions being drawn. It must be remembered that unlike in a systematic review in which critical review will determine whether or not a paper is included, in a scoping review papers of any quality can be included. Therefore, critical review within a scoping review could be considered a flag to researchers using that scoping review to guide their own research that they should proceed with caution. The researcher's proposed direction of research and research question will determine how valuable different aspects of each paper included in a given scoping review are to their project. For example, a paper judged of low quality in this scoping review could still be valuable to another researcher in terms of the

development of research questions, or even as an example of an inappropriate methodology for that particular topic. A high quality paper could be useful as a template for a similar study, for example as part of a longitudinal comparison or subsequent systematic review.

While there are numerous critical appraisal tools available, many have not been validated (Moher et al., 2008). It is preferable to match each paper to its specific type of critical appraisal tool but the majority of papers included in this scoping review did not explicitly state their methodology, rendering it an impossible task to match every paper to a specific type of critical appraisal tool. It was therefore decided to take a general approach and classify each paper as either 'qualitative', 'quantitative', 'mixed methods' or 'grey literature' and conduct critical appraisal by means of four validated tools: one each for qualitative studies (Critical Appraisal Skills Programme, 2017), quantitative studies (Long, Godfrey, Randall, Brett, & Grant, 2002), mixed methods studies (Long, Godfrey, Randall, Brett, & Grant, 2005) and grey literature (McArthur et al., 2015). An Excel workbook was created, with a spreadsheet for each paper being reviewed, and the relevant appraisal tool copied to each. Notes which had been entered into Mendeley regarding each paper were then combined and expanded as each paper was critically reviewed. Findings were recorded into the relevant spreadsheet.

To assess the reliability of this critical review process the first ten papers identified during the study selection process were critically reviewed by myself (LK) and a second reviewer (SP). Neither reviewer was aware of the other's evaluation until reviews were ready for comparison. Initially the tool was applied to one each of a qualitative, quantitative, and mixed methods paper to assess consistency between reviewers, and suitability of the appraisal tools for this project. As results were consistent between reviewers, the remaining seven papers were appraised and compared in the same manner. No discrepancies between reviewers was identified, so the remaining papers were reviewed by myself only, using the aforementioned critical appraisal tools.

As previously mentioned, the use of a critical review tool is to focus the reader's attention on essential elements of study design, execution and reporting to reduce bias when deciding on the quality of each paper. As the critical review tools selected for use in this scoping review were general rather than specifically matched to each study type, it was necessary therefore to apply discretion and determine for each paper which prompts within each tool were relevant to each paper. An example of a completed critical review tool used in this scoping review is

included in Appendix E. On the basis of each critical review, every paper was graded either ‘A’ for acceptable-good, or ‘B’ for poor-acceptable. In broad terms, papers graded ‘A’ could be replicated with few or minor changes, with satisfactory levels of validity and reliability. Papers graded ‘B’ would require many and/or crucial changes to be able to replicate the study in a meaningful way, had lower levels of validity and reliability, or included reporting deficits which rendered critique impossible.

It was decided not to critically review the textbooks included in the audit, as the purpose of the textbook audit was to identify if there could be a need for a comprehensive audit of technique education resources.

Textbook audit

Inclusion and exclusion criteria were developed to apply to all selected books. A phone application ‘Thing counter’ (Karuma, 2015) was used to record results. This application allows multiple counts to occur simultaneously, and new categories to be added during a count when necessary. Final categories of photographs recorded were:

- Total number of photographs showing techniques being demonstrated on a ‘patient’
- Number of photographs showing a female practitioner performing a technique on a ‘patient’
- Number of photographs showing a potentially problematic³ technique being performed
- Number of photographs, or photograph captions/nearby paragraphs specifically stating the technique shown *is not* suitable for smaller practitioners, or if the patient is larger than the practitioner
- Number of photographs, or photograph captions/nearby paragraphs specifically stating the technique shown *is particularly* suitable for smaller practitioners, or if the patient is larger than the practitioner
- Number of photographs showing a male ‘patient’ having a technique being demonstrated on him

³ For example, if I considered the technique as demonstrated would mean the patient or practitioner would have their breasts compressed, or there could be difficulty performing the technique if the patient were larger than the practitioner.

Inclusion criteria

- Photographs showing manual therapy techniques being demonstrated on a 'patient'
- Photographs showing both patient and practitioner

Exclusion criteria

- Photographs showing examination techniques (where examination techniques can also be used as treatment they were included/excluded on the basis of how that photograph was classified in that book)
- Drawings or diagrams of techniques
- Techniques demonstrated on a model skeleton
- Photographs showing musculoskeletal treatment techniques using devices, such as acupuncture, cupping, therapeutic ultrasound
- Photographs showing only one person (for example, the patient), an exercise the patient does without the need for a practitioner, or a practitioner demonstrating a stance or handhold

No distinction was made between techniques which were represented by an individual or series of photographs: all photographs meeting the above criteria were counted individually.

No retest was performed, and this count was undertaken by one person, so no intra- or inter-rater reliability is available.

Framework Stage 4: Charting the Data

Peer reviewed and grey literature

The data was managed within Excel to allow for comprehensive sorting options. An Excel workbook was created and particulars from each paper were entered using the following headings:

1. Name of paper and reference details
2. Name of publication, for example, journal title
3. Date of publication
4. Type of paper (qualitative/quantitative/mixed methods/grey)
5. Method
6. Country of study
7. The study population source

8. Target audience for the paper
9. The profession to which the paper is related
10. Critique of the paper by primary researcher (LK)
11. Main theme of the paper

These data headings were selected in consideration of the objective of identifying gaps in the literature. Therefore, data such as study size were not considered relevant, as would be the case in a systematic review. Study size and its relevance to each study was considered as part of the critical review, and contributed to the final assessment of each study (as A or B).

Textbook audit

The data generated were entered into an Excel spreadsheet with the following headings:

1. Title
2. Number of technique photographs
3. Number of technique photographs showing ‘potentially problematic’ techniques
4. Primary profession targeted by this book
5. Comments

Framework Stage 5: Collating, Summarising and Reporting the Results

As recommended by Levac et al. (2010), this stage was broken into three: analysis, reporting the results, and reflection on the value of the findings as they relate to the original research question.

Analysis: Peer reviewed and grey literature

Inductive thematic analysis and familiarity with data

The iterative process used within the scoping review, and the inclusion of critical review, meant I acquired a high level of familiarity with the data. An ongoing record was kept of comments and points of note prompted from progressive re-readings of every paper.

Preliminary codes

As papers had previously been categorised by headings during Stage 4, it was decided these would be the preliminary ‘codes’. These codes were then sorted into two categories, according to the ‘study population source’ (for example, students), and the ‘target audience

for the paper' (for example, the profession). I decided to keep these categories deliberately general, to prevent unintended 'clumping' of findings according to chiropractic, osteopathy and physiotherapy categories, ever mindful of the aims of the scoping review to identify gaps.

Searching for and reviewing themes

The papers in these two preliminary categories of 'study population source' and 'target audience for the paper' were then further sorted according to the main aim, and/or implicit or explicit question raised in each paper. Each paper was considered on its own merits. If it did not match a theme already identified, a new theme was proposed, until all papers were allocated to a theme.

Defining and naming themes

A total of ten themes were ultimately developed by this process of combining papers which asked similar questions or had similar aims.

1. Intervention by Gender

Studies using an experimental intervention-style method deliberately developed using a gender lens.

2. Can Women Do It As Well As Men and Vice Versa: Students

Studies investigating if female and male students are equally capable.

3. Can Women Do It As Well As Men: Profession

Studies investigating if females working in the profession are as capable as males. Note this category is different to the previous category as this one does not ask if men are as capable as women.

4. Patient Preferences and Perceptions

Studies investigating the views, beliefs, and preferences of patients.

5. Gender Bias within Management, Research and Education Faculties

Studies investigating gender inequality within the professions' management and/or faculty hierarchies.

6. The Profession's Demographics

Studies investigating a profession's demographic make-up, using a gender lens.

7. History of Gender in the Professions

Papers which apply a gender and/or sex lens to aspects of the history of the profession.

8. The Body and Gender: 'Doing Gender'

Studies primarily investigating the relationship between the physical body and the expression of masculinities and/or femininities within the professions.

9. Accommodation of Anatomy

Studies offering an intervention which accommodates anatomy specific to a particular sex.

10. Career Choices and Perceptions of Equity: Profession/Students

Studies investigating the career choices of students and/or professionals, and/or their perceptions of equity within their professional/educational experience.

Textbook audit analysis

Data were transferred to another spreadsheet, and separated into four categories: chiropractic, osteopathy, physiotherapy and combination. One textbook specifically targeted a combination of the chiropractic and osteopathic professions so a pragmatic decision was made to categorise this textbook as 'combination'. Averages were calculated for all categories.

Reporting

Peer reviewed and grey literature

The ten themes were entered into the spreadsheet. The combined information became a template sheet. Eleven further sheets were created, and the template sheet copied to each, one for each of the headings above to allow for separate sorting and recording of results. Each sheet was then sorted by topic heading and each 'sort' saved separately, with the relevant column highlighted to avoid confusion when accessing the data subsequently. An example of this process can be seen in Appendix F.

Results were collated and summarised into Microsoft® Word (version 16.18) [Word] documents using a descriptive numerical summary approach. It was decided that tabular form was the most appropriate presentation of the data for highlighting gaps in the literature. As a result of this process two main tables were created: one with a summary of topics, and the other an abridged summary.

The ‘summary of topics’ (Table 1) was used to allocate an identification (ID) number 1- 48 to each paper, for ease of reference when comparing and contrasting results. The following headings were used: ID number, Reference, Summary, Purpose of Study, Questions Identified as a Result of the Study, Points of Note, and Potential Research Opportunities.

These headings were selected to give an overview of each paper, and to clearly show areas for further research, as identified either by the authors of the original papers, or by myself during the process of this scoping review.

The ‘abridged summary’ (Table 2) was created with the following headings: ID, Reference, Method, Country of Study, Study Population Source, Target Audience for the Study, Associated Profession, Critique, Theme.

These headings were created to provide an overview. The purpose of presenting a ‘summary of topics’ table and an ‘abridged summary’ table in this manner is to allow readers to compare and contrast any combination of data included in this scoping review, dependent on which elements are relevant to their own research topics.

Several further tables were developed to summarise some of the main categories which highlight gaps in the literature, such as which profession the research relates to, the population studied, which methodologies have been utilised, and which countries are represented. The critical review assessment gradings (A or B) were also included in both tables, as a reminder to readers to maintain caution when comparing and contrasting the data.

Textbook audit reporting

It was decided the textbook analysis data would be most useful with minimal statistical analysis, so again, a descriptive numerical analysis process was selected. This choice was due to the small sample size and because each technique was represented by between one and twelve photographs, which would significantly skew any statistical analysis undertaken.

Framework Stage 6 (Optional): Consultation

As noted above, although there is disagreement in the literature about whether or not consultation should be an essential element of a scoping review, there is agreement that there

should be a clear purpose for any consultation undertaken (Arksey & O'Malley, 2005; Levac et al., 2010). In general, it is suggested consultation be used to ensure there is appropriate coverage of the research topic, for example if there is a possibility that without the consultation process important information will be missed. The decision was made to not include the optional stage of consultation within this scoping review. This decision was based on consideration of the original research question, the view that it was possible to achieve appropriate coverage of this topic without consultation, and the fact that this scoping review could be used in the future as a basis from which to launch a targeted and informed consultation process.

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Section Two

Manuscript

Abstract

Background:

There are complex expressions of gender and sex inherent within the three professions of chiropractic, osteopathy, and physiotherapy. These professions commonly use the body of the practitioner to provide treatment for the body of the patient (more so than most other regulated healthcare modalities), yet the application of a sex and gender lens in this context seems to have received scant attention within the literature.

Objectives:

To examine the nature, range and extent of research investigating the impacts of sex and/or gender on patients and practitioners within the professions of chiropractic, osteopathy and physiotherapy, to identify areas for further research.

Method:

A scoping review was conducted based on the Arksey and O'Malley framework (Arksey & O'Malley, 2005). Sixteen online databases were searched, with no date or geographical restrictions.

Results:

Forty-eight papers from eight countries, including peer reviewed publications and grey literature, were selected for inclusion. Thirty-five of the papers used related to physiotherapy, nine to chiropractic, one to osteopathy, and three to a combination of these professions. Ten themes were identified. Thirteen recommended texts to illustrate technique skills to student chiropractors, osteopaths and physiotherapists in New Zealand were also included. Technique textbooks used within these three professions in New Zealand demonstrate a significant under-representation of females as practitioners, compared to males.

Conclusion:

There are numerous opportunities to address significant gaps in research utilising various methodologies and covering a wide range of topics applying a sex and gender lens, relating to the professions of chiropractic, osteopathy and physiotherapy. It seems the proportions of males and females employed within chiropractic, osteopathy and physiotherapy have greatly influenced the volume and direction of research undertaken to date. This scoping review has also highlighted a need for a comprehensive audit of teaching resources for chiropractic, osteopathic and physiotherapy as there are currently few textbooks showing female practitioners demonstrating techniques, particularly high velocity, low amplitude thrusts (HVLATs).

Keywords:

chiropractic, osteopathy, physiotherapy, gender, sex, feminism, masculinity, femininity.

Introduction

The first question relevant to this paper is: what is gender, and what is sex? Authors have acknowledged it is difficult to separate these concepts (Butler, 1986; Lips, 2008; West & Zimmerman, 1987), with one study elegantly describing the relationship between sex and gender in terms of the continuous loop of a Mobius band:

The outside of the Mobius band is related to as biology/sex and if you follow the band, suddenly you are on the inside of the band and it has become gender...you follow the band and end upon the outside again and gender has gone back to biology. (Alex, Fjellman Wiklund, Lundman, Christianson, & Hammarström, 2012, "Sex and Gender as Interwoven," para. 2)

Due to this inherently complicated situation of trying to tease apart and apply definitions of sex and gender, and the way these terms are often used inconsistently within scientific literature, it can be asked why it is useful to consider the value of studying a health related topic in terms of sex or gender at all.

It is well established within the wider health-related literature that effects of sex and gender may negatively affect patients, practitioners, education providers and the professions themselves (Govender & Penn-Kekana, 2008; Newman, 2014). For example, women publish academic papers less often than men (Fridner et al., 2015; Kaufman & Chevan, 2011); at the

start of their tertiary education male students have higher expectations than female students of what they will achieve after graduation (Johanson, 2007; Newman, 2014); male and female patients are treated differently for pain even when they exhibit identical symptoms (FitzGerald & Hurst, 2017; Govender & Penn-Kekana, 2008; Hirsh, Hollingshead, Matthias, Bair, & Kroenke, 2014; Hollingshead, Matthias, Bair, & Hirsh, 2015; Stenberg & Ahlgren, 2010); and men progress more quickly through institutional ranks, and to a higher level than women, even if they are in the minority (Henley, 2015; Newman, 2014; Sabus, 2010). Differences in professional achievement of all types cannot be attributed to seemingly obvious causes such as women taking time out of their careers to raise a family (Kaufman & Chevan, 2011).

However, numerous authors have also noted that while sex and gender are important, they are often ignored within healthcare research (Heidari et al., 2016; Nowatzki & Grant, 2011). One recommendation to mitigate this issue is the adoption of gender based analysis (GBA), described as a process to consider the “sources and consequences of inequalities between women and men and to develop strategies to address them ... [which focuses] on gender differences in health and health care and appropriate policies” (Heidari et al., 2016, p. 4). The value in considering GBA when conducting healthcare research is to highlight instances of systemic inequality and discrimination (Heidari et al., 2016). Importantly, this process of GBA can identify not only differences between men and women, but also similarities between men and women, differences amongst women, and opportunities for innovation (Nowatzki & Grant, 2011). Such a process benefits all.

In 2016, Sex and Gender Equity in Research (SAGER) guidelines were published, recommending researchers and journal publishers commit to considering and reporting on sex and gender within all healthcare research (Heidari et al., 2016). The guidelines recommend that use of ‘sex’ to refer to biological markers such as physical attributes or genetic testing, while ‘gender’ should refer to “the socially constructed roles, behaviours and identities of female, male and gender-diverse people” (Heidari et al., 2016, p. 1). The guidelines emphasise that usage of the terms ‘sex’ and ‘gender’ should be deliberate, and considered, to avoid confusion. A further recommendation, due to the intimate and complex relationship between sex and gender, is while sex should be reported in studies, the influence of gender should also be considered and discussed, and both factors reported on jointly. As an active step towards encouraging positive changes, the SAGER guidelines recommend that if

researchers do not report on sex and gender within a given study they should clearly justify why these factors are not considered pertinent (Heidari et al., 2016).

Several authors have acknowledged the limited amount of research applying a sex and gender lens to the physiotherapy profession (Dahl-Michelsen, 2015; Hammond, 2013; Öhman, 2001), and it seemed from initial literature searches that chiropractic and osteopathy also have limited research with this focus. A scoping review was therefore considered an appropriate methodology, as scoping reviews can be used to map existing research on a topic, prepare for a systematic review, identify gaps in the literature, and inform further research (Arksey & O'Malley, 2005). Scoping reviews are a comparatively recent variant of literature review which follow a structured five- or six-stage framework first proposed by Arksey and O'Malley (2005). In contrast to a systematic review, which aims to summarise and synthesise the best available evidence concerning a specific topic, aiming for depth of topic, a scoping review aims for breadth (Pham et al., 2014). A scoping review can be used as a standalone study to identify gaps in the literature, or as one stage within an ongoing review process. It is a valuable methodology when the nature, range and extent of existing literature is unknown, as it allows for a broad question, and inclusion of both peer reviewed and grey literature (Arksey & O'Malley, 2005; Levac et al., 2010).

One criticism of scoping reviews is the lack of critical review (Grant & Booth, 2009). Unlike a systematic review where papers must reach a quality threshold to be included, literature of any quality can be included in a scoping review (Levac et al., 2010). Readers must therefore be cautious when interpreting results and conclusions from scoping reviews, as the value of literature included will be dependent on how individual readers intend to utilise the results. For example, a study included within a scoping review may have been executed and reported poorly, but may identify pertinent and valuable research questions.

A scoping review of the three professions of chiropractic, osteopathy and physiotherapy literature presents an opportunity to compare and contrast the influences and consequences of sex and gender for patients, practitioners, the professions, and educational providers.

The chiropractic, osteopathy and physiotherapy professions

The origin of these three professions occurred during the latter half of the 19th and early part of the 20th centuries, although manual therapy and 'bonesetting' has been described in the histories of many cultures for thousands of years (DiGiovanna et al., 2009; Fornasier, 2017;

Meeker & Haldeman, 2002). Chiropractic, osteopathy, and physiotherapy are regulated healthcare professions in New Zealand, requiring 3-5 years specialised tertiary education (New Zealand Chiropractic Board, n.d.; Osteopathic Council of New Zealand, n.d.; Physiotherapy Board of New Zealand, 2018). Practitioners must maintain registration with their respective professional regulatory bodies, and all three are recognised by the Accident Compensation Corporation (ACC), a nationalised insurance programme which subsidises rehabilitation healthcare for all New Zealanders who experience injury (ACC: New Zealand Government, 2018).

In the late 19th century, the founder of osteopathy encouraged the inclusion of female students at his American School of Osteopathy, at a time when women were actively discouraged from higher education, particularly healthcare (Quinn, 2011). Internationally, the proportions of females compared to males employed in the profession has remained reasonably equal, with the exception of the USA where male osteopaths outnumber female osteopaths by approximately 2:1 (Leach, 2013).

While the founder of chiropractic was comfortable allowing women to train at his institution during the late 19th century, by 1983 only 6% of the 23000 chiropractors in the USA were female (Gromala, 1983). Numbers of female chiropractors are increasing, although chiropractic remains a male dominated profession (Johnson & Green, 2012; Leach, 2013).

Physiotherapy presents an interesting situation when considering issues of sex and gender. Although initially developed in Sweden as a very masculinised vocation, circumstances changed once the medical profession realised the potential competition these men presented, and by 1934 the medical hegemony had (possibly unintentionally) contrived a situation launching physiotherapy on a trajectory of becoming primarily a career for women, and requiring subjugation to the medical profession (Öhman, 2001). Only in the latter half of the 20th century did physiotherapists start to gain autonomy as healthcare professionals (Fornasier, 2017). Physiotherapy is also subject to a curious paradox: while there are a larger proportion of females employed within the physiotherapy profession, physiotherapy is not especially perceived as a 'female' profession (Hammond, 2013). This perception is possibly a result of the high visibility of male physiotherapists associated with elite sports teams, and how physiotherapists are portrayed by the media (Hammond, 2013).

Objectives

A scoping review was conducted to identify gaps within the literature relating to sex and gender within the regulated healthcare professions of chiropractic, osteopathy and physiotherapy, with the intention of highlighting specific areas that may have limited or non-existent research. The value of applying a gender lens can result in benefits for all, not just females (Nowatzki & Grant, 2011; Öhman, 2001). It is envisioned this scoping review can be used by researchers to consider the value of investigating sex and/or gender for many applications. This value could include but is not limited to: raising awareness amongst education providers and professional bodies and so encouraging change and professional innovation; identifying perceptions of discrimination from the perspective of patients in order that any resulting service quality issues can be mitigated; or using the findings from this scoping review as the first stage towards investigating the effects of other types of discrimination within musculoskeletal healthcare, for example, due to ethnicity, sexuality or non-binary gender. It is hoped this scoping review could guide the direction of future research towards developing a comprehensive and therefore more useful understanding of the effects of sex and gender on chiropractic, osteopathy and physiotherapy.

Methods

This scoping review utilised the five stage framework proposed by Arksey and O'Malley (2005) and included critical review as recommended by Levac et al. (2010). The five stages are: identifying the research question; identifying the relevant studies; study selection; charting the data; and collating, summarising and reporting the results (Arksey & O'Malley, 2005). It was decided to include the critical review process as at least one paper criticises the scoping review as a methodology on the grounds that it may not be robust if critical review is not included (Grant & Booth, 2009). Grant and Booth's concern regarding the lack of critical review is that conclusions may be drawn from the mere existence of studies rather than consideration of whether the studies included in the scoping review are themselves of acceptable quality.

Stage One: Identifying the research question

'What is known about experiences, perceptions, and impacts on practitioners and patients due to sex and gender in the chiropractic, osteopathy and physiotherapy professions?' The research question was developed using the Population, Concept and Context (PCC) structure (Peters et al., 2015). In contrast to systematic reviews where the question is specific, scoping

review questions must remain broad (Arksey & O'Malley, 2005). It was decided that 'population' could be described as 'practitioners and patients' because 'experiences, perceptions and impacts' on these groups would by default capture any research relating to the relevant professions and educational institutions, given the compulsory regulatory relationships between these groups. It was decided context would be the professions of chiropractic, osteopathy and physiotherapy, based in part on these three similar but different professions being regulated under the Health Practitioners Competence Assurance (HPCA) Act in New Zealand (New Zealand Government, 2003). Regulation provides some level of consistency in how these professions are practised and clear boundaries for inclusion criteria, which would be otherwise ambiguous for example if the 'context' was complementary and alternative medicine (CAM) (Cochrane Complementary Medicine, n.d.; World Health Organisation, 2018).

Stage Two: Identifying the relevant studies

During the second stage decisions are made concerning which databases and other sources will be searched, which search terms will be used, and other considerations such as language(s), time frame, and resource constraints such as availability of personnel (Arksey & O'Malley, 2005). It is often appropriate to include grey literature in a scoping review (Tricco et al., 2016).

In this scoping review, in addition to a search of peer reviewed literature, a second search strategy was developed to audit textbooks (specifically photographs demonstrating technique skills) used within chiropractic, osteopathy and physiotherapy education in New Zealand in 2018 to teach practical skills. The purpose of the text book audit was to compare and contrast one aspect of the current resources used to support the teaching of osteopathic, chiropractic and physiotherapy manual therapy techniques, to identify any potential sex and/or gender issues and to establish if there is a potential need for a comprehensive audit of technique education resources.

Search strategy: Peer reviewed literature

The following databases were searched following consultation with a librarian and a clinical researcher, during November 2017 - January 2018: ScienceDirect, Ebsco (Academic Search Complete, AMED, CINAHL, Health Source: Nursing/Academic, MEDLINE, SportDiscus), NCOR, Index to chiropractic literature (ICL), nzresearch, PEDro, Cochrane Library,

Informit, Ostmed, Google Scholar, Scopus. Inconsistent use of the terms 'sex' and gender' within the literature led to a labour-intensive search process. Papers were then exported to Mendeley and duplicates removed. Manual searches of reference lists of all included papers were undertaken. The 'cited by' function of the Scopus and Google Scholar databases was utilised to identify further papers. As no relevant papers were identified by this process, it was considered that saturation had been reached.

Search strategy: Textbook audit

A list of titles of technique textbooks recommended by three New Zealand educational institutions, representing chiropractic, physiotherapy and osteopathy, was collated, either by contacting the institution directly and requesting a list of recommended and/or compulsory textbook titles, or by accessing an online 'required and/or recommended textbook' list.

Stage Three: Study selection

In contrast to a systematic review, inclusion and exclusion criteria in scoping reviews are developed post hoc, and iteratively, as familiarity with the subject matter is acquired from reading the studies (Arksey & O'Malley, 2005).

To be included in this review, papers needed to relate to chiropractic, osteopathy, physiotherapy, or a combination of these, plus utilise a gender lens of any description. Due to the inconsistencies within the literature around the use of the terms 'sex' and 'gender', screening questions were developed: Do(es) the title/abstract/keywords include any combination of search terms from Category A+B? Category A: Sexism, sexist, male, female, woman, man, women, men, gender, gender discrimination, sex differences, gender inequality, sex inequality, gender pay gap, neosexism, harassment, glass ceiling, gender concordance/discordance, abuse, aggression, paternalism, paternalistic, paternal. Category B: Chiropractic, chiropractor, osteopath, osteopathy, osteopathic, physiotherapy, physiotherapist, physical therapy, physical therapist, musculoskeletal. OR Does the paper apply a gender or feminist lens to any aspect of the physiotherapy, chiropractic and/or osteopathy profession(s)? OR Does the paper investigate practical manual therapy techniques commonly used by physiotherapists, chiropractors and/or osteopaths which may be influenced by the sex of the practitioner and/or patient? Due to a relative paucity of literature on these topics there were no restrictions applied to date, methodology used, or geographical location.

Papers were excluded if the topic was primarily concerned with sexuality, non-binary gender and/or sex, or sexual harassment. Although there are important discussions to have around the topics of non-binary gender, sexual orientation, sexuality, and sexual harassment, and their relationship to musculoskeletal healthcare; and although there is overlap with the topic of this scoping review, due to the complexities and depth required for researching such topics it was decided these would be better served by separate studies. Papers were also excluded if not published in English, or if sex was reported only as part of a demographic summary, or if a gender or feminist lens was not used when sex differences were reported as part of investigations of specific medical conditions. See Figure 4 for numbers of excluded studies.

Textbooks were included if they related primarily to technique skills instruction. If it was not clear from the title of each textbook whether the content related primarily to the teaching of practical skills, then either online or hard copies of those textbooks were investigated. The number of photographs demonstrating practical techniques were counted and recorded using a phone application “Thing counter” (Karuma, 2015), and six categories were developed. Photographs were included if they showed both patient and practitioner, and manual therapy techniques being demonstrated on a ‘patient’. Photographs were excluded if they showed: examination techniques (where examination techniques can also be used as treatment they were included/excluded on the basis of how that photograph was classified in that book); drawings or diagrams of techniques; techniques demonstrated on a model skeleton; musculoskeletal treatment techniques using devices (such as acupuncture, cupping, therapeutic ultrasound); only one person (for example, the patient); an exercise the patient does without the need for a practitioner; or a practitioner demonstrating a stance or handhold.

No distinction was made between techniques which were represented by an individual or series of photographs: all photographs meeting the above criteria were counted separately.

Stage Four: Charting the data

The nature and volume of data determine the most appropriate form of charting the data (Daudt et al., 2013). “A ‘narrative review’ or ‘descriptive analytical’ method is used to extract contextual or process oriented information from each study” (Levac et al., 2010, p. 3). A Microsoft ® Excel (version 16.18) [Excel] workbook was created and eleven headings were selected in consideration of the research question and the intention of identifying gaps in the literature: Name of paper and reference details; Name of publication (for example,

journal title); Date of publication; Type of paper (qualitative/quantitative/mixed methods/grey); Method; Country of study; The study population source; Target audience for the paper; The profession to which the paper is related; Critique of the paper by first author (LK); Main theme of the paper. Data such as study size were not specifically highlighted, as would be usual in a systematic review; study size was considered relevant as part of the critical review process only.

Stage Five: Collating, summarising and reporting the results

As recommended by Levac et al. (2010), stage five was divided into three discrete sub-stages: analysis, reporting the results, and reflection on the value of the findings as they relate to the original research question. Thematic analysis, in combination with a descriptive numerical summary analysis was used (Levac et al., 2010).

Analysis of peer reviewed and grey literature

Ten themes were ultimately developed following a structured approach to thematic analysis which involved: the primary researcher becoming very familiar with the data, creating preliminary codes, searching for themes, reviewing themes, defining and naming themes, and reporting (Nowell et al., 2017). The iterative process used within the scoping review, and the inclusion of critical review, meant the primary researcher (LK) acquired a high level of familiarity with the data. Themes were identified using an inductive approach (in which themes relate strongly to the data) with each paper considered on its own merits: if an identified theme did not match an existing theme, a new theme was proposed, until all papers were allocated to a theme.

Analysis of textbook audit

Textbook data were transferred to an Excel sheet and percentages calculated for each heading. Because of the small sample size, and because each technique was represented by between one and twelve photographs, it was decided to present the data with minimal statistical analysis, to avoid misrepresentation of the results.

Reporting

In consideration of the aim of this scoping review to identify gaps in the literature it was decided the most suitable presentation of data would be in tabular form, summarising the data as sorted within the Excel spreadsheets created during the data charting stage.

Critical appraisal of individual sources of evidence

It was decided to include critical appraisal to increase the validity of the scoping review, as there is a danger of drawing misleading conclusions if the quality of the available literature is not considered (Levac et al., 2010). Four validated critical review tools were selected, one each to cover qualitative studies, quantitative studies, mixed methods studies, and grey literature. Ten papers were independently appraised by two researchers (LK, SP), to assess for consistency. No discrepancies between researchers were identified. The remaining papers were appraised by one researcher (LK), and graded 'A' or 'B'. In broad terms, papers graded 'A' could be replicated with few or minor changes. Papers graded 'B' would require many and/or crucial changes to be able to replicate the study in a meaningful way, or included reporting deficits which rendered critique impossible.

Results

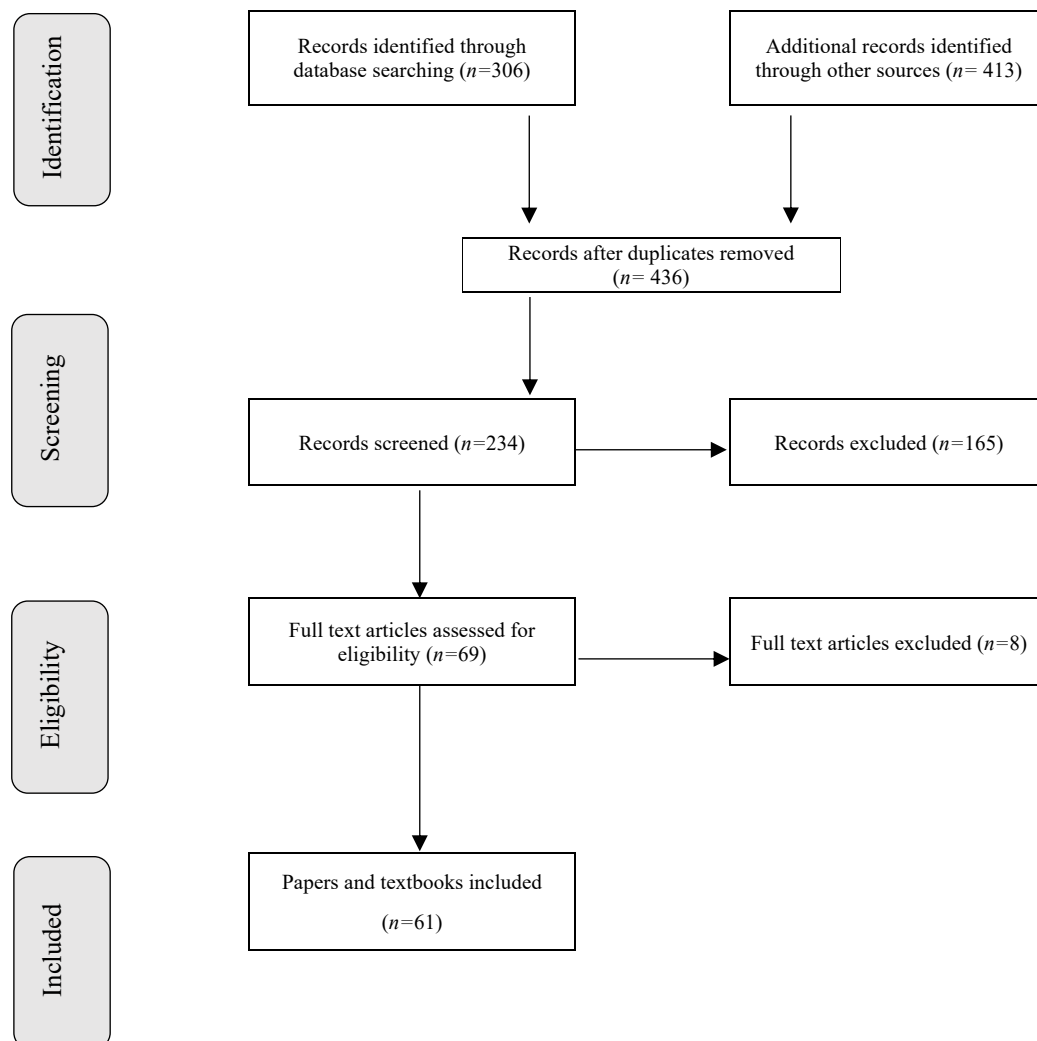


Figure 4. PRISMA flow diagram for the scoping review process (Pham et al., 2014)

Overview

This scoping review incorporates 48 individual papers published between 1980 - 2017, plus 13 textbooks. Table 1 presents a summary of all papers included in this scoping review, showing the purpose of each study, specific suggestions for further research on each topic, and whether the paper was graded A or B during the critical review process. Table 2 summarises the type of paper, method, country of study, population studied, profession to which the paper relates, and themes. The ten themes identified during the process of thematic analysis are: 1) Intervention by Gender; 2) Can Women Do It As Well As Men and Vice Versa: Measuring Students' Abilities; 3) Can Women Do It As Well As Men: in a

Professional Capacity; 4) Patient Preferences and Perceptions; 5) Gender Bias within Management, Research and Education Faculties; 6) The Profession's Demographics'; 7) History of Gender in the Professions; 8) The Body and Gender: 'Doing Gender'; 9) Accommodation of Anatomy; 10) Career Choices and Perceptions of Equity. Each paper has been allocated an identification (ID) number 1- 48, for ease of reference whilst navigating the data.

Table 1

Summary of All Papers with Shaded Rows Indicating Papers Critiqued as 'A' Quality (Acceptable – Good) and Unshaded Rows Critiqued as 'B' Quality (Poor – Acceptable)

ID	Reference	Summary	Purpose of Study	Questions Identified as a Result of the Study	Points of Note and Potential Research Opportunities
1	Armstrong, S., Ried, K., Sali, A., & McLaughlin, P. (2013). A new orthosis reduces pain and mechanical forces in prone position in women with augmented or natural breast tissue: A pilot study. <i>Journal of Plastic, Reconstructive and Aesthetic Surgery</i> , 66(7), e179–e188. https://doi.org/10.1016/j.bjps.2013.02.012	Pilot study to test an orthosis on women in a prone position. Target population is women with breast implants due to risk of rupture, but also any woman with breast discomfort in prone position.	To examine pain, force and pressure in natural and augmented breast tissue, with and without the use of an orthosis designed to reduce displacement and compression on breast tissue during prone activities.	Authors suggest similar, larger studies needed, plus long term studies tracking women with breast implants and the long term effects of using the orthosis on failure rates of those implants.	Study did not test in-vivo use of orthosis while applying manual therapy techniques such as HVLTs, despite being an intended application for the orthosis use.
2	Bergman, B., & Marklund, S. (1989). Masculinisation and professionalisation of the physiotherapy profession: A study of Swedish physiotherapists. <i>Physiotherapy Practice</i> , 5(2), 55–64. https://doi.org/10.3109/09593988909044414	A non-random survey of physiotherapists in a region of Sweden were surveyed about their views of the profession.	To examine demographic information, professional roles, job expectations, role conflicts, professional norms, professional power and influence.	None specified.	Potentially a study worth repeating as a longitudinal comparison.
3	Bishop, F. L., Bradbury, K., Hj Jeludin, N. N., Massey, Y., & Lewith, G. T. (2013). How patients choose osteopaths: A mixed methods study. <i>Complementary Therapies in Medicine</i> , 21(1), 50–57. https://doi.org/10.1016/j.ctim.2012.10.003	Patients who had attended a particular multidisciplinary complementary health clinic within the previous two years were non-randomly sampled, one group via postal survey, another group by interviews to discover how they select osteopaths.	To discover: if there is gender concordance between osteopaths and their patients; if patients prefer osteopaths who are also biomedical doctors; whether patients are influenced by whether the osteopath works in the public or private sector.	None specified.	This study was limited to one clinic in the UK, so is potentially worth repeating within a wider and/or different context.
4	Bishop, F. L., Smith, R., & Lewith, G. T. (2013). Patient preferences for technical skills versus interpersonal skills in chiropractors and physiotherapists treating low back pain. <i>Family Practice</i> , 30(2), 197–203. https://doi.org/10.1093/fampra/cms066	Questionnaire sent to a random sample of households in an area in the UK to examine the impact of four factors (patient sex, practitioner sex, practitioner speciality (chiropractic or physiotherapy), practitioner reputation (technical ability or interpersonal skills) on patients' choice of therapist to treat low back pain.	To determine if female patients prefer female physiotherapists and chiropractors to male physiotherapists and chiropractors; if patients prefer physiotherapists to chiropractors; if patients prefer physiotherapists with a reputation for technical skills rather than interpersonal skills, and chiropractors with	None specified.	

			interpersonal rather than technical skills.		
5	Bisiacchi, D. W., & Huber, L. L. (2006). Physical injury assessment of male versus female chiropractic students when learning and performing various adjustive techniques: A preliminary investigative study. <i>Chiropractic & Osteopathy</i> , 14(17), 17. https://doi.org/10.1186/1746-1340-14-17	A convenience sample of second to fourth year students at a USA chiropractic college were surveyed to discover injuries sustained while performing adjustive technique classes.	To identify specific areas male, and female students sustain injury while learning to deliver spinal manipulation techniques to patients.	None specified.	This study found male students experience higher rates of injuries while in class, and females while in clinic. No hypothesis or discussion was offered around this finding. The authors stated their intention to conduct further similar studies but a Google Scholar search in January 2018 using the 'cited by' function did not find any related studies.
6	Bogg, J., Pontin, E., Gibbons, C., & Sartain, S. (2007). Physiotherapists' perceptions of equity and career progression in the NHS. <i>Physiotherapy</i> , 93(2), 137–143. https://doi.org/10.1016/j.physio.2006.09.002	Data relating to the physiotherapy profession were extracted from a national survey of National Health Service (NHS) allied health professionals.	To discover physiotherapists' perceptions of equality and diversity within the NHS and physiotherapy.	None specified.	
7	Dahl-Michelsen, T. (2014). Sportiness and masculinities among female and male physiotherapy students. <i>Physiotherapy Theory and Practice</i> , 30(5), 329–337. https://doi.org/10.3109/09593985.2013.876692	Observations of, and qualitative interviews with first year physiotherapy students learning practical skills.	To explore how the importance of performing sportiness is gendered in terms of students' judgement of themselves and their classmates as suitable physiotherapy students.	“Are opportunities for developing varied professional identities within physiotherapy education too limited? How are students' perceptions of sportiness as a requirement to become a physiotherapist and their ideas about the need for competence in sport and physical activity being addressed in the educational setting? Are such perspectives and ideas being confirmed or challenged? How do students' perceptions of the importance of sportiness as a core competence in physiotherapy relate to other competences that they perceive as necessary to be qualified as future physiotherapists?” (p. 335).	A potentially worthwhile study to repeat in other countries, plus in the chiropractic and osteopathic professions.
8	Dahl-Michelsen, T. (2015). <i>Gender in physiotherapy education: A study of gender performance among physiotherapy students and changes in the</i>	Investigating how gender becomes significant in physiotherapy education,	“How does gender become significant in physiotherapy education? Subthemes: How	"Who are the recognised teachers in physiotherapy education and what are their	As Norway has an 'equality paradox' this study could be repeated in other countries.

	significance of gender (PhD thesis). Oslo and Akershus University College of Applied Sciences.	studying first year physiotherapy students during skills training classes, in Norway.	do physiotherapy students perform gender in their education? What are the changes in the significance of gender in contemporary physiotherapy education?" (p. 5).	characteristics? What competences are seen as important in order to teach in contemporary physiotherapy education? What are the similarities and differences between female and male teachers in physiotherapy education? Do we need more male teachers or not?" (p. 68). Other suggested areas for study: interactions between physiotherapy students/teachers, physiotherapy teachers exclusively, longitudinal version of this study to track changes towards gender over time during their education, and international/cultural versions of this study for comparison, especially Sweden as the birthplace of physiotherapy.	The author makes a particular point that gender issues are complex so need to be approached in a more nuanced manner, ideally correlating findings utilising multiple methods and methodologies.
9	Dahl-Michelsen, T., & Solbrække, K. N. (2014). When bodies matter: Significance of the body in gender constructions in physiotherapy education. <i>Gender and Education</i> , 26(6), 672–687. https://doi.org/10.1080/09540253.2014.946475	Investigating how gender becomes significant in physiotherapy education, studying first year physiotherapy students during skills training classes, in Norway.	“Which bodily performances indicate the significance of gender in the skills training of physiotherapy students?” (p. 672).	None specified.	Mentions the paper by Sudmann (2009) (not available in English), which discusses the issue of female physiotherapists by necessity being in close physical contact with their patients.
10	Davies, J. (1990). Physiotherapy: Where are the men? <i>Physiotherapy (United Kingdom)</i> , 76(3), 132–134. https://doi.org/10.1016/S0031-9406(10)62136-0	Survey of third year physiotherapy students from the UK.	To investigate the reasons for the low proportion of males in physiotherapy and consider the desirability of increasing the proportion of men in physiotherapy.	None specified.	
11	Edgar, S. (2015). Identifying the influence of gender on motivation and engagement levels in student physiotherapists. <i>Medical Teacher</i> , 37(4), 348–353. https://doi.org/10.3109/0142159X.2014.948829	A cross-sectional survey of physiotherapy students, using the Motivation and Engagement Scale – University/College (MES-UC), to review motivational thoughts and behaviours influencing learning.	To determine if there are any differences in motivation and engagement across the four year levels of the physiotherapy program at The University of Notre Dame Australia, taking into consideration gender and age.	Author proposes prospective and longitudinal studies using a variety of quantitative measures to look at relationships and variables influencing motivation and engagement at an individual level.	Potentially worth repeating similar studies for chiropractic and osteopathy professions.

12	Forand, D., Drover, J., Suleman, Z., Symons, B., & Herzog, W. (2004). The forces applied by female and male chiropractors during thoracic spinal manipulation. <i>Journal of Manipulative and Physiological Therapeutics</i> , 27(1), 49–56. https://doi.org/10.1016/j.jmpt.2003.11.006	Quasi-experimental study.	To determine what magnitude of forces are generated by male and female chiropractors as they deliver spinal manipulation to the thoracic spine.	None specified.	In this study male chiropractors self-reported successful HVLTs at a higher rate than female chiropractors but this point was not discussed at all.
13	French, N. (1991). Gender bias detected in a survey of chiropractic technique class grades. <i>The Journal of Chiropractic Education</i> , 5(2), 70–73. Retrieved from http://www.journalchiroed.com	Survey of tutors within five USA chiropractic colleges.	Is there a gender bias in grading of chiropractic skills classes?	None specified.	
14	Gromala, T. (1983). Women in chiropractic: Exploring a tradition of equity in healing. <i>Chiropractic History: The Archives and Journal of the Association for the History of Chiropractic</i> , 3(1), 59–63. Retrieved from http://www.historyofchiropractic.org	Random survey of the ‘women’s chiropractic sorority’ to determine how 20 th century women have experienced the education and profession of chiropractic.	“How have 20th century women experienced the early coeducation of chiropractic schools and field practice ? (p. 59). What are women’s motivation for entering chiropractic? What support systems do women rely on to make and sustain a chiropractic career choice? (p. 61). What educational experiences promote women? How do women chiropractors finance a chiropractic practice? How does the community respond to women chiropractors? How do women chiropractors respond to the community? (p. 62). What chiropractic techniques do women chiropractors use? What professional issues do women chiropractors see as relevant to chiropractic?” (p. 63).	None specified.	
15	Hammond, J. A. (2013). <i>Doing gender in physiotherapy education: A critical pedagogic approach to understanding how students construct gender identities in an undergraduate physiotherapy programme in the United Kingdom (EdD thesis)</i> . Kingston. Retrieved from http://eprints.kingston.ac.uk/27739/	Digital and audio diaries recorded by physiotherapy students over one academic year were combined with interviews.	“Do physiotherapy students have particularly gendered expectations of physiotherapy and does this affect how they construct their professional identities? Should action be taken to challenge the stereotypical image of physiotherapy to promote	Author suggests “these narratives could be used to look at educators’ gender perceptions; further research on physiotherapists and gender expressions relating to interactions with students; and explore the gendered constructions of identity in	This could be a useful template upon which to base similar studies for chiropractic and osteopathy.

			<p>more nuanced understandings of gender within the profession (p. 11). How do students construct gender identities in physiotherapy? What types of gender discourses are articulated in students' experiences of becoming a physiotherapist? What are the implications for representations of gender in physiotherapy education and practice?" (p. 23).</p>	<p>physiotherapeutic interactions." The author also suggests further research could "compare the gender constructions of physiotherapy with other professions within the context of healthcare hierarchies" (p. 150).</p>	
16	<p>Hammond, J. A. (2009). Assessment of clinical components of physiotherapy undergraduate education: Are there any issues with gender? <i>Physiotherapy</i>, 95(4), 266–272. https://doi.org/10.1016/j.physio.2009.06.003</p>	<p>Retrospective analysis of physiotherapy students' clinical and portfolio results from three cohorts during their last two years of study.</p>	<p>To explore gender differences in assessment of the clinical and portfolio components of physiotherapy undergraduate education.</p>	<p>"With a growing number of male physiotherapy applicants in a largely female-dominated profession, do male applicants' expectations conflict with those of the profession? Are there any other factors that contribute to observable differences in practice, and are these differences more widespread in physiotherapy and health care? Do clinical educators, academic tutors and students interpret the clinical assessment processes and criteria differently, and are these interpretations 'gendered'?" (p. 271).</p>	<p>This study was a comprehensive version of the study by French (1991).</p>
17	<p>Harvey, T., & Newman, G. (1993). Equal opportunities and entry to physiotherapy education. <i>Physiotherapy</i>, 79(6), 406–407. https://doi.org/10.1016/S0031-9406(10)60763-8</p>	<p>Working party paper.</p>	<p>To encourage discussion around the lack of diversity within physiotherapy profession, and the benefits of increasing diversity.</p>	<p>Highlights the lack of data about diversity within physiotherapy and the value of working towards obtaining that data.</p>	
18	<p>Irion, G., & Cossman, J. (2008). Factors related to low representation of male physical therapists in acute care settings. <i>Acute Care Perspectives</i>, 17(4), 16–25.</p>	<p>A survey using two extremes of male representation for comparison, to predict which factors influence whether a physiotherapist will work in a hospital or outpatient clinic.</p>	<p>What interactions among sex and gender role attitudes, upward mobility and job satisfaction are factors leading to sex segregation in physiotherapy?</p>	<p>"Is sex segregation inevitable? Can it be corrected, does it occur within other occupations especially those similar to physiotherapy? Would our society benefit from intervening when an occupation begins to</p>	

experience sex-segregation?
Does diversity in gender roles attitudes help the profession of physical therapy by filling positions in hospitals that women with a feminist gender role attitude and most men have abandoned or does the traditional gender role attitude hold back the movement of physical therapy toward a fully-fledged profession by discounting the need for autonomy and specialization characterising other professions with the potential result of falling behind in acquisition of new knowledge and skills that define the practice of physical therapy?” (p. 20).

19	James Campbell, C. R. (2010). <i>The social structural and gender attitude effects on job satisfaction for U.S. physical therapists (PhD dissertation). Dissertation Abstracts International Section A: Humanities and Social Sciences</i> . Mississippi State University.	The 2004 Physical Therapy Labor Force Survey was examined for potential bias using a sample of physical therapists from the 2000 US Census PUMS 5 percent sample.	To discover if gender attitudes about opportunities (promotional, jobs) affects the interplay of social structural factors of work at the individual's occupational level in either the vertical hierarchy or horizontal segregation dimensions for physical therapists in determining current workplace satisfaction.	Author suggests “questions should be included on fairness in opportunities by gender, (e.g. Do you believe this is fair? Do you personally care about this specific inequity?) consider the identification and grouping of specialty areas within the field of physical therapy, refine and identify the job satisfaction domains (beyond ‘intrinsic rewards and psychological/physical wellbeing which were useful in this study for identifying gender opportunity attitudes) e.g. pay and benefits, patient focus/population/load, flexible work hours and geographical location” (pp. 133-134).	Could be a useful basis for further studies, as uses longitudinal and cross sectional data, sourced from census data and surveys. This is a USA study so would be useful to do in other countries, and in osteopathy and chiropractic.
20	Johanson, M. A. (2007). Sex differences in career expectations of physical therapist students. <i>Physical Therapy</i> , 87(9), 1199–211. https://doi.org/10.2522/ptj.20060285	Survey/questionnaire of students.	To determine whether sex differences are reflected in the career expectations of physical therapy students.	Suggests need to identify factors such as expectations of future family responsibilities and how much this influences career expectations. Do similar study at start and finish of studies to see if there is a	Could be a suitable study to repeat as a comparison at least a decade post-study, plus could be repeated for osteopathy and chiropractic.

				difference, also studies to determine if expectations and actual career status from particular programs, resources and educational activities designed to eliminate barriers or advance the careers of women in physiotherapy actually make a difference.	
21	Johansson, S. (1999). Gendered physiotherapy in transition: The Swedish case. <i>Advances in Physiotherapy</i> , 1(1), 27–36. https://doi.org/10.1080/140381999443537	Random sample of physiotherapists surveyed.	To investigate the power structure in the physiotherapy workplace, and relation to the professional knowledge base. To look overall at male and female differences in professional strategies.	“Will male physiotherapists occupy the more glamorous positions in the occupation that are associated with high-status aspects, such as prestigious professional relations and productivity? (p. 34). What stance should researchers in the field of the professions take towards horizontal collaboration between professions? How should researchers interested in gender issues evaluate movement from part-time employment used as a women-friendly strategy to allow the combination of family and employment, towards full-time employment and greater competition based on formal competence? How can one’s authority be used in a home environment? What are the differences between working within the norms of working life and working according to the norm system of non-working time?” (p. 35).	
22	Johnson, G. M., Little, R., Staufenberg, A., McDonald, A., & Taylor, K. G. M. (2016). How do they feel: Patients’ perspectives on draping and dignity in a physiotherapy outpatient setting: A pilot study. <i>Manual Therapy</i> , 26, 192–200. https://doi.org/10.1016/j.math.2016.08.007	A questionnaire and focus group asking patients from an outpatient physiotherapy clinic about their views on draping.	To investigate patients' views relating to draping and dignity and their choice of dressing options in the physiotherapy outpatient setting.	The authors suggest asking the same questions but of cardiorespiratory and neurological patients physiotherapy patients, and also in a hospital setting.	Could repeat a similar study to compare osteopathy and chiropractic patients.
23	Kaufman, R. R., & Chevan, J. (2011). The gender gap in peer-reviewed publications by physical therapy faculty	A survey of full time physiotherapy faculty	The authors noted no previous studies had looked at the gap	The authors noted more work is needed on the extent of	This study could be repeated periodically to measure trends,

	members: A productivity puzzle. <i>Physical Therapy</i> , 91(1), 122–131. https://doi.org/10.2522/ptj.20100106	members in the USA was undertaken, investigating demographic, work, education, employment and scholarship information.	in publishing between males and females in the physiotherapy field, so investigated the effects of gender on peer-reviewed publication productivity in physical therapy.	family obligations influencing the productivity of women; importantly, the need to ask women who have left the profession, plus investigation into latent variables not included in their study including availability of resources to women, or different values, or the “ability of women to foster opportunity and achievement.”	plus could be applied to the chiropractic and osteopathy professions.
24	Kell, C. (2006). Undergraduates’ learning profile development: What is happening to the men? <i>Medical Teacher</i> , 28(1), e16–e24. Retrieved from http://www.medicalteacher.org	Analysis of self-report surveys related to learning profiles, completed by physiotherapy students at the start and end of each academic year.	To look at the UK physiotherapy curriculum and determine if there is an unintentional gender bias against males, following the observation that male physiotherapy undergraduates had not been performing as well as female undergraduates.	The authors asked “Will these mature male students develop their profiles once free from the constraints of the programme or will clinical practice further restrict their growth? (p. e22). They also stated “A qualitative approach will be taken in a new study to follow this undergraduate group over time so that we can start to explore the contexts of origin and real significance of the observed learning profile changes” (p. e23). However, no research matching this intention was found during this scoping review.	This study could potentially be followed up as originally intended by the authors.
25	Linker, B. (2005). The business of ethics: Gender, medicine, and the professional codification of the American Physiotherapy Association, 1918-1935. <i>Journal of the History of Medicine and Allied Sciences</i> , 60(3), 320–54. https://doi.org/10.1093/jhmas/jri043	An essay discussing the history of the American Physiotherapy Association's ethics and code of conduct, providing a snapshot in time.	To highlight the role gender played in the development of the physiotherapy profession, and show the early female physiotherapists consciously chose to focus on the relationship between the physician and the physiotherapist, rather than the patient and physiotherapist.		This could be a useful exercise for the chiropractic and osteopathy professions to complete, especially considering these professions have historically had a different relationship to physicians than that of the physiotherapist.
26	MacLean, V. M., & Rozier, C. (2009). From sport culture to the social world of the “good PT.” <i>Men & Masculinities</i> , 11, 286–306. https://doi.org/10.1177/1097184X06294619	A case study examining the relationships among sport, work, and the gender order in the traditionally female-dominated profession of physical therapy.	To discuss the “social processes that facilitate men’s entry into the profession, the development of gendered careers and identities, as well as the maintenance of	The authors ask “under what conditions is positive change in the gender order possible” (p. 303), and suggest further work needs to be done on fully incorporating the viewpoints	This could be a useful study upon which to base similar studies for chiropractic and osteopathy.

			masculine privilege in a predominantly female profession” (p. 286)	and experiences of men in this female dominated profession, plus parallel research should be undertaken using similar gender-based theoretical frameworks investigating women in male-dominated professions.	
27	Moore, P., Conine, T. A., & Laster, T. E. (1980). Sex-role stereotyping in health care: Perceptions of physical therapists. <i>Physical Therapy</i> , 60(11), 1425–9. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/7433521	Abstract only, full text not available. Physiotherapists reported their observations and perceptions on six dimensions of sex-role stereotyping of women, either as patients or as providers of health care.	Abstract only, full text not available.	Abstract only, full text not available.	This study is useful as a historical record of beliefs of physiotherapists about the influences of sex and gender on the profession. From the limited information available the study seems to have a similar focus to that of Raz et al. (1991). Could be a useful topic to update for the physiotherapy profession, plus a new research topic for chiropractic and osteopathy.
28	Muehleman, M. B., Peterson, C. K., & Humphreys, B. K. (2017). Differences in outcomes of patients treated by male vs female chiropractors. <i>Journal of Manipulative and Physiological Therapeutics</i> , 40(6), 420–426. https://doi.org/10.1016/j.jmpt.2017.05.001	A prospective cohort study with one year follow up.	To compare outcomes for patients depending on the sex of the chiropractor, at 1, 3, and 6 weeks, and 12 months.	Why do female chiropractors in Switzerland have significantly higher levels than male chiropractors, of patients with acute presentation compared to chronic? Does this also happen in other countries?	
29	Naylor, S., Norris, M., & Williams, A. (2014). Does ethnicity, gender or age of physiotherapy students affect performance in the final clinical placements: An exploratory study. <i>Physiotherapy</i> , 100(1), 9–13. https://doi.org/10.1016/j.physio.2013.05.004	Retrospective analysis of clinical placement grades awarded during physiotherapy students final clinical placements.	To explore demographic differences in awarded marks of the final clinical placement in a physiotherapy undergraduate programme.	Recommendations were related to ethnicity, not gender.	
30	Öhman, A. (2001). <i>Profession on the move: Changing conditions and gendered development in physiotherapy (Medical Dissertation)</i> . Umeå University.	This thesis uses qualitative and quantitative methods and encompasses five separate research papers, three of which are included separately in this scoping review [see 31–33]. One paper did not independently meet the inclusion criteria, so is not	To “use a gender perspective to describe and analyse perceptions and attitudes to the professional role and the physiotherapy profession among some of the actors engaged in physiotherapy education” (p. 47).	Are there different gender constructions in similar health professions?	Highlights the lack of studies on 'the gendered body' within physiotherapy. This thesis would be useful, in part or entirety, upon which to base similar studies for chiropractic and osteopathy.

		analysed in this scoping review.			
31	Öhman, A., Hägg, K., & Dahlgren, L. (1999). Competent women and competing professions: Physiotherapy educators' perceptions of the field. <i>Advances in Physiotherapy</i> , 1(2), 59–72. https://doi.org/10.1080/140381999443447	In depth interviews were conducted with physiotherapy educators, using a gender theoretical framework.	To describe and analyse perceptions of individual professional development, physiotherapy education and the profession in general.	What does the conflict between the theoretical (academic) and practical part of the programme mean in an ordinary teaching situation, (when few in the profession were aware of the gendered power relations in both academia and health care)?	See comments [30].
32	Öhman, A., Solomon, P., & Finch, E. (2002). Career choice and professional preferences in a group of Canadian physiotherapy students. <i>Advances in Physiotherapy</i> , 4(1), 16–22. https://doi.org/10.1080/140381902317303177	A survey was administered on two occasions to a cohort of Canadian physiotherapy students.	To identify reasons for the career choice, professional preferences and the longitudinal development of attitudes towards healthcare work in a group of Canadian physiotherapy students.	“What implications does the gendered division of labour have for further development of the professional field? How will the development of the Canadian physiotherapy profession be influenced if men and women tend to specialize in different subfields of the profession? There is a need for further studies that focus on students’ and recently graduated physiotherapists’ perceptions of the profession and their professional strategies.” (p. 21).	See comments [30].
33	Öhman, A., Stenlund, H., & Dahlgren, L. (2001). Career choice, professional preferences and gender: The case of Swedish physiotherapy students. <i>Advances in Physiotherapy</i> , 3(3), 94–107. https://doi.org/10.1080/140381901750475348	A survey was administered on two occasions to a cohort of Swedish physiotherapy students.	To identify reasons for the career choice, professional preferences and the longitudinal development of attitudes towards healthcare work in a group of Swedish physiotherapy students.	“What implications will the strong interest for physical activity have on the satisfaction with the field of physiotherapy and with the greater field of healthcare? Will they try to create working conditions in accordance with their preferences and their own habitus? (pp. 102-103). What would have happened if they had been able to interact more frequently with private healthcare settings during the programme?” What kind of messages do the students get about masculinity and	See comments [30].

			femininity during the programme? (pp.103-104).	
34	Palmgren, P. J., Chandratilake, M., Nilsson, G. H., & Laksov, K. B. (2013). Is there a chilly climate: An educational environmental mixed method study in a chiropractic training institution. <i>The Journal of Chiropractic Education</i> , 27(1), 11–20. https://doi.org/10.7899/JCE-12-015	The Perceived Chilly Climate Scale (PCCS) was used, plus focus group interviews were conducted on a group of Chiropractic students at the Scandinavian College of Chiropractic, Sweden.	To explore the presence and extent of gender-related issues in a chiropractic undergraduate learning environment, part of a wider study to assess the educational environment as perceived by students at a Swedish chiropractic college.	“Why did PCCS and focus group interviews data provide such incongruence in relation to our question?” (p. 18).
35	Parry, A. (1995). Ginger Rogers did everything Fred Astaire did backwards and in high heels. In <i>Physiotherapy</i> (Vol. 81, pp. 310–319). https://doi.org/10.1016/S0031-9406(05)66790-9	From a conference presentation: discusses the historical subjugation of physiotherapy to the medical profession, and how that relates to subjugation of women, resulting in a lack of professional autonomy.	Asks how physiotherapists, and other professions allied to medicine, can maintain professional independence in the face of the management model imposed on the NHS, and how can such independence be justified to managers and doctors?	None specified.
36	Peterson, C., & Rampacher, A. (1999). Effects of gender and age on students’ performance in adjustive technique classes. <i>Journal of Chiropractic Education</i> , 13(2), 114–130. Retrieved from http://www.journalchiroed.com	A ‘retrospective different subject design’ was used to analyse chiropractic students’ grades in adjustive technique classes, in relation to demographic information such as age and gender (sex).	To determine if there are differences in adjustive performance between different groups of students attending a UK college of chiropractic.	Suggests further studies warranted, and include recommendations to offset the limitations in this study.
37	Raz, P., Jensen, G. M., Walter, J., & Drake, L. M. (1991). Perspectives on gender and professional issues among female physical therapists. <i>Physical Therapy</i> , 71(7), 530–540. https://doi.org/10.1093/ptj/71.7.530	Ten experienced female physiotherapists were interviewed regarding their professional and personal life.	To investigate the elements or values necessary for a caring environment and relationships; the role of the family; and sexism as expressed in the job and as measured by leadership, money and respect.	Suggests continued investigation into practical ways women might be encouraged into continuing education and taking leadership roles within physiotherapy, by the availability, for example of flexible working conditions and on-site child care.
38	Ried, K., Armstrong, S., Sali, A., & McLaughlin, P. (2014). Orthosis reduces breast pain and mechanical forces through natural and augmented breast tissue in women lying prone. <i>Chiropractic & Manual Therapies</i> , 22(1). https://doi.org/10.1186/2045-709X-22-2	Open label clinical trial, a follow up to another study [1]. This study measured pain perception, peak pressure, maximum force, and breast tissue displacement using	To test the effectiveness of an orthosis to reduce pressure on breast tissue in the prone position during different types of therapy such as chiropractic or surgery.	Suggested further studies with varied use of the orthosis such as using it in positions other than prone.
				As with the study related to this one, this study did not test in-vivo use of the orthosis while applying manual therapy techniques such as HVLATs, despite being an intended

		different sizes of an orthosis compared to no orthosis.		application for the orthosis use.
39	Roberts, P., & Smith, S. (2002). Qualitative study of the reality of life for male undergraduate physiotherapy students. <i>Physiotherapy</i> , 88(1), 2002. Retrieved from https://www.physiotherapyjournal.com	Abstract only, full text not available. An exploratory study using focus groups and semi-structured discussions with second and third year male physiotherapy students.	To capture some aspects of the reality of life for men undertaking undergraduate physiotherapy education.	This could be a useful study upon which to base similar studies for chiropractic and osteopathy, plus execute an updated study for physiotherapy.
40	Rozier, C. K., Hamilton, B. L., & Hersh-Cochran, M. S. (1998). Gender-based income differences for physical therapist managers. <i>Physical Therapy</i> , 78(1), 43–51. https://doi.org/10.1093/ptj/78.1.43	Survey of physiotherapist managers.	To determine whether income differences associated with gender exist for therapists in management positions and whether such differences also exist for salaried and self-employed individuals, after adjusting for differences due to hours worked, years worked full-time, leave taken from the profession, number of years at a facility, and number of years in a position.	Investigate the issue of salary differences based on area of practice within physiotherapy, that is, acute care settings.
41	Rozier, C. K., Raymond, M. J., Goldstein, M. S., & Hamilton, B. L. (1998). Gender and physical therapy career success factors. <i>Physical Therapy</i> , 78(7), 690–704. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/9672543		To investigate items considered important in defining career success for male and female physiotherapists, and the relationship among gender beliefs about career success and career experiences.	“Whether female physical therapists’ non-clinical skills such as computer and business skills are less than those of male physical therapists” (p. 702), plus “we did not investigate job value, job involvement, specific motivational factors (e.g. peer or spouse pressure, lifestyle desires), or role stress. Our focus on overall career success may not account for differences in various facets of success such as job status, salary level, or relationship to lifestyle” (p. 703).
42	Sabus, C. (2010). Endangered roles in physical therapist education: A feminist vision for scholarship in clinical education. <i>Journal of Physical Therapy Education</i> , 24(3), 44–49. Retrieved from https://journals.lww.com/jopte/pages/default.aspx	Position paper, targets the Clinical Director of Education role within physiotherapy education, a role the author argues has a feminised nature.	Highlights the difficulties of having research being valued more highly than teaching, and more females are in teaching roles and males in research roles, and the problems for the profession as a whole. Author	None specified.
				This study could be repeated and updated within physiotherapy. Chiropractic and osteopathy tend not to have formalised areas of speciality, so a study based on this one could have limited value for those professions.
				This could be a useful study upon which to base similar studies for chiropractic and osteopathy, plus execute an updated study for physiotherapy.

			states the paternalistic traditional organisation of university supports research as more valuable than teaching students.	
43	Schofield, D. J., & Fletcher, S. L. (2007). The physiotherapy workforce is ageing, becoming more masculinised, and is working longer hours: A demographic study. <i>Australian Journal of Physiotherapy</i> , 53(2), 121–126. https://doi.org/10.1016/S0004-9514(07)70045-4	To use previously unpublished data from the Australian Census of Population and Housing.	To examine trends in the ageing, retirement patterns, and work practices of physiotherapists, to project future retirement, and investigate if the workforce is becoming more masculinised.	Further studies could be conducted investigating physiotherapists in education, research and administration as this study only included practising physiotherapists.
44	Short, S. D. (1986). Physiotherapy: A feminine profession. <i>Australian Journal of Physiotherapy</i> . Australian Physiotherapy Association. https://doi.org/10.1016/S0004-9514(14)60657-7	Based on a conference presentation.	Uses sociology processes to look at physiotherapy's issues of being a semi-profession, and problems with becoming more professional: "professionalisation is a masculine strategy in a patriarchal society" (p. 242).	
45	Stenberg, G., & Ahlgren, C. (2010). A gender perspective on physiotherapy treatment in patients with neck and back pain. <i>Advances in Physiotherapy</i> , 12(1), 35–41. https://doi.org/10.3109/14038190903174270	Survey of physiotherapists to ascertain how they treated patients for neck or back pain.	To assess if the patients' and/or the physiotherapists' gender (sex) influences the physiotherapy treatment given to patients with neck and/or low back pain."	None specified. Although this paper uses the term 'gender perspective', it is more a 'sex' perspective. A study based on this one, applying the SAGER guidelines, or another type of gender lens, could be warranted for the chiropractic, osteopathy and physiotherapy professions.
46	Strömbäck, M., Wiklund, M., Salander Renberg, E., & Malmgren-Olsson, E.-B. (2016). Gender-sensitive and youth-friendly physiotherapy: Steps toward a stress management intervention for girls and young women. <i>Physiotherapy Theory and Practice</i> , 32(1), 20–33. https://doi.org/10.3109/09593985.2015.1075639	A pre- post- study design utilising a gender-sensitive intervention administered by physiotherapists as part of a stress management programme for girls and young women.	Evaluates initial steps of a gender-sensitive, youth-friendly group intervention model designed for teenage girls and young women who experience stress-related or psychosomatic problems.	None specified, but authors expressed a hope other physiotherapy interventions for managing stress and mental health related conditions could be developed utilising a gender lens. This could be a useful study upon which to base similar studies for the design of chiropractic and osteopathy, in addition to further physiotherapy interventions.
47	Thöni, J., Peterson, C. K., & Humphreys, B. K. (2017). Comparison of treatment outcomes in neck pain patients depending on the sex of the chiropractor: A prospective outcome study. <i>Chiropractic & Manual</i>	Prospective outcomes study with follow up at 1, 3, 6 weeks and one year. Questionnaires were given to patients to report their levels of pain at these times, with a final	To determine if male and female chiropractors achieve the same treatment outcomes in neck pain patients.	None specified.

Therapies, 25(1), 18. <https://doi.org/10.1186/s12998-017-0149-8>

questionnaire asking for the patients overall impression of improvement.

48 Vollenweider, R., Peterson, C. K., & Humphreys, B. K. (2017). Differences in practice characteristics between male and female chiropractors in Switzerland. *Journal of Manipulative and Physiological Therapeutics*. <https://doi.org/10.1016/j.jmpt.2017.03.004>

Secondary analysis of data from the Swiss Job Analysis 2009 study (a chiropractic specific questionnaire).

To see if higher rates of female chiropractic students will lead to a shortage of chiropractors, as women 'work part-time' and the men who currently make the bulk of the workplace will be retiring soon. Part of a survey analysing chiropractic practice in Switzerland following the start of a new program in 2008 to look at chiropractic practice and make sure education was responding appropriately.

Why do women chiropractors tend to spend more time with patients during the follow-up visits? Do women spend more time with each patient because they talk more or listen more with their patients? Does this have an influence on the patient's satisfaction with care (p. 5). How much may it cost to educate these 'additional chiropractors' needed and where will this money come from because traditionally chiropractic education is funded primarily by Swiss taxpayers. Chiropractic and human medicine also need to find out why there are fewer men studying these subjects. Are men no longer applying to study medicine or chiropractic, or are they less likely to pass the difficult entrance examination compared with women? (p. 6).

Table 2

Abridged Summary of Papers Including Themes

ID	Author(s) and Year	Type of Study	Method	Country of Study	Study Population Source	Target Audience for this Study	Associated Profession	Critique	Theme
1	Armstrong, Ried, Sali, & McLaughlin (2013)	Quantitative	"Pilot" "Open label study"	Australia	Patients G	Patient G (female) Profession G	G	B	9 - Accommodation of Anatomy
2	Bergman & Marklund (1989)	Quantitative	"Survey/questionnaire" "Non-random"	Sweden	Physiotherapists	Physiotherapists	P	A	10 - Career Choices, and Perceptions of Equity: Profession, Students
3	Bishop, Bradbury, Hj Jeludin, Massey, & Lewith (2013)	Mixed methods	Survey/questionnaire Interviews "Explanatory mixed methods design incorporating a quasi-experimental study administered by postal survey and a qualitative interview study"	UK	Patients of O	Osteopaths	O	A	4 - Patient Preferences and Perceptions
4	Bishop, Smith, & Lewith (2013)	Quantitative	Survey/questionnaire	UK	Patients of C P	Chiropractors Physiotherapists	C P	A	4 - Patient Preferences and Perceptions
5	Bisiacchi & Huber (2006)	Quantitative	Survey/questionnaire "Preliminary investigative study"	USA	Students C	Educators C	C	B	2 - Can Women Do It As Well As Men and Vice Versa: Students
6	Bogg, Pontin, Gibbons, & Sartain (2007)	Quantitative	Survey/questionnaire "National survey"	UK	Physiotherapists	Profession P Physiotherapists	P	B	10 - Career Choices, and Perceptions of Equity: Profession, Students
7	Dahl-Michelsen (2014)	Qualitative	Observations Interviews	Norway	Students (1st year P)	Educators P	P	A	8 - The Body and Gender: 'Doing Gender'
8	Dahl-Michelsen (2015)	Qualitative (PhD thesis)	Observations Interviews "Social interactional framework"	Norway	Students P	Educators P	P	A	8 - The Body and Gender: 'Doing Gender'

9	Dahl-Michelsen & Solbrække (2014)	Qualitative	Observation Interviews	Norway	Students (1st year P)	Educators P	P	B	8 - The Body and Gender: 'Doing Gender'
10	Davies (1990)	Quantitative	Survey/questionnaire	UK	Students (3rd year P)	Educators P	P	B	10 - Career Choices, and Perceptions of Equity: Profession, Students
11	Edgar (2015)	Quantitative	Survey/questionnaire "Cross sectional design"	Australia	Students (1st-4th year P)	Educators P	P	A	2 - Can Women Do It As Well As Men and Vice Versa: Students
12	Forand, Drover, Suleman, Symons, & Herzog (2004)	Quantitative	Non-randomised experimental	Canada	Chiropractors	Unclear	C	B	3 - Can Women Do It As Well As Men: Profession
13	French (1991)	Quantitative	Survey/questionnaire	USA	Educators C	Educators C	C	B	2 - Can Women Do It As Well As Men and Vice Versa: Students
14	Gromala (1983)	Quantitative	Survey/questionnaire "Open-ended"	USA	Chiropractors	Unclear	C	B	10 - Career Choices, and Perceptions of Equity: Profession, Students
15	Hammond (2013)	Qualitative (Dr of Education thesis)	Interviews Audio diaries	UK	Students (start of 2nd year P)	Educators P	P	A	8 - The Body and Gender: 'Doing Gender'
16	Hammond (2009)	Quantitative	"Retrospective analysis of students' results"	UK	Students P	Educators P	P	A	2 - Can Women Do It As Well As Men and Vice Versa: Students
17	Harvey & Newman (1993)	Grey	Working party report	UK	n/a	Profession P Educators P NHS (National Health Service)	P	A	10 - Career Choices, and Perceptions of Equity: Profession, Students
18	Irion & Cossman (2008)	Quantitative	Survey/questionnaire	USA	Physiotherapists	Profession P	P	B	10 - Career Choices, and Perceptions of Equity: Profession, Students
19	James Campbell (2010)	Quantitative (EdD thesis)	Survey/questionnaire	USA	Physiotherapists	Profession P	P	A	10 - Career Choices, and Perceptions of Equity: Profession, Students

20	Johanson (2007)	Quantitative	Survey/questionnaire "Descriptive study"	USA	Students P	Educators P	P	A	10 - Career Choices, and Perceptions of Equity: Profession, Students
21	Johansson (1999)	Quantitative	Survey/questionnaire	Sweden	Physiotherapists	Profession P	P	B	10 - Career Choices, and Perceptions of Equity: Profession, Students
22	Johnson, Little, Staufenberg, McDonald, & Taylor (2016)	Mixed methods	Pilot study Focus group Survey/questionnaire "Cross sectional study design using qualitative and quantitative methods"	NZ	Patients P	Physiotherapists	P	A	4 - Patient Preferences and Perceptions
23	Kaufman & Chevan (2011)	Quantitative	Survey/questionnaire "Cross sectional study"	USA	Faculty P	Academia P	P	A	5 - Gender Bias within Management, Research and Education Faculties
24	Kell (2006)	Quantitative	Survey/questionnaire	UK	Students P	Educators P	P	B	2 - Can Women Do It As Well As Men and Vice Versa: Students
25	Linker (2005)	Essay	n/a	USA	Physiotherapists	Profession P	P	A	7 - History of Gender in the Professions
26	MacLean & Rozier (2009)	Qualitative	Interviews	USA	Physiotherapists (early and mid- career male)	Profession P	P	A	10 - Career Choices, and Perceptions of Equity: Profession, Students
27	Moore, Conine, & Laster (1980)	Unclear (abstract only)	n/a (abstract only)	USA	Physiotherapists	Profession P	P	n/a	10 - Career Choices, and Perceptions of Equity: Profession, Students
28	Muehleman, Peterson, & Humphreys (2017)	Quantitative	"Prospective cohort study, with one year follow up"	Switzerland	Patients C	Unclear	C	B	3 - Can Women Do It As Well As Men: Profession
29	Naylor, Norris, & Williams (2014)	Quantitative	"Exploratory study, retrospective analysis"	UK	Students P	Educators P	P	B	2 - Can Women Do It As Well As Men and Vice Versa: Students
30	Öhman (2001)	Mixed methods (medical dissertation)	Interviews Focus groups Survey/questionnaire	Sweden Canada	Students P Physiotherapists Educators P	Educators P	P	A	10 - Career Choices, and Perceptions of Equity: Profession, Students

31	Öhman, Hägg, & Dahlgren (1999)	Qualitative	Interviews	Sweden	Educators P (female)	Educators P	P	A	10 - Career Choices, and Perceptions of Equity: Profession, Students
32	Öhman, Solomon, & Finch (2002)	Quantitative	Survey/questionnaire "Longitudinal"	Canada	Students P	Educators P	P	A	10 - Career Choices, and Perceptions of Equity: Profession, Students
33	Öhman, Stenlund, & Dahlgren (2001)	Quantitative	Survey/questionnaire "Longitudinal"	Sweden	Students P	Educators P	P	A	10 - Career Choices, and Perceptions of Equity: Profession, Students
34	Palmgren, Chandratilake, Nilsson, & Laksov (2013)	Mixed methods	Survey Interviews Focus groups "Case study"	Sweden	Students C	Scandinavian College of Chiropractic	C	B	10 - Career Choices, and Perceptions of Equity: Profession, Students
35	Parry (1995)	Grey	Keynote lecture	UK	n/a	Profession P	P	A	7 - History of Gender in the Professions
36	Peterson & Rampacher (1999)	Quantitative	"Retrospective different study design"	UK	Students C	Anglo-European College of Chiropractic	C	A	2 - Can Women Do It As Well As Men and Vice Versa: Students
37	Raz, Jensen, Walter, & Drake (1991)	Qualitative	Interviews	USA	Physiotherapists (female)	Profession P	P	A	10 - Career Choices, and Perceptions of Equity: Profession, Students
38	Ried, Armstrong, Sali, & McLaughlin (2014)	Quantitative	Non-randomised "Open label clinical trial"	Australia	Patients G (female)	Patients Chiropractors Osteopaths Physiotherapists Other	G C O P	B	9 - Accommodation of Anatomy
39	Roberts & Smith (2002)	Qualitative (abstract only)	Focus groups	UK	Students P (2nd and 3rd year)	Unclear	P	n/a	10 - Career Choices, and Perceptions of Equity: Profession, Students
40	Rozier, Hamilton, & Hersh-Cochran (1998)	Quantitative	Survey/questionnaire	USA	Physiotherapists in management	Profession P	P	B	5 - Gender Bias within Management, Research and Education Faculties

41	Rozier, Raymond, Goldstein, & Hamilton (1998)	Quantitative	Survey/questionnaire	USA	Physiotherapists	Profession P	P	A	10 - Career Choices, and Perceptions of Equity: Profession, Students
42	Sabus (2010)	Grey	Position paper	USA	Director of Clinical Education (DCE)	Profession P	P	A	5 - Gender Bias within Management, Research and Education Faculties
43	Schofield & Fletcher (2007)	Quantitative	"Observational study using census data"	Australia	Physiotherapists	Profession P	P	A	6 - The Profession's Demographics
44	Short (1986)	Grey	Based on conference presentation	Australia	n/a	Profession P	P	A	7 - History of Gender in the Profession
45	Stenberg & Ahlgren (2010)	Quantitative	Survey/questionnaire "Cross-sectional"	Sweden	Physiotherapists Patients of P	Physiotherapists	P	A	1 – Interventions by Gender
46	Strömbäck, Wiklund, Salander Renberg, & Malmgren-Olsson (2016)	Mixed methods	Intervention Pilot "Pre post design"	Not specified (Sweden?)	Patients P (female youth)	Physiotherapists	P	A	1 - Interventions by Gender
47	Thöni, Peterson, & Humphreys (2017)	Quantitative	"Prospective cohort outcomes study"	Switzerland	Chiropractors	Unclear	C	B	3 - Can Women Do It As Well As Men: Profession
48	Vollenweider, Peterson, & Humphreys (2017)	Quantitative	Survey/questionnaire "Secondary analysis from survey data"	Switzerland	Chiropractors	Profession C	C	B	3 - Can Women Do It As Well As Men: Profession

Note. Where a study design is specified in full or part it is represented within quotation marks.

P – Physiotherapy, C – Chiropractors, O – Osteopathy, G – General.

A – Replicable with few or minor changes, B – Would need many or major changes, or not able to be critiqued.

The 48 papers comprise peer-reviewed journal articles: ID numbers 1-6, 11, 12-14, 16, 18, 20-26, 28, 29, 34, 36-38, 40, 41, 43, 45-48; theses: ID 8, 15, 19; a medical dissertation: ID 30; grey literature: ID 17, 35, 42, 44; and two articles with only an abstract available: ID 27, 39. ID numbers 7, 9, and 31-33 are part of ‘thesis 8’ and ‘medical dissertation 30’ respectively, but are also published as individual journal articles so are treated as separate papers in this scoping review.

Thirty-five papers are associated with the physiotherapy profession, nine with chiropractic, and one with osteopathy; the three remaining papers are described as either a combination of physiotherapy and chiropractic, or ‘general’, that is, findings are targeted to chiropractors, osteopaths, physiotherapists, manual therapists and surgeons (Table 3).

There are 29 quantitative studies, with 22 of those using self-reported surveys, questionnaires or scales as a key data collection tool. The remaining quantitative studies comprise: non-randomised open label studies ($n=2$), a non-randomised quasi-experimental study ($n=1$), and retrospective analyses of data ($n=4$). The eight qualitative studies use observations and interviews ($n=3$), interviews and audio diaries ($n=1$), interviews ($n=3$), and focus groups ($n=1$). Four studies utilise mixed methods design, employing the following data collection tools: survey/questionnaire and interviews ($n=1$); survey/questionnaire and focus group ($n=1$); survey/questionnaire; focus group and interviews ($n=2$). Forty studies included in this scoping review do not fully specify a study design (Table 2). A summary of the types of methodologies used by each of the three professions is shown in Table 3.

Table 3

Type of Paper (Methodology Used) and Associated Profession

	Qualitative	Quantitative	Mixed Methods	Other (Grey/Unknown)
Chiropractic		8	1	
Osteopathy			1	
Physiotherapy	8	18	2	6
General		3		1
Total	8	29	4	7

The studies use students, professionals, educators or faculty, a combination of these, or patients as their population sources (Table 4). Table 2 shows target audiences for the studies are sometimes different to the population source with twenty papers (45%) using matching population sources and target audiences (ID: 1, 2, 6, 13, 17-19, 21, 23, 25-27, 31, 37, 40-43, 45, 48). Fifteen papers (34%) use students as a population source with the target audience of ‘educators’ (ID: 5, 7-11, 15, 16, 20, 24, 29, 32-34, 36). Five papers (11%) use patients as a population source with the target audience of a profession (ID: 3, 4, 22, 38, 46) and five papers (11%) use either patients or practitioners as a population source and are unclear about the target audience (ID: 12, 14, 28, 39, 47). One paper (<1%) uses a combination of students, practitioners and educators as the population source with a target audience of ‘educators’ (ID: 30).

Table 4
Population Source

	Students	Professionals	Educators or Faculty	Patients	Students, Professionals and Educators
Chiropractic	3	3	1	2	
Osteopathy				1	
Physiotherapy	13	11	3	3	1
General				2	
Physiotherapy & Chiropractic				1	
Total	16	14	4	9	1

Note. The four grey literature papers are not included in this table.

Papers are from eight countries, with the United Kingdom (UK) (25%), and the United States of America (USA) (27%) predominating (Table 5). New Zealand (NZ) represents the only country where an author or authors did not publish more than one paper on the topic of sex and/or gender relating to chiropractic, physiotherapy or osteopathy.

Table 5

Country of Study

	Australia	Canada	New Zealand	Norway	Sweden	Switzerland	UK	USA	Unspecified
Chiropractic		1			1	3 ^a	1	2	
Osteopathy							1		
Physiotherapy	3	2 ^a	1	3 ^a	6 (3 ^a)		9 (2 ^a)	11 (3 ^a)	1
General	2 ^a						1		
Total	5	3	1	3	7	3	12	13	1

Note. (Number)^a of papers from the same author(s)

Table 6 shows 28 papers achieving an ‘A’ standard (acceptable – good), and 18 achieving a ‘B’ standard (poor – acceptable). The highest number of papers critiqued as ‘A’ overall relate to the physiotherapy profession, which represents 71% of the physiotherapy papers included in this review. Less than 1% of the chiropractic papers were graded ‘A’. Two papers were unable to be critiqued due to the full text not being available, and these are rated as ‘B’. It must be emphasised that a paper graded ‘B’ in this scoping review is a flag to readers to ‘proceed with caution’ when considering the value to place on that paper. The critique is not meant to steer readers away from that paper entirely, as would be the case in a systematic review. Twenty-nine of the 48 papers (60%) make suggestions regarding further specific research questions or general areas of research which could be investigated (Table 1).

Table 6

Distribution of Themes from Most to Least Prevalent (Including A or B Critical Review Grading)

	Chiropractic	Osteopathy	Physiotherapy	General	Chiropractic	Osteopathy	Physiotherapy	General
	Grade A				Grade B			
10. Career Choices, and Perceptions of Equity: Profession, Students			11		2		6	
2. Can Women Do It As Well As Men and Vice Versa: Measuring Students' Abilities	1		2		2		2	
3. Can Women Do It As Well As Men: in a Professional Capacity					4			
8. The Body and Gender: 'Doing Gender'			3				1	
7. History of Gender in the Professions			3					
4. Patient Preferences and Perceptions		1	1	1				
5. Gender Bias within Management, Research and Education Faculties			2				1	
1. Interventions by Gender			2					
9. Accommodation of Anatomy								2
6. The Profession's Demographics through a Gender Lens			1					
Total	1	1	25	1	8	-	10	2

Themes

The physiotherapy profession is represented most widely, appearing in eight of a possible ten themes, with the greatest majority (44%) of these studies relating to how physiotherapy students and professionals perceive various aspects of equity within their profession (Table 6). Chiropractic studies are represented in three of the ten themes. One paper relates to the osteopathy profession. Two studies are included in the category of ‘general’ as the findings of these two studies are targeted towards any or all of the following health-related settings: surgical, physiotherapy, chiropractic, osteopathy, plus other types of manual therapy (Armstrong et al., 2013; Ried et al., 2014).

Theme 1: Interventions by Gender

Theme one encompasses two studies which use an experimental intervention-style method deliberately developed using a gender lens. One of the studies designed a gender-sensitive stress management physiotherapy programme for girls and young women (Strömbäck et al., 2016), and the other study investigates the influence of gender on physiotherapists’ selection of treatment choices in relation to their own, and their patients’, sex (Stenberg & Ahlgren, 2010). These two studies could be useful templates upon which to base further research as they were both graded ‘A’ within this scoping review.

Theme 2: Can Women Do It As Well As Men and Vice Versa: Measuring Students’ Abilities

This theme encompasses studies which investigate if female and male students are equally capable. The seven studies investigating if women can perform as well as men and vice versa arise from the chiropractic (Bisiacchi & Huber, 2006; French, 1991; Peterson & Rampacher, 1999) and physiotherapy (Edgar, 2015; Hammond, 2009; Kell, 2006; Naylor et al., 2014) professions. One study aims to determine if differences in performance levels between male and female students are because male students experience discrimination while studying physiotherapy (Kell, 2006). Six of these seven studies investigate examination grades to compare results between male and female students. The exception study by Bisiacchi (2006) looks at injuries sustained by male and female students while performing adjustive techniques. The main difference between this theme and the one following (Theme 3: Can

Women Do It As Well As Men: In A Professional Capacity) is not just the student population being studied, but more notably, the fact that the research is not so pre-emptive in the assumption men will outperform women.

Theme 3: Can Women Do It As Well As Men: In a Professional Capacity

The four chiropractic studies in this review examine whether women can perform chiropractic to the same standard as men (Forand et al., 2004; Muehlemann et al., 2017; Thöni et al., 2017; Vollenweider et al., 2017). One paper argues that as “women are more likely to work part time” and the current cohort of predominantly male chiropractors retires, there will be many more women needed in the profession (Vollenweider et al., p. 2). Three papers are unclear about the purpose of investigating whether there are different outcomes for patients of male practitioners compared to female practitioners (Muehlemann et al., 2017; Thöni et al., 2017; Vollenweider et al., 2017). Note this theme is different to the previous theme as studies included in this theme do not ask if men are as capable as women.

Theme 4: Patient Preferences and Perceptions

This theme includes studies which investigate the views, beliefs and preferences of patients. Although there are three papers included under this theme it must be noted only one of these three seems to be concerned with directly improving outcomes for patients (Johnson et al., 2016). The other two papers investigate why patients preferentially select particular practitioners (Bishop, Bradbury, Hj Jeludin, Massey, & Lewith, 2013; Bishop, Smith, & Lewith, 2013) with the authors describing patient choice of practitioner as one of the first steps in developing the patient/practitioner relationship, although it can be argued the group potentially benefitting most from the results of these studies are practitioners themselves. This scoping review therefore highlights a large gap in existing literature concerning patients’ preferences and perceptions.

Theme 5: Gender Bias within Management, Research and Education Faculties

This theme includes three studies investigating gender inequality within the professions’ management and/or faculty hierarchies. Two papers highlight similar systemic, gender related barriers resulting in women being less prolific publishers than men within the physiotherapy literature, and these studies were published less than four months apart so were unable to build on the work of each other (Kaufman & Chevan, 2011; Sabus, 2010). Rozier, Hamilton and Hersh-Cochran (1998) investigate income differences between male and

female physiotherapists in management positions, and in the process highlight the tendency for males to be employed in the higher paying specialist areas of physiotherapy, plus the unexplained differences between male and female income in private practice. The findings may suggest systemic gender related barriers exist which direct professional development of women away from senior physiotherapy roles. With only three papers published on this topic (one critiqued as 'B,' and two as 'A') there is scope for more research in this area, not only within the physiotherapy profession, but also within the chiropractic and osteopathic professions.

Theme 6: The Profession's Demographics

This theme covers studies which investigate a profession's demographic make-up using a gender or feminist lens. Only one paper investigates the demographic composition of the physiotherapy profession with a specific focus on the influence of sex/gender (Schofield & Fletcher, 2007), with no comparative studies found relating to the chiropractic or osteopathy professions.

Theme 7: History of Gender in the Profession

The seventh theme encompasses papers which apply a gender and/or sex lens to the history of the professions of chiropractic, osteopathy or physiotherapy. Chiropractic and osteopathy have not applied a gender lens to the development of their respective professions within peer-reviewed literature. Three physiotherapy papers included in this theme were published approximately a decade apart and discuss various historical aspects of the profession viewed through a gender lens (Linker, 2005; Parry, 1995; Short, 1986). There is much overlap between the subject matter in these papers which provide snapshots in time, with a related focus. Historical trends and events can be useful when considering the ongoing direction and development of professions.

Theme 8: The Body and Gender: 'Doing Gender'

This theme encompasses four physiotherapy papers and investigates the relationship between the physical body and the expression of masculinities and/or femininities within the profession. Specifically the four studies consider the intersection between the 'performance' of gender and the 'performance' of physiotherapy (Dahl-Michelsen & Solbrække, 2014; Dahl-Michelsen, 2014, 2015; Hammond, 2013). Although there is no formal requirement for physiotherapy students to be 'sporty', studies have found a perception amongst students and

physiotherapists that physiotherapy students must be actively involved in sport (Dahl-Michelsen, 2014; Hammond, 2013). One paper explored the intersection between sport and gender within a physiotherapy education programme as sportiness has been traditionally associated with the performance of masculinity (Dahl-Michelsen, 2014). What was revealed was a considerably more complex situation than had been previously hypothesised, with a hierarchy where hyper-sporty males are considered ‘most suitable’ as physiotherapists, essentially because they are performing masculinity ‘most acceptably’. Hyper-sportiness in females however, while acceptable within the context of physiotherapy, is seen to signal women’s performance of ‘complicit masculinity’, which can never achieve the higher status afforded to hyper-sporty male physiotherapy students. Female physiotherapy students who were ‘averagely sporty’ were considered to be next in the hierarchy, as they were conforming more closely to the feminine gender norm of being less sporty. Men who were ‘averagely sporty’ were afforded the least prestige as not only were they not performing masculinity ‘properly,’ but also they were not performing the (implied) professional norms of physiotherapy.

Theme 9: Accommodation of Anatomy

To be included within this theme, studies must offer an intervention which accommodates anatomy specific to a particular sex. Two (related) studies meet this criterion, showing a clear justification for reducing or eliminating pressure on breast tissue (Armstrong et al., 2013; Ried et al., 2014). These studies focus on the effect of pressure on patients’ breast implants, but the authors highlight that all women would potentially benefit from use of their orthosis, especially those who are lactating, have implants, or have undergone mastectomy. Although the results of these studies are suggested as being useful for patients of musculoskeletal therapies, no attempts were made to confirm the orthosis could be effective during an in-vivo chiropractic or osteopathic treatment technique such as a high velocity, low amplitude thrust (HVLAT). Further studies were recommended to investigate use of the orthosis in positions other than prone, with the authors suggesting the value of using an orthosis in a seated position because for example, car seat belts can potentially rupture breast implants during motor vehicle accidents.

Theme 10: Career Choices and Perceptions of Equity

Theme ten comprises 19 studies which investigate the career choices of students and/or professionals, and/or their perceptions of equity within their professional/educational

experience (Bergman & Marklund, 1989; Bogg et al., 2007; Davies, 1990; Gromala, 1983; Harvey & Newman, 1993; Irion & Cossman, 2008; James Campbell, 2010; Johanson, 2007; Johansson, 1999; MacLean & Rozier, 2009; Moore et al., 1980; Öhman, 2001; Öhman et al., 2001; Öhman et al., 1999; Öhman et al., 2002; Palmgren et al., 2013; Raz et al., 1991; Roberts & Smith, 2002; Rozier, Raymond, et al., 1998). There are two studies which investigate what chiropractors experience in terms of the theme 'Career Choices, and Perceptions of Equity (Gromala, 1983; Palmgren et al., 2013). The paper by Gromala (1983) provides an overview of the experience of female chiropractic students and professionals but there are seemingly no subsequent similar studies for comparison. The study by Palmgren et al. (2013) asks whether students at a particular chiropractic college perceive a 'chilly climate'. The 'chilly climate' as discussed by Hall & Sandler (1982) is the subtle and persistent sexist subtext to which females are exposed in many aspects of daily life. The study by Palmgren et al. (2013) concludes some students do perceive a 'chilly climate', but not at a high enough level to be concerning. This conclusion is reached despite the study finding female students perceive the overall educational climate to be chillier than do their male counterparts. The validity of this study is compromised by acknowledged but unaddressed disparities in findings between the qualitative and quantitative data, which throws into question the conclusion drawn about the low levels of chilly climate present at this college.

Textbook audit

The summary of results of the textbook audit are shown in Table 7. There are three physiotherapy, five osteopathy, four chiropractic, and one combined osteopathy/chiropractic textbooks included in this audit. Only one book (physiotherapy) shows female practitioners performing HVLA/Ts, and no photographs of male practitioners (Kisner & Colby, 2012). This book is also the only one showing examples of a smaller female practitioner demonstrating on a larger male 'patient'. One book (osteopathy) states 33 times that a technique is particularly unsuited to smaller operators, and does not offer alternatives; it also states four times that a technique is particularly suited to a smaller operator (Hartman, 1997). There are no osteopathic textbooks showing photos of female practitioners. The total percentage of photographs showing female practitioners is 10.3%. One chiropractic book, and one osteopathic book show an almost even number of images of male and female patients (Bergmann & Peterson, 2011; Nicholas & Nicholas, 2012).

Table 7

Summary of Textbook Audit Showing Breakdown of Technique Photographs as a Percentage of Total Technique Photographs per Book

	Photographs Showing Female Practitioner (%)	Photographs Showing Potentially Problematic Techniques (%)	Photographs Showing Male patients (%)	Photographs Showing Female patients (%)	Techniques Specifically Highlighted as Particularly Unsuitable for Smaller Practitioners (%)	Techniques Specifically Highlighted as Particularly Suitable for Smaller Practitioners (%)
Physiotherapy:						
Bruckner & Khan (2011)	8.77	1.75	85.96	14.04	0	0
Kisner & Colby (2012)	100	1.25	68.75	31.25	0	0
Cook (2012)	11.18	6.83	0.31	99.69	0	0
Total	40	3.28	51.7	48.3	0	0
Osteopathy:						
Hartman (1997)	0	8.57	0	100	7.07	0.86
Barral & Croibier (2007)	0	0	0	100	0	0
Gibbons & Tehan (2016)	0	35.37	0	100	0	0
Gyer, Michael, & Calvert- Painter (2016)	0	2.45	23.52	76.47	0	0
Nicholas & Nicholas (2012)	0	5.74	48.42	51.57	0	0
Total	0	10.43	14.4	85.61	1.41	0.17
Chiropractic:						
Bergmann & Peterson (2011)	9.25	7.75	48.75	51.25	0	0
Broome (2000)	0	0.84	0	100	0	0
Byfield (2012)	4.74	9.09	91.3	8.7	0	0
Cooperstein & Gleberzon (2004)	0	7.69	100	0	0	0
Total	3.50	6.34	60.01	39.99	0	0
Chiropractic & Osteopathy:						
Gyer, Michael, & Davis (2017)	0	15.15	100	0	0	3.03

Discussion

The results of this scoping review support claims of minimal research investigating sex and gender within the field of physiotherapy (Hammond, 2013; Öhman, 2001), and even less research investigating sex and gender within chiropractic (Palmgren et al., 2013) and osteopathy.

This dearth of research seems peculiar, considering these three professions predominantly use the body of the practitioner to provide treatment for the body of the patient. There is an abundance of literature in the field of gender studies supporting the concepts of the body as a locus of power, the embodiment of gender, and the role of the physical body in the practising of masculinities and femininities (Duncan, 1994; Foucault, 1979; Paechter, 2003).

Within this scoping review by far the widest range of research relates to the physiotherapy profession. There are 35 papers from seven countries relating to the physiotherapy profession, and this research is distributed across eight of the ten themes identified in this review, representing research pertinent to students, the profession, patients, educators and educational institutions. This variety of physiotherapy-related research and the time frame within which it has been undertaken (1980-2016) provides a preliminary understanding of the development of, and trends within, that profession. The theme which encompasses by far the most research is that of 'Career Choices, and Perceptions of Equity: Profession, Students,' with papers published over several decades between 1980 and 2013. However, with six of the 17 physiotherapy-related papers included within this theme being critiqued as 'B' within this scoping review, it seems there is still much research to be undertaken before a systematic review of even the most popular theme concerning the topic of sex and gender within physiotherapy would be warranted.

Research relating to the chiropractic profession is primarily concentrated on comparison of the performance of female practitioners and male practitioners, and although the population sources for these studies encompasses students, practitioners, educators and patients, overall only three papers are clear about the purpose, potential benefits of, and audience for the research represented. These three papers propose their findings could be used to make improvements to chiropractic education, although it must be noted one of these studies was only ever intended to be relevant for its specific institution (Palmgren et al., 2013), and one

was judged at the time of publication to be so poorly executed and reported that it prompted an outcry from within the profession (French, 1991; Lawrence & Wittmer, 1991).

One of the most striking results highlighted during this scoping review is the almost total absence of research relating to the osteopathic profession. The one osteopathy-related paper identified asks patients why they chose a particular osteopath as their practitioner. There seems to be no research applying a gender lens to the following questions: how osteopaths perceive equity within their profession, if there is any gender bias affecting progression of osteopaths' career paths, if there is gender bias experienced by or affecting students or professionals, or how gender is expressed within the context of osteopathy and how this expression may affect patients and/or practitioners. Osteopathy has from its inception actively welcomed women into the profession, and is not especially hierarchical, possibly rendering discrimination against women less visible. It is difficult to accept there would not be gender bias within the profession, but without research there is no way of knowing if or where it exists, or examining any effects or trends.

Although generally research questions drive decisions about study design and methodology, some authors propose that due to the complexities and subtleties inherent within the expression and influences of gender within healthcare, researchers investigating gender effects should utilise the widest range of methodologies possible and pursue both qualitative and quantitative data to uncover nuances of gender expression (Dahl-Michelsen, 2015; Johanson, 2007). These authors suggest researchers use mixed method study designs, or seek to corroborate existing data but with use of alternative methodologies. Studying a profession's demographics is one example of a situation where a combination of qualitative and quantitative methodologies could be used to draw out the nuances of the influences and effects of sex and gender. For example, quantitative data could be collected relating to the proportions of males and females employed within the profession, and how much they earn, and qualitative data collection could be undertaken to discover some of the nuanced gender/sex-related influences on these aspects of the professions. The lack of studies applying a gender lens to the demographic makeup or trends of chiropractic, osteopathy and physiotherapy seems to be a major oversight given the inherent influence of sex and gender on society in general. There are numerous examples within the literature of studies reporting the demographics of all three professions (Eaton et al., 2012; Leach, 2013), although without the application of a gender lens, or the use of a framework such as the SAGER guidelines, it can be argued the utility of these studies is comparatively limited.

This scoping review has highlighted a significant prevalence of the use of quantitative study designs, with only 18% of the papers in this review utilising a purely qualitative study design, and all of those studies relating to the physiotherapy profession only. Additionally, although 20% of the total studies included in this review used patients as their population source, in only 11% of the studies overall were patients asked for their views. This much lower level of qualitative research is potentially a manifestation of the higher value assigned within the scientific community to ‘masculine, disembodied knowledge’, or knowledge *about* the body, in preference to ‘feminine, embodied knowledge’, which is knowledge obtained about the lived experience *of or through* the body (Ellingson, 2006; Gale, 2010). As chiropractic, osteopathy and physiotherapy have never had a completely comfortable relationship with the medical profession (DiGiovanna et al., 2009; Fornasier, 2017; Meeker & Haldeman, 2002) perhaps the focus on building a catalogue of research based predominantly on disembodied (‘masculine’) knowledge has been an understandable attempt at gaining a higher level of acceptance from the traditional patriarchy of the medical fraternity.

It also seems likely the historical development of each profession has influenced the direction of research undertaken. The themes identified in this review demonstrate some reflection on the part of the physiotherapy profession. Compared to chiropractic and osteopathy it can be argued that physiotherapy with its higher proportion of females in the workforce, has had an increased incentive to pursue research into sex and gender. As a profession which has been subjugated to the ‘patriarchal’ medical profession for most of the 20th century, physiotherapy has had to fight to win autonomy, and one method of gaining emancipation is by developing a deep understanding of the system which allows the perpetuation of dominance by one group over another.

Conversely, chiropractic has a history traditionally considered ‘masculinised’ with a strong business model, which has been predominantly led, developed and perpetuated by charismatic men prepared to go to jail for their right to practice chiropractic (Meeker & Haldeman, 2002). Chiropractic has largely rejected the medical hegemony, and remains steadfast about their profession’s values and ideals. This lack of compromise combined with an early understanding that chiropractors would have had to justify their existence via means acceptable to the medical establishment, resulted in the comparatively early establishment of a research arm, with a heavy focus on validation of their profession as more than ‘quackery’ (Meeker & Haldeman, 2002). This may be why the research focus has been on validating the

ability of women to do the job as well as men: is this focus a relic of the need to justify chiropractic to the medical profession and the general public? Alternatively, this research focus could be a fear reaction; that women are going to displace men from the profession. None of the chiropractic studies included in this review utilised a purely qualitative methodology, and without qualitative research there is no way of knowing how male or female chiropractors or their patients feel about gender.

A further consideration is that of the countries represented within this scoping review. Sex and gender are intimately related to their historical and social contexts, or communities. It must be remembered that a given 'community' could be social, professional or geographical context (Paechter, 2006). This consideration of 'community' is therefore important when researching sex and gender as results may be valid only for the specific community studied. For example the Scandinavian countries of Norway and Sweden are subject to the phenomenon known as the 'gender equality paradox' (Dahl-Michelsen, 2015). This paradox describes a situation where women from countries with higher rates of gender equality seem to make academic and professional choices which result in *more* imbalance between the rates of males and females employed in some professions (Borchorst, 2016). The 'gender equality paradox' must therefore be considered as part of any interpretation of the results of this scoping review as 21% of the studies included in this scoping review are from Scandinavian countries.

There seems to be minimal inter-relatedness between the papers included in this review, which is further substantiated by the large number of themes identified. This apparently disjointed body of research has eventuated despite 60% of the papers in this scoping review including specific questions authors raised as a result of their study and which could be suitable for further research. In most cases, where there was a direct connection between the research questions of multiple papers it was due to some level of shared authorship (Table 5). It seems there is an opportunity to develop some direction within the body of research regarding sex and gender within chiropractic, osteopathy and physiotherapy. There is currently insufficient research for example to conduct a systematic review of any aspect of gender and its influence or effect on the professions of chiropractic, osteopathy or physiotherapy, or investigate gender-related trends over time.

The ten themes identified within the papers included in this scoping review highlight numerous gaps within the literature, both in terms of potential topics and research questions plus methodologies.

Arguably the most interesting finding from one study within the theme ‘Can Women Do It As Well As Men and Vice Versa: Measuring Students’ Abilities’ (Bisiacchi & Huber, 2006) is not discussed at all: it was discovered female students sustain higher rates of injury while performing adjustments on patients in clinical situations, while male students sustain more injuries performing adjustive techniques during class. Does this finding relate to gender and the performance of masculinity and femininity? The study by Bisiacchi and Huber (2006) acknowledges that while there is research investigating injuries sustained by musculoskeletal therapy students while learning adjustive techniques, rarely is gender targeted as an integral aspect of the research. This lack of a gender lens being applied to injuries sustained by students seems to be an oversight on behalf of the chiropractic, osteopathy and physiotherapy professions. Although there are issues which compromise the quality of the study by Bisiacchi and Huber (2006), the differences between males and females in the location of their injuries (for example wrist, low back or neck), and in the context of injuries sustained (for example in class), would seem to warrant further investigation utilising a gender lens.

It is tempting to assume the studies included within the theme ‘Can Women Do It As Well As Men: In a Professional Capacity’ were a response to second-wave feminism of the 1990s, but three of these studies were published in 2017 (Muehleman et al., 2017; Thöni et al., 2017; Vollenweider et al., 2017). Why has chiropractic focussed heavily on performance of women compared to men, rather than the experience and perceptions of women working in the chiropractic profession, or chiropractic patients’ experiences? It is not stated explicitly, but there is an implied perception that men are superior chiropractors to women, and perhaps a corollary assumption that increasing numbers of female chiropractors may be detrimental to the profession. It is not clear if this implied perception stems from patients, the profession, the public, or a combination of these. The following quote illustrates this assumption:

... at times there has been the misconception that at least some of the chiropractic treatments require a certain degree of strength to perform properly and that female chiropractors may find this more challenging compared to their male colleagues. Conversely, some patients comment that they prefer a female chiropractor as they assume her treatment may be gentler. (Thöni et al., 2017, p. 2)

This viewpoint implying there is a perception that females cannot physically perform chiropractic to a standard equal to males also appears in the Forand et al. (2004) study in which the objective is to see if female and male chiropractors can perform an HVLAT using the same level of force. In the Forand et al. study the success of the HVLAT (thrust) was determined by the chiropractor delivering it. Twenty thrusts were performed by women and 11 of those were deemed successful. Of the 14 thrusts delivered by the men, ten were self-reported as successful, a higher percentage. But there was no consideration of whether these findings indicate that males achieve a successful thrust more often than females, or if males self-report success more often than females. There are many elements to a successful thrust and the ability to produce force is on its own of limited value. Much as in martial arts in which a smaller person can move a larger person, it is about accuracy of vectors, direction of force, and speed, rather than magnitude of force alone (Chila et al., 2011; Hartman, 1997). This requirement for skill over strength is acknowledged by early female chiropractors in the study by Gromala (1983), but is not subsequently mentioned in other chiropractic studies included in this review.

One study initially found patients of female chiropractors overall had better outcomes than those of male chiropractors (Muehlemann et al., 2017). Post hoc analysis was undertaken with data modified to exclude patients with acute presentations, to demonstrate equivalent outcomes for patients of male and female chiropractors. This removal of patients with acute presentations from the data is justified by the authors who suggest patients with acute presentations are more likely to show improved outcomes than patients with chronic conditions. The authors claim female chiropractors see higher numbers of patients with acute presentations, and male chiropractors see more patients with chronic presentations, therefore rendering any comparison between the outcomes for patients with chronic and acute presentations unfair. This point raises a question not identified in the study: why do female chiropractors have a noticeably higher number of patients with acute presentations compared to male chiropractors? This phenomenon is perplexing because the Vollenweider et al. (2017) paper (which along with the Thöni et al. 2017, and Muehlemann et al. 2017 papers shares two of the same authors) states there is generally no difference between the numbers of patients with acute versus chronic presentations seen by female chiropractors compared to male chiropractors.

There are complex relationships between the practising of masculinity and femininity (which alter dependent on cultural, social and temporal context), the self-policing nature of these practices, and the tendency towards prioritising disembodied rather than embodied knowledge within healthcare professions (Foucault, 1979; Hammond, 2013; Paechter, 2003). These complex relationships are overlaid on the premise that chiropractors, osteopaths and physiotherapists primarily use their own bodies to provide treatments for the bodies of their patients. The theme of 'The Body and Gender: 'Doing Gender' therefore seems to warrant significantly more attention in the literature than it has attracted to date.

The discussion around the intersection of sportiness and gender in physiotherapy, and the consequences of 'doing gender' in this profession, raises some interesting questions for the chiropractic and osteopathic professions as well. How important is 'sportiness' with its associated gendered implications, to chiropractors and osteopaths? How does 'doing gender' manifest within the chiropractic and osteopathic professions? Is there a gender element (conscious or subconscious) that might explain why students elect to study one of these professions in preference to the others? For example Schofield and Fletcher (2007) discuss the 'prestige of physiotherapy' rising over recent times since more men have entered the profession. Is chiropractic considered to have higher prestige than physiotherapy or osteopathy because, for example, chiropractors often take the title of doctor? One aspect of a profession's prestige is income. How much of the variation of income between chiropractors, osteopaths and physiotherapists is related to gender?

The original impetus for this scoping review was the difficulty experienced by myself as both a 'patient' and practitioner of osteopathy during techniques requiring pressure to be placed on breast tissue, causing pain and discomfort. As a practitioner there was also the challenge of managing some techniques which could be problematic if the patient was much larger than the practitioner, or positioning meant the patient would have the practitioner's breasts close to their face, and even potentially obscuring the patient's breathing. The theme 'Accommodation of Anatomy' demonstrates examples of the importance of considering sex differences within musculoskeletal healthcare, and suggests other options may need to be explored, such as alternatives for performing HVLTs to the thorax, or when the patient is larger than the practitioner. It must be noted that the two studies which tested an orthosis to mitigate the effects of pressure on breast tissue had connections to the company which manufactured the orthosis, but bias possibilities aside there is merit in pursuing the effectiveness of an orthosis or other alternatives for use during HVLT techniques.

If such alternatives have been explored, they are not widely available to students or practitioners through commonly used technique-skills textbooks, as highlighted in this review. Only one of the 13 books included in this review showed a female practitioner performing HVLA/Ts, and this physiotherapy book was also the only one to show examples of a smaller practitioner with a larger patient (Kisner & Colby, 2012). The question seems obvious: why are women so under-represented as practitioners and over-represented as patients within these texts? It is perhaps less surprising within the chiropractic texts, with its history of male dominance within the profession. But remarkably, there are no examples within the osteopathy texts showing female practitioners, and very few such examples within physiotherapy texts.

None of the studies in this review asks if there are techniques practitioners choose to avoid due to feeling physically unsuited to the technique. Anecdotal reports suggest this reluctance to employ certain techniques is potentially an issue which warrants further investigation (personal communication).

This scoping review has highlighted the predominance of the theme ‘Career Choices and Perceptions of Equity’ within the physiotherapy field. However, somewhat surprisingly, despite the overall paucity of literature, the research which does exist seems to ignore what has come before: Johanson (2007) does not make mention of Öhman (2001, 2002) despite investigating the same topic of physiotherapy students’ career expectations. For chiropractic, osteopathy, and physiotherapy, ‘Career Expectations and Perceptions of Equity’ is an important topic. Physiotherapy has specialist areas within the profession, some of which attract more prestige and higher remuneration, unlike chiropractic and osteopathy which as professions tend not to have such delineations, and are overall less hierarchical. This lack of an obvious hierarchy within chiropractic and osteopathy potentially requires a nuanced approach to uncover manifestations of sex and gender issues. There must be careful consideration given to the selection of the most appropriate methodologies to expose some of the subtleties inherent within expressions of sex and gender, and it has been recommended by more than one author that combinations of qualitative and quantitative data could be one way to uncover these nuances (Dahl-Michelsen, 2015; Johanson, 2007).

Limitations and Strengths of this Scoping Review

As far as we are aware this is the first time a scoping review of the literature relating to sex and gender in the chiropractic, osteopathy and physiotherapy professions has been undertaken. Several authors have acknowledged the scarcity of research in the area of sex and gender in physiotherapy (Dahl-Michelsen, 2015; Hammond, 2013; Öhman, 2001), and this scoping review supports these assertions, plus highlights even larger gaps in the literature regarding the chiropractic and osteopathic professions. The inclusion of critical review in this scoping review was shown to be valuable as it further highlights the extent of the gaps in the literature. For example, only one of the nine papers relating specifically to the chiropractic profession was critiqued as ‘A’, that is, suitable to be replicated with minor, or few changes; and although there were 35 papers relating uniquely to the physiotherapy profession, eight were graded ‘B’, and two were not able to be critiqued.

It is possible there were papers inadvertently excluded from this scoping review due to inconsistent usage of the terms sex and gender within the literature, and the resultant database search strategy which was used to accommodate that inconsistency. In addition, resourcing constraints limited the search and selection processes to one researcher. There was at least one potentially relevant study which had to be excluded due to not being available in English; this study was specifically discussed in one study included within this review, and referenced in several others. It is therefore likely that by restricting the search to those published in English, other relevant papers were missed.

The textbook audit did not differentiate between a technique being explained by one photograph or many. Individual techniques were demonstrated by between one and 12 photographs making direct comparison between the books potentially misleading.

Conclusion

There have been numerous gaps within the literature highlighted in this scoping review. For specific questions readers are directed to Table 1 and the discussion sections.

The professions of chiropractic and osteopathy in particular have extensive scope for investigating both breadth and depth of sex and gender issues, and it has become apparent there are gaps not only in the specific topics being researched, but also in the methodologies selected and because of wide variations in the quality of existing research.

There is a noticeable gap concerning patients' perspectives on sex and gender issues within the realms of chiropractic, osteopathy and physiotherapy. This gap is remarkable given chiropractic, osteopathy and physiotherapy have the intention of being patient-centred healthcare professions (Gatterman, 2006; Pinto et al., 2012; Thomson, Petty, & Moore, 2013).

A comprehensive, gender-sensitive audit of resources available to students of chiropractic, osteopathy and physiotherapy is warranted, with a view to increasing the prevalence of women being shown as practitioners in textbooks, and especially performing HVLTs, plus options for instances where the patient is larger than the practitioner.

Depending on the sex and/or gender topic being considered, researchers should investigate the use of different types of feminist lenses for the potential to highlight issues not previously identified. First wave feminism developed to combat patriarchy, but as the years have passed and gender issues have often become less overt, more subtle approaches have been required in an effort to highlight the nuances of gender discrimination. This is where the value of mixed method and qualitative approaches comes to the foreground. Researchers should therefore carefully consider methodology when investigating a sex/gender issue within the professions of chiropractic, osteopathy or physiotherapy. Due to the minimal research currently available, researchers could consider corroborating existing quantitative data with a qualitative study for example, or consider the use of mixed methods.

All researchers investigating any aspect of the professions of chiropractic, osteopathy or physiotherapy should use SAGER guidelines for designing and executing research (Heidari et al., 2016). These guidelines should be used even in research not specifically intending to investigate aspects of sex or gender in healthcare, and all researchers should be deliberate with their use of the terms 'sex' and 'gender'.

Readers are reminded that papers included in this scoping review did not have to meet a quality threshold, so researchers using this scoping review to direct their own research are cautioned to consider the critical review of all papers included within this scoping review. Although there may seem to be relevant existing research, it may be that the research is of low quality.

This scoping review has identified that there are numerous opportunities to apply a gender lens to critique and develop the professions of chiropractic, osteopathy and physiotherapy. In particular there is a lack of representation of women as practitioners within resources used for chiropractic, osteopathy and physiotherapy education. The effects and influences of gender are complex and nuanced and need to be considered by taking into account the local and wider community contexts in which they occur. The adoption of the SABER guidelines by all health researchers would contribute considerably towards development of a deeper understanding of the effects of gender and sex within healthcare, with much potential to expose previously unsuspected findings. One possible reason for the apparent lack of continuity or cohesiveness of the research undertaken to date is inconsistency of usage of the terms ‘sex’ and ‘gender’ within all healthcare research, rendering database searches using those terms inefficient. Although physiotherapy has been the largest contributor to the literature from the three professions included in this review, there remain many gaps in the literature for all three professions, not only with regard to specific topics and research questions but also with regard to methodologies.

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Section 3

Appendices

Appendix A

IJOM Guidelines (abridged)

Retrieved from:

<https://www.journalofosteopathicmedicine.com/content/authorinfo#idp1338208>

The Editors of the Journal welcome contributions for publication from the following categories: Letters to the Editor and Editorials, Reviews and Original Research articles, Protocols, Commentaries, Education, Clinical and Practice articles (Case Studies)

The Guidelines are separated into the following sections:

- A Online Submission
- B Types of Contributions
- C General Guidance
- D Preparation of the Manuscript
- E Specific Guidance for Original Research Articles
- F Specific Guidance for Protocols
- G Post Acceptance

Types of contributions

For all the following types of contributions authors are requested to consider the international readership of the journal and to be aware of the need to explain local contexts or define terminology where these are likely not to be commonly understood internationally. Word limits exclude tables, figures and reference list.

Reviews and Original Articles (2,000 - 5,000 words)

Authors should select "Review Article" or "Full Length Article" at the submission stage when submitting either a Review or an Original Research article.

These should be either **(i)** reports of new findings related to osteopathic medicine that are supported by research evidence. These should be original, previously unpublished works; or **(ii)** a critical or systematic review that seeks to summarise or draw conclusions from the established literature on a topic relevant to osteopathic medicine.

Please see specific guidance below for original research articles and the requirement to submit a checklist from the appropriate reporting guideline together with your paper as a guide to the editors and reviewers of your paper. The checklists for each reporting guideline can be found on the [EQUATOR](#) website. Checklists should be uploaded at submission as "Checklist" file types.

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For enquiries relating to the submission of articles (including electronic submission where available) please visit this journal's homepage at <http://www.elsevier.com/ijosm>. You can track accepted articles at <http://www.elsevier.com/trackarticle> and set up e-mail alerts to inform you of when an articles status has changed. Also accessible from here is information on copyright, frequently asked questions and more.

Contact details for questions arising after acceptance of an article, especially those relating to proofs, will be provided by the publisher.

Submission checklist

You can use this list to carry out a final check of your submission before you send it to the journal for review. Please check the relevant section in this Guide for Authors for more details.

Ensure that the following items are present:

One author has been designated as the corresponding author with contact details:

- E-mail address
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All necessary files have been uploaded:

Manuscript:

- Include keywords
- All figures (include relevant captions)
- All tables (including titles, description, footnotes)
- Ensure all figure and table citations in the text match the files provided
- Indicate clearly if color should be used for any figures in print

Graphical Abstracts / Highlights files (where applicable)

Supplemental files (where applicable)

Cover Letter

Conflict of Interest Statement

Author agreement

Further considerations

- Manuscript has been 'spell checked' and 'grammar checked'
- All references mentioned in the Reference List are cited in the text, and vice versa
- Permission has been obtained for use of copyrighted material from other sources (including the Internet)
- Relevant declarations of interest have been made
- Journal policies detailed in this guide have been reviewed
- Referee suggestions and contact details provided, based on journal requirements

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Appendix B

PRISMA Scoping Review Checklist

Section	Item	PRISMA-ScR Checklist Item
Title	1	Identify the report as a scoping review
Abstract		
Structured summary	2	Provide a structured summary that includes (as applicable) background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives
Introduction		
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.
Methods		
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).
Summary measures	13	Not applicable for scoping reviews.
Synthesis of results	14	Describe the methods of handling and summarizing the data that were charted.
Risk of bias across studies	15	Not applicable for scoping reviews.
Additional analyses	16	Not applicable for scoping reviews.
Results		
Selection of sources of evidence	17	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram
Characteristics of sources of evidence	18	For each source of evidence, present characteristics for which data were charted and provide the citations.
Critical appraisal within sources of evidence	19	If done, present data on critical appraisal of included sources of evidence (see item 12).
Results of individual sources of evidence	20	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.
Synthesis of results	21	Summarize and/or present the charting results as they relate to the review questions and objectives
Risk of bias across studies	22	Not applicable for scoping reviews
Additional analyses	23	Not applicable for scoping reviews
Discussion		
Summary of evidence	24	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.
Limitations	25	Discuss the limitations of the scoping review process
Conclusions	26	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.
Funding	27	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.

JB1 = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews. * Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites. † A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JB1 guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy documents).

Appendix C

Table Showing Search-Term Refinement Strategy for a Smaller Database

Database	Date/time	Search terms	Total hits	Possibly Relevant Titles	Notes
Pedro (Chrome)	6/11/17 9.15-10am	Sexism	0		
		Sex	633	15	Into Mendeley
		Sexist	0		
		Gender	518	15	Into Mendeley
		Gender bias	12	0	
		“Gender bias”	1	0	
		Gender discrimination	0		
		Gender inequality	0		
		“Gender inequality”	0		
		Gender role	23	0	
		“Gender role”	1	0	
		Gender specific care	16	0	
		“Gender specific care”	0		
		Masculine	3	0	
		Feminine	1	0	
		Masculinity	0		
		Femininity	1	0	
		Sexual Harassment	0		
		Abuse	38	0	

Appendix D

Table Showing Search-Term Refinement Strategy for a Large Database

Science Direct (Chrome)	2.15pm 6/11/17	Search terms	Total hits	Possibly Relevant Titles	Notes
Title/abstr/keywords		Sex* OR Gender AND Physi*therap*	148	31	Into Mendeley
Title/abstr/keywords		Sex* OR Gender AND Osteopath*	27	8	Into Mendeley
Title/abstr/keywords		Sex* OR Gender AND Chiropract*	30	11	Into Mendeley
Title/abstr/keywords		Sex* OR Gender AND Musculoskeletal	438	Did not manually search	
Title/abstr/keywords		Sex* OR Gender AND Musculoskeletal Therapy	30	2	Into Mendeley

Note. * Represents use of database-appropriate truncation, wildcard and other such functions.

Appendix E

Example of Completed Critical Review Tool

Evaluation Tool for Quantitative Research Studies			
Paper being appraised:	Forand, D., Drover, J., Suleman, Z., Symons, B., & Herzog, W. (2004). The forces applied by female and male chiropractors during thoracic spinal manipulation. <i>Journal of Manipulative and Physiological Therapeutics</i> , 27 (1), 49–56.		
Reviewer:	LK		
Date reviewed:	21-Jan-18		
Review Area	Key Questions		
(1) STUDY OVERVIEW			
Bibliographic Details	0. Author, title, source (publisher and place of publication), year		
Purpose	1. What are the aims of the study? 2. If the paper is part of a wider study, what are its aims?	a little confusing as in the objective they state they want to study the forces generated by male/females during spinal thrusts because it could be argued women might not have the physical capacity to generate forces as strong as men	
Key Findings	3. What are the key findings of the study?	no difference between force produced by M:F during HVTs	
Evaluative Summary	4. What are the strengths and weaknesses of the study and theory, policy and practice implications?	a successful HVT was determined by the practitioner, either by an audible pop or by reassessment of the vertebral segment and reporting increased movement. This is a serious flaw as it could just mean the ones who report a successful HVT could be saying it was successful, when it may not be if determined by an observer. It could also have been argued that people using higher than necessary forces to 'get' the HVT are relying on force rather than good technique. Clearly on average males could use higher force than females (ie on a pad), so its a bit of a different question to study whether males and females can produce sufficient force to get a successful HVT (which isnt necessarily maximum force). Its the wrong question: force is not the only factor in producing a successful HVT	assumption that greater weight, height and strength are required to generate forces
(2) STUDY, SETTING, SAMPLE AND ETHICS			
The Study	5. What type of study is this? 6. What was the intervention?	unspecified (expreiment?) performing HVTs to any TP T4-9, using any technique as long as AP direction and hand contacted sensor pad	
	7. What was the comparison intervention?	m v f	
	8. Is there sufficient detail given of the nature of the intervention and the comparison intervention?	mostly	
	9. What is the relationship of the study to the area of the topic review?		
Setting	10. Within what geographical and care setting was the study carried out?	not specified, Calgary presumably!	
Sample	11. What was the source population?	chiros in Calgary	
	12. What were the inclusion criteria?	not specified, although were matched for experience, 28 were 'recruited' (how?). Patients were chosen if asymptomatic, male, between 170-185cm tall, 70-82kg) Didn't say if they were regular 'HVT' consumers (and some people are 'clickier' than otehers, or easier to manip if they like HVTs and are familiar with them, the practitioner etc)	
	13. What were the exclusion criteria?	not specified	
	14. How was the sample selected?	not specified	
	15. If more than one group of subjects, how many groups were there, and how many people were in each group?		
	16. How were subjects allocated to the groups?		
	17. What was the size of the study sample, and of any separate groups?		
	18. Is the achieved sample size sufficient for the study aims and to warrant the conclusions drawn?		
	19. Is information provided on loss to follow up?	n/a	
	20. Is the sample appropriate to the aims of the study?	14M, 14 F so, very small sample. Plus...no mention if they all trained at the same college or same country etc	
	21. What are the key sample characteristics, in relation to the topic area being reviewed?	sex, height, weight	
(3) ETHICS			
Ethics	22. Was Ethical Committee approval obtained?	yes	
	23. Was informed consent obtained from participants of the study?	yes obtained	
	24. Have ethical issues been adequately addressed?		

(4) GROUP COMPARABILITY AND OUTCOME MEASUREMENT		
Comparable Groups	25. If there was more than one group was analysed, were the groups comparable before the intervention? In what respects were they comparable and in what were they not?	comparable in terms of experience but no other data mentioned ie trained at same colleg, same country, age range, although it was good that height and weight of all chiros and pateints were measured as they did a ratio/% size between patient/chiro comparison
	26. How were important confounding variables controlled (e.g. matching, randomisation, in the analysis stage)?	
	27. Was this control adequate to justify the author's conclusions?	
	28. Were there other important confounding variables controlled for in the study design or analyses and what were they?	
	29. Did the authors take these into account in their interpretation of the findings?	
Outcome Measurement	30. What were the outcome criteria?	
	31. What outcome measures were used?	forces measured with tech equipment, recalibrated each time. Big issue is 'successful HVT' was determined by the chiro, not someone independent, or even the patient/model
	32. Are the measures appropriate, given the outcome criteria?	
	33. What other (e.g. process, cost) measures are used?	
	34. Are the measures well validated?	
	35. Are the measures of known responsive to change?	
	36. Whose perspective do the outcome measures address (professional, service, user, carer)?	
	37. Is there a sufficient breath of perspective?	
	38. Are the outcome criteria useful/appropriate within routine practice?	
	39. Are the outcome measures useful/appropriate within routine practice?	
Time Scale of Measurement	40. What was the length of follow-up, and at what time points was outcome measurement made?	
	41. Is this period of follow-up sufficient to see the desired effects?	
(5) POLICY AND PRACTICE IMPLICATIONS		
Implications	42. To what setting are the study findings generalisable? (For example, is the setting typical or representative of care settings and in what respects?)	T spine adjustments only, and study sample v small and possibly homogenous but cant tell. No justification of why Tspine chosen, would have thought they would look at body areas where practitioner injuries are reported and doing what types of treatments and go from there (eg if its reported in literature that women have higher levelsof injury performing L spine techniques then wouldnt you start there?) They justified their study by saying pretty much that obviously women are generally smaller and weaker than men so therefore might n ot have the strength to produce enough force to get HVTs (although this is unclear)
	43. To what population are the study's findings generalisable?	
	44. Is the conclusion justified given the conduct of the study (For example, sampling procedure; measures of outcome used and results achieved?)	given their 'off' original question/hypothesis it looks like they had a predetermined outcome in mind : null hypothesis was "there was no difference in the mechanics of spinal manipulation between male and female chiropractors", which is slightly different to their later comment whether "women clinicians have difficulty in reaching the forces exerted by male chiropractors dtring high speed low amplitude treatment"
	45. What are the implications for policy?	
	46. What are the implications for service practice?	
(6) OTHER COMMENTS		
Other Comments	47. What were the total number of references used in the study?	10/28 refs include the same author (W Herzog), although h is a bit of a legend (??)apparently, this still seems a little suspicious....(Herzog is an author on this paper)
	48. Are there any other noteworthy features of the study?	
	49. List other study references	41 cited (google schoalr 22 jan2018), only one related (vollenweider)
	Source: Long AF, Godfrey M, Randall T, Brettle AJ and Grant MJ (2002) Developing Evidence Based Social Care Policy and Practice. Part 3: Feasibility of Undertaking Systematic Reviews in Social Care. Leeds: Nuffield Institute for Health.	
Overall appraisal:		
		interesting is the force produced as a % of bodyweight, what is the ongoing cost of that, which didn't get discussed at all
		results showed a variety of force, with some women producing much higher force than any males, but no data or discussion showing relationship of expereince to force (you would expect more expereined to use less force as in theory their technique should be better)
		overall, poor study due to lack of clarity around actual hypothesis, and lack of discussion around two points above which could be confounding factors, plus 'successful HVTs determined by practitioner themselves

Appendix F

Example of the Process Used to Sort Data Within Excel

name and details of paper	date of paper critiqued by LX & SP	Y full text available (in english)	type of study method	summary of study	summary of results	country of study study population source target audience for this study	associated profession my critique potential theme further questions asked in this paper questions arising from this paper	my comments, or what do I think this paper contributes to the overall topic
Bisiacchi, D. W., & Huber, L. L. (2006). Physical injury assessment of male versus female chiropractic students when learning and performing various adjustive techniques: A preliminary investigative study. <i>Chiropractic & Osteopathy</i> , 14 (17), 17. https://doi.org/10.1186/1746-1340-14-17	2006 Q31	Y	quant survey/questionnaire	to discover the injuries sustained, by gender (sex) while doing adjustive techniques as a chiro student,	that there are enough differences in injury types and rates to warrant further investigation with the aim of modifying behaviour to prevent these	USA students chiropractic education providers	chiro poor-acceptable physical technique	would be interesting to look at the result noted in this paper that more females get injurie in clinic and males in the classroom, plus they did identify that data relating to height and weight werent used in this study but that it could be used in future as it was collected, and while they did set out to identify gender differences I would think it would have been useful to consider if they really were 'gender' issues (ie attitudinal), or 'sex' issues (physical) or a combo.
Forand, D., Drover, J., Suleman, Z., Symons, B., & Herzog, W. (2004). The forces applied by female and male chiropractors during thoracic spinal manipulation. <i>Journal of Manipulative and Physiological Therapeutics</i> , 27 (1), 49–56.	2004	Y	quantitative non randomised, experimental	14M and 14 F chiropractors from Calgary performed Tsp HVTs anywhere between 14-9 to see if males/females apply the same amount of force.	no differences found for upper Tsp, preload forces from male xros significantly higher than females	Canada chiropractors uncertain	chiropractic poor-acceptable physical capability are women capable of producing enough force to do successful HVTs	Interesting is the force produced as a % of bodyweight, what is the ongoing cost of that, which didn't get discussed at all results showed a variety of force, with some women producing much higher force than any males, but no data or discussion showing relationship of experience to force (you would expect more experienced to use less force as in theory their technique should be better). Suspicious that of the 28 refs, 10 were by Herzog (one of the authors) plus although 41 cited this paper only one looked at gender/sex (vollenweider). overall, poor study due to lack of clarity around actual hypothesis, and lack of discussion around two points above which could be confounding factors, plus 'successful HVTs determined by practitioner themselves. T spine adjustments only, and study sample v small and possibly homogenous but cant tell. No justification of why Tspine chosen, would have thought they would look at body areas where practitioner injuries are reported and doing what types of treatments and go from there (eg if its reported in literature that women have higher levelsof injury performing L spine techniques then wouldnt you start there?) They justified their study by saying pretty much that obviously women are generally smaller and weaker than men so therefore might n ot have the strength to produce enough force to get HVTs (although this is unclear)
Muehleemann, M. B., Peterson, C. K., & Humphreys, B. K. (2017). Differences in outcomes of patients treated by male vs female chiropractors. <i>Journal of Manipulative and Physiological Therapeutics</i> , 40 (6), 420–426. https://doi.org/10.1016/j.jmpt.2017.05.001	2017	Y	quantitative prospective cohort study, with one year follow up	comparing outcomes for patients with LBP depending on sex of xro, at 1 wk, 1,3,6,12 months, using a pragmatic approach where tt could be any as decided by the chiro, and as many tts as needed.	once acute patients are removed from the picture then there is no difference, otherwise patients of female xros have better outcomes	Switzerland patients, chiropractors patients, education providers	chiropractic poor-acceptable are patients better off seeing male or female chiropractors why do women xros get a significantly higher number of acute patients compared to men? Does this also happen in countries other than Switzerland?	The comment was made quite some way into the paper that because lots of xro ttt is HVLA's and articulation, this could be assumed to need more strenght (with the assumption being women cant be as strong as men and provide adequate treatment moutcomes). The original objective was stated as" compare treatment outcomes of low back pain patients depending on the sex of the treating doctor of chiropractic" which actually could be about lots of aspects (empathy, communication skills, practitioner/patient congruency and so on). Then, when the outcomes were actually better for female practioniers, they did some post hoc analysis and took out the influence of the acute patients so that there was no difference between males and female xros. They did comment that results are determined by a lot more than physical ttt, then!" This suggests that patient outcomes of improvement and satisfaction may be more likely influenced by other factors associated with low back pain"...so are they saying that as women couldnt possibly be providing the same physical quality of ttt they must be making gains in some other way (eg communication) Early in the paper thay say that xro is 'male heavy' but that that is changing, and that traditioanly men have been fulltime, women parttime. But that now more women are coming thru the educaiton system. So, you would expect the male xros in this study to be on average more experienced in terms of length of time qualified, and more likely to be working FT rather than PT. So, overall not useful at all for these reasons, and not clear of the xros were blinded to what the study was about (mentions they were coached thru the study protocol whatever that means). And although there are good reasons fora pragmatic tt approach it would have been good to know how many tts each patienn had (there could be some pattern between m/f where it takes more/less number of sessions)

Declaration

Name of candidate: LYNDA KAY

This Thesis/Dissertation/Research Project **entitled** : What is known about experience, perceptions + impacts on practitioners and patients due to sex and gender in the professions: A scoping review.
is submitted in partial fulfillment for the requirements for the Unitec degree of Master of Osteopathy

Principal Supervisor: DR DIANNE ROY

Associate Supervisor/s: DR HELEN GREMILLION
SUE PALFREYMAN

CANDIDATE'S DECLARATION

I confirm that:

- This Thesis/Dissertation/Research Project represents my own work;
- The contribution of supervisors and others to this work was consistent with the Unitec Regulations and Policies.
- Research for this work has been conducted in accordance with the Unitec Research Ethics Committee Policy and Procedures, and has fulfilled any requirements set for this project by the Unitec Research Ethics Committee.

Research Ethics Committee Approval Number: N/A

Candidate Signature: [Signature] Date: 06/12/2018

Student number: 1425363

Full name of author: LYNDA KAY

ORCID number (Optional):

Full title of thesis/dissertation/research project ('the work'):

WHAT IS KNOWN ABOUT EXPERIENCES, PERCEPTIONS, AND
IMPACTS ON PRACTITIONERS AND PATIENTS DUE TO SEX AND
GENDER IN THE CHIROPRACTIC, OSTEOPATHY AND PHYSIOTHERAPY
PROFESSIONS: A SCOPING REVIEW

Practice Pathway:

Degree: MASTER OF OSTEOPATHY

Year of presentation: 2018

Principal Supervisor: DR DIANNE ROY

Associate Supervisor: DR HELEN GRIMMOND, SUE PALFREYMAN

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