

A qualitative study investigating research priorities and investigative capacity in sports-focused chiropractic research, part 1 – identifying research priorities to inform a Delphi study

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Objectives: To identify sports-focused research priorities to inform the development of a research agenda for sports chiropractors.

Methods: A qualitative description study was conducted using semi-structured interviews with 20 sports chiropractic researchers from 8 different countries and focus group interviews with 12 sports chiropractic leaders from Canada.

Results: 150 research priorities were identified, and

Étude qualitative sur les priorités de recherche et la capacité de recherche en chiropratique sportive, partie 1 - identification des priorités de recherche pour guider une étude Delphi

Objectifs : Identifier les priorités de recherche axées sur le sport pour guider le développement d'un programme de recherche pour les chiropraticiens du sport.

Méthodologie : Une étude de description qualitative a été menée à l'aide d'entrevues semi-structurées auprès de 20 chercheurs en chiropratique sportive de huit pays et d'entrevues en groupes de discussion avec 12 dirigeants de la chiropratique sportive du Canada.

Résultats : 150 priorités de recherche ont été

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three main themes emerged: area of research, research actions, and research methodology. Six areas of research were identified: basic science and mechanism research, clinical research, health services research, population health, specific conditions and topics in sport, and chiropractic research in sport. Collaboration in research and contributing to the broader sports research effort were two subthemes identified as research actions, and the remaining codes were related to research methodology.

Conclusions: *The research priorities identified can be utilized to plan future research prioritization studies to inform a research agenda for the sports chiropractic field.*

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KEY WORDS: sports, chiropractic, qualitative research, research

Introduction

In Canada, \$1.5 billion in annual healthcare costs has been attributed to sports and physical activity-related injuries.^{1,2} With up to 55% of adults^{3,4} and 74% of youth⁵ partaking in sports and physical activity in Canada, the importance of managing these injuries has implications for the Canadian healthcare system. Chiropractors are primary contact healthcare practitioners who possess the skills to manage sports injuries. In Canada, nearly a third of chiropractors surveyed in 2011 reported treating sports injuries as a main component of their practice, and a practice focus of treating sports injuries was identified as a variable that was associated with receiving increased physician referrals.⁶ In Australia, 49.5% of chiropractors reported treating athletes, and of the chiropractors who treated athletes, they more often reported collaborative professional and referral relationships compared to chiropractors who did not often treat athletes.⁷ For these reasons, sports injury management is an important area of professional activity with collaborative opportunities for the chiropractic field.

identifiées, et trois thèmes principaux sont ressortis : le domaine de recherche, les actions de recherche et la méthodologie de recherche. Six domaines de recherche ont été identifiés : la science fondamentale et la recherche sur les mécanismes, la recherche clinique, la recherche sur les services de santé, la santé de la population, des conditions et des sujets particuliers liés au sport et la recherche en chiropratique sportive. La collaboration dans la recherche et de façon plus générale, la contribution à l'effort de recherche sur le sport sont deux sous-thèmes identifiés comme des actions de recherche, et les autres codes sont liés à la méthodologie de recherche.

Conclusions : *Les priorités de recherche identifiées peuvent servir à préparer de futures études sur la priorisation de la recherche et à guider un programme de recherche dans le domaine de la chiropratique sportive.*

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MOTS CLÉS : sports, chiropratique, recherche qualitative, recherche

In many countries, sports chiropractic is recognized as an accredited specialty within the profession or is regarded as an area of practice concentration. The International Federation of Sports Chiropractic/Fédération Internationale de Chiropratique du Sport (FICS) is an assembly of national chiropractic sports councils and individual members worldwide that serves to coordinate the advancement of sports chiropractic, globally.⁸ In Canada, sports chiropractic is an accredited specialty within the chiropractic profession, and the Royal College of Chiropractic Sports Sciences (Canada) (RCCSS(C)) is the governing and organizing body that coordinates the involvement of the chiropractic profession with amateur and professional athletic sport organizations.⁹ Fellows of the RCCSS(C) in Canada are leaders in clinical practice, education and research with respect to sports chiropractic.¹⁰

While general chiropractic practice can involve the treatment of sports injuries, previous reports have identified characteristics common to sports chiropractic practice.^{7,10-12} In Australia, sports chiropractors more often reported utilizing a multi-modal treatment approach in-

volving a range of treatment techniques such as spinal manipulation/mobilization, extremity manipulation/mobilization, soft tissue therapies, acupuncture, taping techniques, rehabilitation and specific exercise therapies.⁷ In a survey of Fellows of the RCCSS(C), 95% of respondents felt that “chiropractic treatment involved more than a chiropractic adjustment”, and the majority felt that their treatment could cause improvements in an athlete’s sport performance. The most utilized interventions reported to affect performance were spinal joint manipulation/mobilization (92%), extremity joint manipulation/mobilization (89%), exercise prescription (86%), sport-specific training advice (86%), manual soft tissue therapies (84%), and rehabilitation prescription (81%). All respondents felt that inter-disciplinary health professional relationships were important in the treatment of athletes.¹⁰ Any research endeavors conducted to advance the sports chiropractic field should take into consideration these distinctive approaches to sports chiropractic practice.

Research is vital to advance knowledge and provide evidence-informed, up-to-date, and safe patient care. Recently, chiropractic research agendas have been developed in North America and Europe utilizing the Delphi method to achieve expert consensus on research priorities.^{13,14} The Delphi method is a systematic voting procedure that involves recruiting experts to participate in an iterative survey process where experts vote upon a list of statements (often referred to as seed statements) and rank their importance with the purpose of determining consensus.¹⁵⁻¹⁷ While these research agendas facilitate broad research planning for the chiropractic profession, they do not specifically address the research needs of sports chiropractors. From an interview study, sports chiropractic practitioners emphasized the importance of conducting research on topics unique to their field, such as the effectiveness of sports chiropractic treatment on athletic performance, injury recovery, and injury prevention.¹¹ A limitation of previous chiropractic research agendas is that the Delphi panels to create such agendas had minimal sports chiropractic input.^{13,14}

To the authors’ knowledge, a research agenda has not been published for the sports chiropractic field. It is our intention to conduct Canadian and International Delphi studies to determine consensus on sports-focused research priorities for sports chiropractors. Prior to conducting a Delphi study, an appropriate sample of experts must be

identified, and research priorities must be identified to create seed statements for the Delphi procedure for experts to vote on. To determine these essential components, we developed a three-phase plan to create a sports-focused research agenda for sports chiropractors that involves the following: phase one – an exploratory study to uncover the opinions of sports chiropractors about research topics, phase two – a qualitative study designed to extract a list of research priorities from sports chiropractic experts and to explore investigative capacity within the sports chiropractic field, and phase three – conducting both Canadian and International Delphi studies.

The phase one exploratory study involved interviewing chiropractors with a sports-focused practice to explore their opinions about research using quantitative text analysis methods.⁸ Chiropractors with a sports-focused practice concentrated their discussions about research on topics specific to the sports context, such as the effects of various sports chiropractic interventions on athletic performance, injury prevention for athletes, chiropractic care of sports injuries, and the care of athletes in clinical practice.⁸ These sports-related research interests were not captured by previous Delphi studies conducted for the general chiropractic profession^{13,14}, highlighting the need to perform separate research prioritization Delphi studies for the sports chiropractic field.

Previous chiropractic research agenda studies utilized qualitative methods to identify research themes and priorities to generate seed statements for their Delphi process; however, these approaches were published as an appendix, and their methods were not reported in their entirety.^{13,14} We believe there is richness in the qualitative data collected to create seed statements when planning a Delphi study that should be explored, as the knowledge gleaned from the analysis can assist with research planning and inform the implementation of a research agenda. This present project was conducted in two parts. The aim of the first part of this project was to conduct a qualitative description study of semi-structured and focus group interviews from sports chiropractic researchers and organizational leaders to better understand the research priorities important to these experts. The data from the first part of this study will inform seed statements for a Canadian Delphi study to determine consensus on research priorities for Canadian sports chiropractors and will also provide an initial framework for planning a similar Inter-

national Delphi study. The second part of this project involves exploring investigative capacity in sports-focused chiropractic research and will be reported as a separate article.

Methods

Study design

We conducted a cross-sectional qualitative description study using semi-structured interviews of sports-focused chiropractic researchers and focus group interviews of organizational leaders of sports chiropractic in Canada. Qualitative description is a method that aims to acquire a rich description of the phenomenon under study, but is not used to develop substantive theory or explanations from the data.¹⁸ It is especially relevant in questionnaire development and in studies aiming to gain first-hand knowledge of professionals' experiences with a particular topic.¹⁹ Considering the aim of this study was to extract research priorities from sports chiropractic researchers and leaders to inform questionnaire development for a Delphi study, this study design was chosen.

Although semi-structured and focus groups interviews are independent data collection methods, the rationale for their combination is advantageous when seeking data completeness where each method reveals different parts of the phenomenon of interest (e.g., complementary views) and for pragmatic reasons.²⁰ To identify research themes and priorities to inform the development of seed statements for a Canadian Delphi study and to inform the planning of a similar international Delphi study, we sought to obtain a broad view of the contributors to the sports chiropractic research landscape, particularly in Canada. Recognizing that the research effort in a field of study can be influenced by the investigators conducting the research and decision-makers that govern a field's resources, we sought to obtain qualitative data from sports chiropractic researchers and decision-makers of sports chiropractic organizations in Canada, specifically members of the Boards of Directors of the RCCSS(C) and its Foundation. We did not seek to recruit clinicians for this study, as many sports chiropractic researchers and decision-makers also maintain a clinical practice or have previous clinical practice experience. We believe their viewpoints would also include the clinician's perspective.

Since researchers work in areas of specialization, oper-

ate with relative autonomy, and can be influenced by their regional research environment, we decided individual semi-structured interviews would best capture the unique views about research that these investigators would have in relation to the study's aim. In contrast, Boards of Directors of organizations are naturally occurring groups that engage in context-dependent group interactions to make collaborative decisions on issues of governance. Consequently, we felt that separate focus group interviews of the Boards of Directors of the RCCSS(C) and its Foundation would best capture the views of these groups on research themes and priorities.

This study received approval by the Canadian Memorial Chiropractic College (CMCC) Research Ethics Board (#1708E01, approval date 09/14/2017) prior to commencement. All participants signed a written informed consent form before the start of each semi-structured or focus group interview.

Participants and eligibility criteria

To be eligible as a participant for the semi-structured interview component of this study, participants had to be a registered chiropractor or a researcher who has either conducted, been a collaborator or supervisor of sports-focused chiropractic research, and who has also published at least one sports-focused research paper within the past 10 years. For the purpose of this study, sports-focused research was defined using the RCCSS(C) definition²¹ that states sports-focused research is "a field of research directly related or relevant to anyone involved in the sport, athletic, or exercise community. These topics may include but are not limited to the following: injuries, injury prevention, treatment, rehabilitation, biomechanics, performance, assessment metrics, nutrition, epidemiology, diagnostic imaging, emergency care, athletic event coverage, team travel, education, exercise physiology, and sport psychology."

For the semi-structured interviews, purposive and snowball sampling was used to identify sports chiropractic investigators that met our selection criteria and who would yield appropriate and useful information for the aim of this study.²² Recognizing that certain researcher characteristics can impact their opinions and viewpoints about research, we sought to interview researchers with different levels of experience, roles/position in research and from different geographical regions. As the aim of

this study was to extract a list of research themes and priorities to inform seed statements for a Canadian Delphi study and to provide preliminary insight for planning a future International Delphi study, we chose to weight our recruitment towards a Canadian sample, with the inclusion of at least one participant from North America (in addition to Canada), South America, Europe, Africa and Australasia.

Sports chiropractic researchers were identified by reviewing publication lists provided by the RCCSS(C), conducting literature searches of the PubMed and Index to Chiropractic Literature databases (see Appendix 1 for search strategy example), and by emailing editorial board members of peer-reviewed chiropractic journals who have conducted work in the sports chiropractic field for recommendations of sports chiropractic researchers. A three-step screening process was used to create a list of eligible sports chiropractic researchers to recruit for this study. Step one – the citations from the RCCSS(C) publication list and literature searches were reviewed to identify citations that met the RCCSS(C) definition²¹ of sports-focused research. Step two – author searches of these citations and of the researchers recommended by journal editorial board members were conducted using PubMed and Google to identify those who met the study's inclusion criteria. Step three – of the sports chiropractic researchers identified from step two, internet searches were conducted to identify their institutional affiliation, research role/position, geographical location, and number of sports-focused publications.

Once compiled, two of the investigators (AL and MB) reviewed this list and stratified these eligible sports chiropractic researchers based on number of publications, research experience, role/position in research, and geographical location. After reviewing these characteristics of the eligible participants, we sought to interview a minimum of one novice researcher, senior researcher, research chair, journal editorial board member, academic program director, and research administrator. The two investigators (AL and MB) who compiled this list met to decide which sports chiropractic researchers to invite to participate in a semi-structured interview based on these attributes. Once these minimums were met, the two investigators continued to meet to decide which researchers would yield appropriate and useful information for the aim of this study. At the completion of each interview,

each participant was asked if they could recommend other sports chiropractic researchers we should contact for this study. Individuals identified by snowball sampling were reviewed against the study's inclusion criteria and researcher characteristics of interest, and the research team decided whether to invite these individuals to participate.

For the focus group interviews, purposive sampling was conducted to identify organizational leaders of sports chiropractic in Canada by contacting board members of the RCCSS(C) and its Foundation. The RCCSS(C) is the governing and organizing body that coordinates the involvement of the Canadian chiropractic profession with amateur and professional athletic sport organizations. It provides post-graduate education to chiropractors to allow them to attain a Fellowship in chiropractic sports sciences and represents approximately 170 chiropractic sports fellows and residents.⁹ The Foundation for the RCCSS(C) is a fundraising organization that collaborates with the RCCSS(C) to fund education and scientific research in chiropractic sports healthcare.²³ To be eligible to participate in the focus group interviews, participants had to be an active member of the board of directors of either the RCCSS(C) or its Foundation.

Once individuals were identified by our sampling methods, all prospective participants were recruited by the principal author by email invitation. To provide an estimate of the sample size for this study, we analyzed our study's characteristics against the items theorized to impact the information power²⁴ of the data that we intended to gather (Appendix 2). We anticipated a sample size of approximately 20 to 30 participants. This is within the sampling range of a previous investigation that demonstrated data saturation occurring in as low as six to eight participants in homogenous samples, and up to 12 to 30 when looking for disconfirming evidence or trying to achieve maximum variation.²⁵

Research team and reflexivity

The interviews were conducted by two members of the research team (ADL – male, LD – female). At each interview, another member of the research team (MB or KS) attended the interview (in person, virtually, or by telephone) to take field notes. Both interviewers (ADL, LD) are practicing chiropractors, Fellows of the RCCSS(C) and are full-time faculty members at the Canadian Memorial Chiropractic College (CMCC). ADL has 13 years

of practice and research experience, and LD has 23 years. In the planning phases of this study, ADL and LD consulted with a senior qualitative researcher at their academic institution for guidance and advice. During the time of conducting the interviews, the field note takers (KS, MB) were a practicing chiropractor and fourth year clinical intern at CMCC, respectively.

Considering the sports chiropractic field is a relatively small field of study, pre-existing relationships within the field can exist. The interviewers, ADL and LD, are both involved in committee work with the RCCSS(C) and are actively involved in the sports-focused chiropractic research field. As a result, they have previous relationships with some of the participants who were interviewed. To mitigate any bias that may have occurred during the interviews, the interviewers regularly reiterated the study's aim and purpose, which was to extract research priorities from the interviews to develop seed statements for a future Delphi study to determine consensus on sports-focused research priorities for sports chiropractors. During the qualitative analysis, ADL and LD aimed to decrease their own bias by regularly meeting to reflect on their coding decisions in relation to the study's aim.

Data collection procedures

Setting and interviews

The semi-structured interviews were conducted in-person or remotely using the Skype Application (Skype Technologies, Microsoft, USA), dependent on the availability of the participants. At each interview, one of the lead authors (ADL or LD) conducted the interview, while another member of the research team (MB or KS) took field notes. The semi-structured interviews were audio-recorded using a digital audio recorder (SONY ICD-PX333 Digital Flash Voice Recorder) and Callnote audio recording software (Callnote, Kanda Software Inc., USA).

Two separate focus group interviews of the organizational leaders of sports chiropractic in Canada were conducted in-person: one for the Board of Directors of the RCCSS(C) and another for the Board of Directors of the Foundation for the RCCSS(C). These focus group interviews were conducted in a meeting room at the location of the RCCSS(C) Annual Board Meeting. Three members of the research team were present at both focus group interviews. The lead author (ADL) moderated the focus

group while LD and MB took field notes. The focus group interviews were audio-recorded using a digital audio recorder (SONY ICD-PX333 Digital Flash Voice Recorder) and Audacity audio recording software (Audacity, USA).

The development of the interview guide was informed by previous work that interviewed chiropractors with a sports-focused practice about sports chiropractic research priorities¹¹, and was distributed to members of the Research and Education Committee of the RCCSS(C) for their feedback related to the questions developed and their relevance to our research question. Prior to data collection, the interview guide was piloted in a mock focus group session involving a group of nine chiropractic clinical interns, and a pilot semi-structured interview was conducted with a research assistant. The same interview guide was used for both the focus group and semi-structured individual interviews. All participants were sent our interview guide (Appendix 3), a minimum of two days in advance of their interview, to provide them with the opportunity to familiarize themselves with the questions and to allow them to consider potential responses.

In addition to the interviews, the participant's age, sex, years of practice, clinical practice status, number of publications, academic positions, geographical location, and education were collected to characterize our sample.

Analysis

At the completion of each focus group and semi-structured interview, ADL and LD met to debrief the interview notes and review the interview recordings to determine if changes should be made to the interview guide and if any researchers suggested by snowball sampling should be considered for recruitment. Two members of the research team, MB and KS, transcribed all audio recordings verbatim with transcripts reviewed for accuracy by the lead author (ADL). All participant names were removed from the transcripts and replaced with unique identifiers. Each participant was sent their transcript for their review with instructions to make any edits or additions to the transcripts that they saw fit. Upon receiving the reviewed and edited transcripts from the participants, they were imported into NVivo™ software (QSR International Pty Ltd., Victoria, Australia) for qualitative analysis.

Qualitative analysis commenced after completing the interviews, with the two focus groups being analyzed first, to determine if changes to the interview guide was neces-

sary before conducting the semi-structured interviews. While it was the intention to analyze each semi-structured interview prior to conducting subsequent ones, to take advantage of opportunities to schedule interviews, the analysis of the semi-structured interviews was conducted after the majority were complete. The decision to stop recruiting participants for further interviews was determined when data saturation was reached, which was defined as the point where further data collection and analysis produced little or no change to the qualitative codes within the data.²⁵

A qualitative content analysis of the interview transcripts was conducted using an interpretivist perspective. The intention of an interpretivist approach is to describe and interpret, but not to develop a substantive theory. It is concerned with how people feel, respond and give meaning to their experiences.²⁶ Since we did not seek to develop theory from the data or compare and contrast the viewpoints of the participants, the semi-structured interviews of the researchers and focus-group interviews of the leaders were given equal weight in our analysis. The unit of analysis were the interview transcripts from each participant. Comparisons between the sports chiropractic researchers and leaders were not made as it was deemed to be beyond the scope of this study.

Two members of the research team (ADL and LD) coded the transcriptions independently using an inductive content analysis for both manifest and latent content, and regularly met for peer debriefing to discuss and resolve any coding discrepancies. Similar codes were sorted and collapsed together to create categories. Themes were abstracted from the codes and categories generated from the data with guidance from research categories utilized by previous chiropractic research prioritization studies.^{13,14} An audit trail of the coding and reflexive process was recorded throughout the analysis. The qualitative analysis and reporting of the data was guided by the consolidated criteria for reporting qualitative research.²⁷

Results

Participants

For the semi-structured interviews, 25 sports-focused chiropractic researchers were recruited (22 from purposive and 3 from snowball sampling) and 20 participated (80% response rate). Of those who declined participation,

Table 1.
Participant demographic characteristics

Number of participants	32
Age in years (mean ± SD)	47.4 ± 10
Sex (male/female)	25 (78%) / 7 (22%)
Average years of practice (mean ± SD)	20.1 ± 9.7
Number maintaining a clinical practice	25 (78%)
Number of publications (mean ± SD)	16.2 ± 23.4
Academic positions	
Faculty (adjunct or primary)	23 (72%)
Professor	18 (56%)
Lecturer/Tutor	7 (22%)
University affiliation	13 (41%)
Chiropractic academic institution affiliation	21 (66%)
Journal editor/editorial board	3 (9%)
Board/committee position in a chiropractic association	16 (50%)
Research chair	1 (3%)
Director of a research program	2 (6%)
Director or coordinator of an academic program	5 (16%)
Education	
Undergraduate	22 (69%)
DC	31 (97%)
Masters	18 (56%)
PhD	5 (16%)
PhD (candidate)	6 (19%)
Sports specialization fellowship/diplomate/degree	19 (59%)
Country	
Canada	21 (66%)
United States of America	4 (13%)
Australia	2 (6%)
Sweden	1 (3%)
Brazil	1 (3%)
England	1 (3%)
Germany	1 (3%)
South Africa	1 (3%)

four researchers reported a lack of time as the reason they could not participate, and one individual cited personal reasons to decline. For the focus groups, all 12 individuals recruited participated fully in the study (100% response rate). A total of 32 participants completed this study. The average interview durations for the semi-structured and focus group interviews were 56.87 and 52.55 minutes respectively. After analyzing the focus group interviews, it

was determined no changes were required to the interview guide prior to conducting the semi-structured interviews.

All participants reviewed and returned their transcripts to the research team, and 12 participants made minor revisions to clarify statements made in their interviews with no significant changes to the content. No new codes emerged from the data in semi-structured interview 17, only one new code was identified from interview 18, and interviews 19 and 20 did not yield any new codes. At this point, we determined further interviews were unlikely to generate any significant new codes and themes from the targeted population and recruitment was concluded.²⁵

Table 1 lists the demographic characteristics of our participants. Our sample had a larger proportion of males (78%), and there was large variability in the average years of practice and number of publications of our participants, demonstrating that participants had varying levels of experience. Most participants held faculty positions (72%), had affiliations with chiropractic academic institutions (66%), and maintained a clinical practice (78%). Nearly all participants were chiropractors (97%), and 59% had some form of sports specialization training. Of the participants, 29 (90%) reported having post-graduate research training (master's degree or higher). Reflective of our sampling strategy, our sample was comprised of 21 (66%) Canadians and 11 (34%) from other countries.

Identified research priorities and themes

A total of 150 individual research priorities were identified from our qualitative analysis and were categorized into three major themes: 1) area of research, 2) research actions and 3) research methodology. The area of research theme was used to categorize research priorities into topics of research to create sub-themes. Similar to previous research prioritization studies for the chiropractic profession^{13,14}, many of the research priorities could be categorized into the sub-themes: basic science and mechanism research, clinical research, and population health. A variety of research priorities emerged from the data that were related to health services research applied to the sport context. As a result, the sub-theme, health services research, was created for these priorities. Consistent with our previous work¹¹, research priorities were frequently identified about chiropractic research conducted in the sport setting, so the sub-theme chiropractic research in sport, was created for this reason. The remaining research

Table 2.
Number of segments of coded text attributed to each research theme

Major research themes and sub-themes	Segments of coded text
Area of research	1065
Clinical research	513
Chiropractic research in sport	243
Specific sports conditions and topics	126
Health services research	91
Basic science and mechanism research	72
Population health	20
Research actions	319
Collaboration in research	303
Contributing to the broader sports research effort	16
Research methodology	66

priorities in the area of research theme were related to specific conditions and topics in sports.

The research actions theme was created to capture research priorities that pertained to efforts related to conducting research. Considering there were a range of research priorities extracted related to research collaboration, the collaboration in research sub-theme was created. In the interview transcripts, many participants mentioned the importance of having sports chiropractors involved in collaborative research teams investigating large sports research topics, and many interviewees recommended that sports chiropractors should contribute to the overall sports research effort that is shared by all professionals working in sport. Consistent with these recommendations, we created the sub-theme contributing to the broader sports medicine research effort to capture these recommendations.

Lastly, the remaining research priorities were related to study design and methodological approaches to research, such as conducting systematic reviews and creating practice- and field-based research networks. These directives were grouped together to form the major theme, research methodology. Table 2 outlines the number of segments of coded text that were attributed to research priorities for each theme and subtheme. All research priorities identified are presented in Table 3 categorized into their respective themes along with supporting quotes.

Table 3.
Research themes and priorities with supporting quotes

Major theme: Area of research	
Basic Science and Mechanism Research	
Fields of Study <ul style="list-style-type: none"> > Biomechanics <ul style="list-style-type: none"> > Biomechanics of Injury > Sports Biomechanics > Cellular Biology & Physiology > Exercise Physiology > Nerve and Neurophysiology 	“We also need to do some basic science research, like, look at biomechanics for instance. Cause, it’s, it’s great getting results but you also want to see, you want to be able to explain why and how with the results that take place. So, doing some research in that area would be helpful.” (Focus Group 2, Participant 3)
Interventions <ul style="list-style-type: none"> > Acupuncture > Extremity Manipulative Therapy > Rehabilitation > Soft Tissue Therapy > Spinal Manipulative Therapy 	“I think the questions people have [are], the biological mechanisms associated with manual therapy, with manipulation specifically, how does spinal manipulation work? Both, in probably the sports chiropractic population as well as the non-sports chiropractic population...what happens when we do some type of manual intervention? Are there biomechanical effects? Are there neurophysiological effects? Or are there both, basically?” (Semi-structured Interview, Participant 5)
Clinical Research	
Consensus & Position Statements	“...I think the lowest hanging fruit on the tree is to get involved in some consensus statements, so whether that’s with CASEM [Canadian Academy of Sports and Exercise Medicine] or CPA [Canadian Physiotherapy Association] or CATA [Canadian Athletic Therapist’s Association] or somewhere else, or whether that’s just part of the concussion thing or exercise is medicine. There are groups that are already forming consensus, and we don’t necessarily have a chiro in the group. So, there’s probably some opportunities to be jumping in on some consensus statements, that in and of themselves, would be a collaboration.” (Focus Group 1, Participant 1)
Diagnosis Research <ul style="list-style-type: none"> > Clinical Prediction Rules > Functional Assessment > Orthopedic Assessment 	“...research into things like clinical prediction rules trying to put patients into categories where we can find the best treatment combination to get them the best outcomes. So, something that centers around being effective and efficient in getting to the problem quickly, and being able to address that effectively and efficiently.” (Semi-structured interview, participant 10) “...I think this idea of functional movement, the quality of movement and how do you move, I think that is wide open and should be a question that chiropractic, especially chiropractic sports researchers, might be asking.” (Semi-structured Interview, Participant 5) “And obviously diagnostic skills as well, so if we look at our you know, if we were looking at certain clinical tests, what tests are most specific and sensitive in terms of picking up a condition that can help with our overall diagnostic abilities?” (Semi-structured interview, Participant 3)
Epidemiology <ul style="list-style-type: none"> > Injury Incidence & Surveillance 	“...you’d gather as much data as you can on baseline demographics, previous health history and then you can follow them over time to see who develops certain injuries, and you can compare those who didn’t develop the injury to those who did or those who were exposed to an injury and those who weren’t. You know, we could look at risk factors or you can follow a group of people with certain types of injuries and follow them over time to see who gets better compared to those who don’t, compare baseline demographics. We call those prognostic factors.” (Semi-structured Interview, Participant 9)
Guidelines & Evidence-based Care Pathways	“...clinical guidelines is a very good way, maybe, to try to produce, uh, I think if, if that’s supposed to be like a kind of a research directive to producing clinical guidelines, I think that’s, that’s one way forward actually.” (Semi-structured Interview, Participant 12)
Intervention & Clinical Efficacy <ul style="list-style-type: none"> > Comparative Effectiveness Studies > Intervention Effects on Specific Outcomes <ul style="list-style-type: none"> > Performance > Recovery > Return to Play > Intervention Profile <ul style="list-style-type: none"> > Treatment Safety > Treatment Timing & Dosage > Specific Interventions <ul style="list-style-type: none"> > Acupuncture > Manipulative Therapy – Extremity > Manipulative Therapy – Spinal > Mobilization Therapy – Extremity > Mobilization Therapy – Spinal > Modalities <ul style="list-style-type: none"> > Laser > Microcurrent > Ultrasound > Vibration Therapy > Neural Mobilization > Nutrition > Patient Counselling and Patient Education > Rehabilitation & Exercise > Soft Tissue Therapy > Supportive Devices & Taping > Treatment Approaches <ul style="list-style-type: none"> > Functional Treatment Approach > Multi-modal Interventions 	“First, we need to compare the effectiveness of a treatment, then show that the treatment is safe, and then assess its cost-effectiveness. It seems to me that you can sell this to third party payers, governments, etc. if you can prove that we firstly work, two – that it does no harm, and then three – it’s cheaper than the next option.” (Semi-structured Interview, Participant 8) “I’ll break it down into three areas. The first one is outcomes-based research on actual treatments, secondarily – outcomes-based research on prevention, and thirdly – on performance or performance enhancement.” (Semi-structured Interview, Participant 8) “I think return to play in general is an important area where we can definitely get more involved and should get ourselves more involved inter-professionally, because typically it’s a team of people helping bring that person back to play.” (Focus Group 1, Participant 6) “Should we adjust before performance? ...when is the best time to do soft tissue treatment? Is it a day before? Is it an hour before? Is it 5 minutes before? That’s stuff I think that can be pertinent for clinical practice. When within somebody’s periodization of training should we focus on more soft tissue work versus fine tuning? When’s the best place to put rehab? That’s probably quite a big topic, but clinically it might help.” (Focus Group 1, Participant 2) “...so we need to look at, you know, both indicators and contraindications to doing manipulation and extremity manipulation. Also, and then, what the effect of those are...if there is a dose response.” (Semi-structured Interview, Participant 11) “Most of the sports chiropractors that I know, most of them do some form of myofascial release, whether its active release or what have you, and they’ll do some type of instrument-assisted soft tissue mobilization or IASTM, whether it’s Graston® or FAKTR®, whatever other named technique, to me there is still so little efficacy research in those areas, in particularly when applied to sports injuries. So, to me, that’s [what] I think a lot of where the exploration could be going.” (Semi-structured Interview, Participant 7) “The second part would be what we call the multimodal effect...systematic review on multimodal effect of chiropractic on different conditions, which is what we do. We do adjusting, we do soft tissue, we do rehab, all of that together; and looking at that to see if all of that we do, does it affect the performance?” (Semi-structured Interview, Participant 2)

<p>Prognosis Research</p> <ul style="list-style-type: none"> ➤ Illness Prevention ➤ Injury Prevention ➤ Risk Factors 	<p>“I would look at risk or prognosis research. We could look at the determinants of sports injuries.” (Semi-structured Interview, Participant 9)</p> <p>“...this holy grail with the injury prevention, it may be possible, it may not be possible, but I think that’s gonna be, or that will continue to be one of the major, or the hottest topic in sports medicine. Can we identify players pre-season, during the season, that are more likely to get injured and can we intervene early?” (Semi-structured Interview, Participant 17)</p>
<p>Research & Development of Outcome Measures</p>	<p>“...I we may need to develop valid and reliable outcome measures which are specific to our research needs if they don’t already exist, 2) that the needs of outcome measures may be different from a research perspective compared to the needs of a field doc.” (Semi-structured Interview, Participant 1)</p>
<p>Health Services Research</p>	
<p>Athletic Field Services</p> <ul style="list-style-type: none"> ➤ Multi-sport Games ➤ Pre-participation Physicals/Examination ➤ Team Care & Travel with Athletes 	<p>“What we can and can’t do on the field and where we have to then...look at other professions for help.” (Focus Group 2, Participant 3)</p> <p>“I think researching into utilization rates in using chiropractors as emergency care or field care and then looking into what is our duties, what does our practice entail, what do we cover, what do we don’t?” (Semi-structured Interview, Participant 2)</p>
<p>Cost-effectiveness</p>	<p>“... is it cost-effective to see a chiropractor versus another practitioner? Because a lot of athletes are, you know, don’t have a lot of funding, so...do we do things faster, more efficient, that is better for their pocket book?” (Focus group 1, Participant 4)</p> <p>“...one thing could be, looking into, is this actually economically feasible for society? ...looking into health economics maybe? If we could prove that what we do, whatever that is I’m still not clear on it as a chiropractor, but what we do actually is more cost effective than something else, maybe that could be a part of an opportunity for chiropractic researchers in sport.” (Semi-structured Interview, Participant 12)</p>
<p>Interprofessional Dynamics</p>	<p>“...understanding the dynamics within the sports fraternity and how to interdigitate with that best.” (Semi-structured Interview, Participant 10)</p>
<p>Knowledge Translation</p>	<p>“...if we would have best evidence constantly updated, treatment algorithms for the most common treatments for the most common conditions, I think it would definitely be beneficial for the field practitioner.” (Semi-structured Interview, Participant 17)</p> <p>“...I think another thing could be to actually inform practitioners how to actually interpret research findings and how these can actually be used in clinical practice.” (Semi-structured Interview, Participant 12)</p>
<p>Sports Healthcare Teams</p>	<p>“...from a point of view of working with others, I think research into factors that enable or disable effective teamwork within a sports-sanctioned environment, that would enable best delivery of care to the patient...” (Semi-structured Interview, Participant 10)</p>
<p>Utilization of Sports Healthcare Services</p>	<p>“...how to collaborate with other health practitioners, so whether that be sport physios, ATs [athletic therapists], how to do the utilization of all us together...on the field, or whatever that might be.” (Focus Group 1, Participant 4)</p> <p>“...if you got the data as to what they were presenting with, how many times they came in to that environment, how many times, you know, what that was utilized, that would be increasing our capacity and capabilities within the profession.” (Semi-structured Interview, Subject 7)</p>
<p>Population Health</p>	
<p>Physical Activity</p> <ul style="list-style-type: none"> ➤ Exercise Is Medicine 	<p>“...with physical activity levels and population health, then we need to look at the exercise is medicine and physical activity levels of our patients and how to get better knowledge translations to practitioners so that they’re also making that part of their patient care”. (Focus Group 1, Participant 6)</p>
<p>Public Awareness & Education</p>	<p>“...I think around patient education and now we’re getting into things around consensus statements and public awareness campaigns...” (Semi-structured Interview, Participant 1)</p>
<p>Special Populations</p> <ul style="list-style-type: none"> ➤ Elite Athletes ➤ Masters Level Athletes ➤ Pediatric Athletes 	<p>“We need to look at populations of athletes, we need to look at the mature athlete, as well as injury rates in younger athletes as well as adults.” (Semi-structured Interview, Participant 8)</p>
<p>Specific Conditions and Topics in Sport</p> <ul style="list-style-type: none"> ➤ Ankle Sprains ➤ Anterior Cruciate Ligament & Knee Ligament Injuries ➤ Athletic Pubalgia ➤ Concussion ➤ Extremities in General ➤ FIFA Injury Prevention Program ➤ Hamstrings Strain ➤ Labral Injuries, Hip ➤ Lateral Epicondylitis ➤ Lisfranc Injuries ➤ Low Back Pain ➤ Meniscus, Knee ➤ Metacarpal Injuries ➤ Neck Pain ➤ Neuropathies ➤ Osteoarthritis ➤ Patellofemoral Pain Syndrome ➤ Pectoralis Tears ➤ Plantar Fasciitis ➤ Platelet-Rich Plasma Injection Therapy ➤ Rotator Cuff ➤ SLAP Injuries ➤ Soft Tissue Injuries & Myofascial Pain ➤ Spondylolysis ➤ Sports Psychology ➤ Sprains & Strains – General ➤ Tendinopathy ➤ Thoracic Pain ➤ Turf Toe 	<p>“We should look at what the bigger picture is in sports medicine, the delivery of sports medical care, where is it all going and we should target our research to be relevant in that area.” (Semi-structured Interview, Participant 15)</p> <p>“Being a part of the sports medicine community is what we want to do um, rather than just prove ourselves. And, essentially, you get to prove yourself through being a part of the community rather than the other way around trying to be a part of the community by proving yourself.” (Semi-structured Interview, Participant 6)</p> <p>“...research related to concussion, it’s a hot topic...and this will help demonstrate our role in the assessment and management of concussion. It’s a huge opportunity for us to participate in interdisciplinary research.” (Focus Group 2, Participant 2)</p> <p>“...to me, chiropractors need to have a seat at the table when it comes to research on those topics...whether it’s just advancing conservative management of those topics, like an example would be something like ACL tears.” (Semi-structured Interview, Participant 7)</p> <p>“...big topics, probably sprain, strain, the ankle sprain is one of the one[s] in all of our own sports [practices] and that’s also another one to look at with the chiropractic care of that.” (Semi-structured Interview, Participant 2)</p> <p>“...hamstring injuries, soft tissue-based, number one occurring soft tissue injury, number one occurring ligamentous injury – in the ankle and in other joints. I’d say start with patellofemoral pain, go to meniscal injury. In the shoulder, I’d say have a look at rotator cuff and impingement syndromes. Many of the really common presentations of these conditions now have recently had a lot of bad PR [public relations] when it comes to both medication and surgeries, and so if we begin to provide evidence-based alternatives that are multimodal in nature, the treatments that is, I suspect that we will stack up quite favorably, if we can.” (Semi-structured Interview, Participant 8)</p> <p>“...if you talk hot topics, I would say labrum, a big one – rotator cuff...throwing injuries and I mean you, I feel like any of these, the chiropractic’s perspective should be there.” (Semi-structured Interview, Participant 1)</p>

Chiropractic Research in Sport	
Comparing Sports Chiropractors to Other Practitioners	<p>“...if we are able to show comparative studies, like that which don't bring it down to this adjustment caused this, but the chiropractic model of care introduced into a multidisciplinary setting improves outcomes, I think that's valuable.” (Semi-structured Interview, Participant 6)</p> <p>“...something along the lines of a job analysis, I think would be critically important to get done again, and seeing an in-depth level what do sports chiropractors do? You know, is that different from what regular chiropractors do? And, if so, how is it different? And then, also looking at how is what sports chiropractors do, how is it different from what other therapists or specialists who see athletes and work with athletes, how does, how is that different?” (Semi-structured Interview, Participant 7)</p>
Competency of Sports Chiropractors	<p>“Well, I think that we have to be able to show that we have certain competencies. This is important.” (Semi-structured Interview, Participant 8)</p> <p>“Well, I guess fundamentally, the first thing that I think that needs to be understood is what makes a sports chiropractor, and so defining the characteristics of what chiropractic sports training entails would be important. I would suggest that understanding the scope of what chiropractors do in sports care is important.” (Semi-structured Interview, Participant 13)</p>
Historical Research in the Sports Chiropractic Field	<p>“...maybe historical aspects of things, and who the chiros were in charge, like Dr. XXXXX, others who were in charge of major [and] minor games,...how they managed and what happened.” (Semi-structured Interview, Participant 2)</p>
Integration of Sports Chiropractic Into Healthcare Teams	<p>“...just getting on the field requires some cultural authority, and to do that you need to prove there is a value for chiropractors being with a team, being on the field, being at major games. We have established that to a great extent, but it's not universal, so building the case for chiropractic to be included in the healthcare teams is the direction.” (Focus Group 2, Participant 4)</p> <p>“...showing the impact of chiropractors within the multi-disciplinary team, I think is an important part of the research, which helps get chiropractors sideline, helps them integrate into that setting. So, rather than anything specifically technique based... setting-specific research that talks about interaction, and a lot of that is going to be more qualitative-type research rather than quantitative, that have chiropractors interact within that environment.” (Semi-structured Interview, Participant 6)</p>
Perception of Sports Chiropractic	<p>“We need to start simple here and ask the public about their knowledge on what is it we do as sports specialist chiropractors and identify knowledge gaps and issues with our public perceptions.” (Semi-structured Interview, Participant 3)</p>
Research Supporting the Strategic Planning For Sports Chiropractic	<p>“...it's just a matter of having organizational meetings, focus groups, think tank sessions so that we can share opportunities, ideas, and have some strategic planning.” (Focus Group 2, Participant 2)</p>
Self-analysis Studies of the Sports Chiropractic Field	<p>“...we need to document the scope of activities that we perform from in field, in clinic, at games triage all the way through to treatment in all those arenas, to the advice we give and our supporting therapies. We need to document the whole lot. Therefore, some of the research we need to perform is the documentation of sports chiropractic activity in each of these domains” (Semi-structured Interview, Participant 8)</p>
Sports Chiropractors as Diagnosticians	<p>“...and then probably on the diagnosis capacity of the sports chiropractor. I'm not sure how we could do that, but maybe kind of an inter-reliability [study], uh, on diagnosis and compare us with others because that would be pretty hard, but maybe to see that we are consistent with our diagnosis and that we can be accurate. I don't think that this is emphasized enough on [in] the field. (Semi-structured Interview, Participant 20)</p>
Surveillance of Professional Activity in Sports Chiropractic	<p>“...it would be nice as far as field work goes for us to actually get some numbers of how many sports chiropractors are actually doing field work, and how we're represented in the field work.” (Focus Group 1, Participant 2)</p> <p>“...what we do as sport chiropractors...where we are treating, what teams we're affiliated with, what are the stats of our utilization rates.” (Sem-structured Interview, Participant 3)</p>
Understanding the Sports Chiropractic Patient	<p>“...chiropractors need to take a step back and think about what is important for the patient, in this case the athlete... so taking away preconceived ideas of how we can best help the patient and replace that with what does the patient actually need and can we fulfill that need in a way that benefits the patient.” (Semi-structured Interview, Participant 10)</p> <p>“...often the practitioner will say well this is what you need without necessarily completely listening to what the athlete has to say...that sort of common ground needs to be nurtured more and perhaps investigated as a source for research questions as oppose to us trying to predict what the athlete may or may not want.” (Semi-structured Interview, Participant 10)</p>
Utilization of Sports Chiropractic Services	<p>“Utilization, I guess. What the athletes are looking for, what the athletes want. Are the athletes seeking out sports chiropractic? Is that communication happening to the outside organization, the sporting organizations? Is that something that's even wanted by the public? So coming into a sport, organizing it from a sports standpoint, are the athletes and the organizations looking to have sports chiropractic represented?” (Focus Group 1, Participant 3)</p>
Major theme: Research actions	
Collaboration In Research	
Funding Agencies	<p>“...the next steps for your group would be to compare your research perspectives and priorities to those of the provincial and national federal funding agencies. They're the ones with the dollars. Everyone is chasing them, although the success rates are very low, you have to get into the process even though the sharks are there. You have to get into the water with them, because that's where the credibility is and the big bucks are. Without the big bucks you won't go very far.” (Semi-structured Interview, Participant 18)</p>
Industry	<p>“...you then have to partner up with the universities, and also the private enterprise groups within the profession to say, 'well who's truly about evidence here and who wants to promote this', because it's not going to get done with unicorns and prayers. It's going to need money and it's got to come from somewhere. Academics can help get there, but largely speaking, you know, the response rate on grants is abysmal in general chiro and in the sports chiropractic field it's going to be even worse than just spinal chiropractic.” (Semi-structured Interview, Participant 8)</p>
Interinstitutional <ul style="list-style-type: none"> ➤ Chiropractic Educational Institutions ➤ Universities 	<p>“...accessibility to academic institutions or to fellows with Masters or PhDs in institutions that we can collaborate with. ...to have the team to be able to support the research, whether it's lab focused, whether it's the statisticians, whether it's the research assistants, to help the accessibility to that type of support staff.” (Focus Group 1, Participant 2)</p>

<p>Interprofessional</p> <ul style="list-style-type: none"> > Individual Professions <ul style="list-style-type: none"> > Athletic Therapists > Biomechanists > Cardiologists > Dentists > Exercise Physiologists > Kinesiologists > Neurologists > Orthopedic Surgeons > Physiatrists > Physicians (General) > Physiotherapists > Psychologists > Pulmonologists > Registered Massage Therapists > Sports Physicians > Professional Organizations <ul style="list-style-type: none"> > American College of Sports Medicine > Canadian Academy of Sport and Exercise Medicine > Canadian Athletic Therapists Association > Canadian Physiotherapy Association > Canadian Society of Exercise Physiologists > Canadian Sport Massage Therapists Association > Sports Physiotherapy Canada 	<p><i>“Research should focus on interdisciplinary relations. Uh, collaboration between chiropractic and all the other health professionals, especially, medical specialties.” (Focus Group 2, Participant 2)</i></p> <p><i>“...do we want to partner with Sports Physiotherapy Canada or CASEM [Canadian Academy of Sports and Exercise Medicine] in terms of getting some of their authors and some of their personnel in our studies, so that collectively we’re working towards a bigger picture?” (Semi-structured Interview, Participant 3)</i></p> <p><i>“...you have to be more cross disciplinary, more inter-disciplinary. You have to engage with many other professions, and many other researchers.” (Semi-structured Interview, Participant 18)</i></p> <p><i>“...build a group of people from within that have, you know, the advanced degrees and have, have a drive to actually chase questions related to sports and chiropractic. From there, then you can start to build these collaborative networks of individuals with, ...multidisciplinary backgrounds,... including PTs, ..sports med docs...other individuals into the team, because when you get the collaborative network together, then the group productivity, that actually is a lot greater than just the productivity of the individual person.” (Semi-structured Interview, Participant 4)</i></p>
<p>Intra-professional</p> <ul style="list-style-type: none"> > Canadian Chiropractic Research Foundation – Research Chairs > Chiropractic Associations > Chiropractic Specialty Colleges > Chiropractic Organizations > Sports Chiropractic Associations > Sports Residents 	<p><i>“I think that we want to look in a few areas for collaboration because I think we can definitely start by collaborating intra-professionally, so looking at some of our other specialties, like collaborating with our clinical specialists and radiology specialists, and the other specialties in Canada” (Focus Group 1, Participant 6)</i></p>
<p>Leading Experts in A Field</p>	<p><i>“...before you start any project you need to identify the experts in that area. I think that if you let the profession that, what you know, the letters behind their name define expertise, you are making a mistake. So...for example, we do some concussion research. We identified world leaders in that domain and then we just reach out to them and see if we have any common interest for a project or a proposed project that we think their expertise could help us with.” (Semi-structured Interview, Participant 16)</i></p>
<p>Sports Community</p> <ul style="list-style-type: none"> > Coaches > Non-profit Organizations > Specialized Sports Training & Development Centres (eg. Olympic Training Centres, Canadian Sports Centres) > Sports Organizations, Federations & Associations > Sports Teams and Clubs 	<p><i>“I think collaborating also with coaches and national sporting organizations. So, like where are the athletes and can we tap into their resources to do research from those institutions, like out in Calgary and Olympic teams, things like that.” (Focus Group 1, Participant 5)</i></p>
<p>Contributing to the Broader Sports Research Effort</p>	
<p>Contributing to the Broader Sports Research Effort</p>	<p><i>“...we should look at what the bigger picture is in sports medicine, the delivery of sports medical care, where is it all going, and we should target our research to be relevant in that area.” (Semi-structured Interview, Participant 15)</i></p> <p><i>“...trying to find this direction where we show that we are contributing to the sports medicine community rather than just trying to prop up the profession...” (Semi-structured Interview, Participant 6)</i></p>
<p>Major theme: Research methodology</p>	
<ul style="list-style-type: none"> > Cohort Studies > Descriptive Studies > Multi-centre Research > Multivariate Research > Practice- and Field-based Research Networks > Qualitative Research > Randomized Clinical Trials > Survey Research > Systematic Reviews & Meta-analysis 	<p><i>“I think we need to set up practice-based research networks at the ‘country’ level and at the ‘international’ level. This is possible now because of the interest and because of the advancement in computing power.” (Semi-structured Interview, Participant 8)</i></p> <p><i>“...we need to be able to deliver a platform for field practitioners to translate their experience into research. So, we have, we seem to have our researchers over in one corner and our field practitioners over in the other corner, and the researchers say, ‘gee it would be nice to get out and get some data from, you know, sporting events and what we do’ and the sports practitioners saying, ‘gee it would be nice to covert what I do into some research.’ And they are not talking.” (Semi-structured Interview, Participant 6)</i></p> <p><i>“Randomized clinical trials, it’s very important for us. Ideally we should do RCTs with some follow up or mixing RCT with cohort studies, so we can not only see the immediate effects of whatever we are testing, but if that [effect] lasts long or not.” (Semi-structured Interview, Participant 14)</i></p>

Discussion

To our knowledge, this is the first qualitative study that investigated the opinions of sports chiropractic researchers and leaders about sports-focused research priorities. Our study extracted a list of 150 research priorities categorized into three major research themes, 1) areas of research with six sub-themes with each representing a separate topic area of research, 2) research actions with two sub-themes, and 3) research methodology. In this present study, we interviewed 21 participants from Canada, and 11 from seven other countries. We purposefully interviewed participants from countries other than Canada, to provide a broader international perspective on identifying research priorities. Future studies can utilize these research priorities in a Delphi process to inform a research agenda for sports chiropractors.

Consistent with our previous work, sports chiropractors believed that research advancement in their field should include sports-specific research priorities.¹¹ This present study extracted research topics that are unique to sports-focused research that have not been identified as priorities by previous chiropractic research agenda studies.^{13,14} This is evidenced by the research themes chiropractic research in sport, specific conditions and topics in sport, and contributing to the broader sports research effort, that emerged from our qualitative analysis. Interestingly, the former research theme is primarily focused on research specific to chiropractic, and the two latter themes refer to general sports research not exclusive to the chiropractic profession. There have been arguments amongst experts about what constitutes sports chiropractic research. Is it research about the chiropractic profession and its clinical methods applied to sport, and does it also include sports research unrelated to the chiropractic profession conducted by chiropractors? Our identification of the two themes – specific conditions and topics in sport and contributing to the broader sports research effort – provides evidence that sports chiropractic researchers and leaders consider the contribution of their members to the broader sports research effort a component of research that should be conducted by sports chiropractors. Also, given that sports healthcare teams are often inter-disciplinary, some of the experts interviewed made mention of the importance of having sports chiropractors on multi-disciplinary research teams investigating key sports healthcare research topics, such as concussion. Given these findings,

we propose utilizing the term “sports-focused research for chiropractors” as a more encompassing label of the research effort that is conducted by sports chiropractors instead of the term “sports chiropractic research”. This distinction may help provide a broader framework for understanding sports chiropractors and their contributions to research.

While some of the areas of research identified were broad and general, such as basic science and mechanism research and clinical research, the sport-specific focus of the research priorities identified was observed within all research themes. For example, the study of biomechanics was often discussed applied to the sports setting and in the prevention of sports injuries. Also, the study of various interventions, such as spinal manipulative therapy, soft tissue therapy and extremity manipulative therapy was often discussed in relation to outcomes of sports performance, return to play and recovery. Additionally, within the theme of population health, research priorities identified were specific to certain athletic populations, such as the study of elite, masters-level and pediatric athletes.

Similarly, while the theme collaboration in research was identified in previous studies investigating research priorities for the general chiropractic profession^{13,14}, many research collaborations identified in our study were specific to the sport context. Collaborations amongst different sports healthcare providers and their respective member organizations were identified, such as sports medicine physicians, orthopedic surgeons, sports physiotherapists, sports massage therapists and athletic trainers to name a few. Also, collaborations with the sports community (sports organizations, coaches and athletes) were identified as an important partnership integral to advancing the sports-focused research effort. In addition to sport-specific collaborations, many of our interviewees made mention of the importance of collaborating with academic institutions, such as universities, and intra-professionally with chiropractic researchers and chiropractic educational institutions.

In addition to identifying research topics unique to sport and sports chiropractic, the extracted priorities also identified research topics that were common to previously published chiropractic Delphi studies investigating research priorities.^{13,14} Similar themes across these studies include basic sciences, clinical, and population health re-

search. Overlapping sub-themes, such as dose-response and safety of spinal manipulative therapy were also identified.^{13,14} It is not surprising the sports chiropractic field share common research priorities with the general chiropractic profession, as some areas of research (e.g., treatment safety) has applicability to the entire profession, including its sub-disciplines. We believe it is important to identify areas of overlapping priorities in general and sports-focused chiropractic research, as collaborative research efforts involving these common research topics could improve investigative capacity within these priority areas.

Limitations and future directions

The limitations of this present study include the possibility of sampling and responder bias. We used purposive sampling to identify chiropractic researchers and leaders; however, it is possible that we may have missed identifying key experts. Additionally, depending on the availability and geographical locations of the interviewees, we used three different interviewing mediums (online via Skype, in-person and telephone) to conduct the individual semi-structured interviews. Recent studies comparing features of qualitative datasets generated from in-person and online interviews have found modest differences in the amount of data provided by participants, but very little difference in the thematic content of responses.^{28,29} Mixed evidence has also been reported of an “online disinhibition effect” during online interviewing, where participants may be more likely to express socially unsanctioned or highly personal opinions or behavior in online settings.³⁰ For the present study, online and telephone interviewing were conducted to deal with the geographical dispersion and preferences of the researchers we sought to interview. It is possible that the different interviewing modes may have impacted the data collected. However, given the results of previous studies^{28,29} comparing online versus in-person interview methods, we suspect this had minimal impact on our overall analysis.

Another limitation is our study was weighted toward a North American sample (66% and 13% of participants were from Canada and the United States of America, respectively). Our results should be interpreted with this bias in mind. While we are confident that we reached data saturation during the coding process, it is unknown whether a random sample of experts or the inclusion of

more sports chiropractic experts from different countries would yield different results in our qualitative analysis. Also, despite our attempts to focus on the study’s aim and limit our own biases, with the nature of qualitative analysis, it is possible that the data interpretation may have yielded different results if analyzed from a different perspective.

Future research can utilize the results of this study to inform the development of seed statements for research prioritization Delphi studies. To minimize the regional bias of our results, we recommend that future Delphi studies revise these research priorities in consultation with regional experts prior to conducting the Delphi process. Also, participants of the Delphi panel can be given the opportunity to suggest additional research priorities on the first round Delphi questionnaire. In the present study, we did not make any comparisons in the qualitative data between participants from different regions or between those holding different roles (e.g., researcher or organizational leaders) as it was determined to be beyond the scope of this study. It is possible contrasting opinions may exist. Future qualitative studies can be conducted to explore this topic, and subgroup analyses from Delphi studies can be conducted to explore regional or role differences in research priorities.

Conclusions

To the authors’ knowledge, this is the first qualitative study that investigated the opinions of sports chiropractic researchers from eight countries in the world and Canadian sports chiropractic organization leaders about sports-focused research priorities for chiropractors. This study identified 150 individual research priorities and three major research themes. The majority of research priorities identified were unique to the sports context. In addition to extracting research priorities that were specific to the chiropractic profession, the experts interviewed emphasized the importance of having sports chiropractors collaborate and contribute to the broader sports research effort that is shared by all professionals working in the sports community. The research priorities identified in this study can be utilized by researchers, sports chiropractic organizations and academic institutions to plan future research prioritization studies to inform a research agenda for the sports chiropractic field.

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Appendix 1.
Search strategy example

PubMed searches

- (((Bursitis) OR “Bursitis”[Mesh])) AND (((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh])))
- (((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))) AND ((hockey) OR “Hockey”[Mesh])
- (((“Baseball”[Mesh] OR baseball)) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh])))
- (((“Soccer”[Mesh] OR soccer)) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh])))
- (((running) OR “Running”[Mesh])) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (((“Football”[Mesh] OR football)) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh])))
- (((rugby) OR “Football”[Mesh])) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (sprint*) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (((“Tennis”[Mesh] OR tennis)) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh])))
- ((((((“Martial Arts”[Mesh] OR Martial arts) OR taekwondo) OR karate) OR Judo)) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh])))
- (((Cycling) OR “Bicycling”[Mesh] OR bicycling)) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (((swimm*) OR “Swimming”[Mesh])) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (((endurance) OR “Physical Endurance”[Mesh])) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (((Basketball) OR “Basketball”[Mesh])) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (((skiing) OR “Skiing”[Mesh])) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (snowboarding) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (((gymnastics) OR “Gymnastics”[Mesh])) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (((Danc*) OR “Dancing”[Mesh])) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (Rowing) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (((“Racquet Sports”[Mesh] OR Lacrosse)) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh])))
- (speed skating) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (Figure skating) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (((track and field)) OR (“Track and Field”[Mesh])) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))

- (triathl*) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (((Diving) OR “Diving”[Mesh])) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- ((((((squash) OR Lacrosse) OR “Racquet Sports”[Mesh]) OR Badminton OR Tennis))) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (Luge) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (bobsled) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (((“Wrestling”[Mesh] OR Wrestl*)) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (motorcross) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (((“Volleyball”[Mesh] OR volleyball)) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (archery) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (((boxing) OR “Boxing”[Mesh])) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (kayaking) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (Canoeing) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (((golf) OR “Golf”[Mesh])) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (((menisc* AND injury) OR (“Meniscus”[Mesh] OR “Tibial Meniscus Injuries”[Mesh] OR “Menisci, Tibial”[Mesh])) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (((“Triangular Fibrocartilage”[Mesh] OR triangular fibrocartilage complex)) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (((prp injection) OR platelet rich plasma therapy)) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (((graston technique) OR instrument assisted soft tissue)) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (((ART) OR active release technique)) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (((“Therapy, Soft Tissue”[Mesh] OR soft tissue therapy)) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (((tendon injury) OR “Tendon Injuries”[Mesh])) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (((Tendinopathy) OR “Tendinopathy”[Mesh])) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (((concussion) OR (“Brain Concussion”[Mesh] OR “Post-Concussion Syndrome”[Mesh]))) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (((“Anterior Cruciate Ligament”[Mesh] OR “Anterior Cruciate Ligament Injuries”[Mesh] OR “Anterior Cruciate Ligament Reconstruction”[Mesh])) OR anterior cruciate ligament)) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (((“Posterior Cruciate Ligament”[Mesh] OR “Posterior Cruciate Ligament Reconstruction”[Mesh])) OR Posterior cruciate ligament)) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (((medial collateral ligament) OR “Medial Collateral Ligament, Knee”[Mesh])) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))
- (lateral collateral ligament knee) AND ((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh]))

- (((("Rotator Cuff"[Mesh] OR "Rotator Cuff Injuries"[Mesh] OR "Shoulder Impingement Syndrome"[Mesh])) OR rotator cuff)) AND ((chiropract*) OR ("Chiropractic"[Mesh] OR "Manipulation, Chiropractic"[Mesh]))
- (((patellofemoral pain syndrome) OR "Patellofemoral Pain Syndrome"[Mesh])) AND ((chiropract*) OR ("Chiropractic"[Mesh] OR "Manipulation, Chiropractic"[Mesh]))
- (((stress fracture) OR "Fractures, Stress"[Mesh])) AND ((chiropract*) OR ("Chiropractic"[Mesh] OR "Manipulation, Chiropractic"[Mesh]))
- (((fracture) OR ("Fracture Healing"[Mesh] OR "Fractures, Bone"[Mesh]))) AND ((chiropract*) OR ("Chiropractic"[Mesh] OR "Manipulation, Chiropractic"[Mesh]))
- (((tennis elbow) OR "Tennis Elbow"[Mesh])) AND ((chiropract*) OR ("Chiropractic"[Mesh] OR "Manipulation, Chiropractic"[Mesh]))
- (((golfers elbow) OR "Elbow Tendinopathy"[Mesh])) AND ((chiropract*) OR ("Chiropractic"[Mesh] OR "Manipulation, Chiropractic"[Mesh]))
- (little league shoulder) AND ((chiropract*) OR ("Chiropractic"[Mesh] OR "Manipulation, Chiropractic"[Mesh]))
- (little league elbow) AND ((chiropract*) OR ("Chiropractic"[Mesh] OR "Manipulation, Chiropractic"[Mesh]))
- (scapular dyskinesis) AND ((chiropract*) OR ("Chiropractic"[Mesh] OR "Manipulation, Chiropractic"[Mesh]))
- (((("Hamstring Muscles"[Mesh] OR "Hamstring Tendons"[Mesh])) OR hamstring strain)) AND ((chiropract*) OR ("Chiropractic"[Mesh] OR "Manipulation, Chiropractic"[Mesh]))
- (((ankle sprain) OR "Ankle Injuries"[Mesh])) AND ((chiropract*) OR ("Chiropractic"[Mesh] OR "Manipulation, Chiropractic"[Mesh]))
- (((exercise-related transient abdominal pain) OR runners stitch)) AND ((chiropract*) OR ("Chiropractic"[Mesh] OR "Manipulation, Chiropractic"[Mesh]))
- (athletic pubalgia) AND ((chiropract*) OR ("Chiropractic"[Mesh] OR "Manipulation, Chiropractic"[Mesh]))
- (((femoroacetabular impingement) OR "Femoroacetabular Impingement"[Mesh])) AND ((chiropract*) OR ("Chiropractic"[Mesh] OR "Manipulation, Chiropractic"[Mesh]))
- (((labral tear) OR labral injury) OR "Rotator Cuff Injuries"[Mesh])) AND ((chiropract*) OR ("Chiropractic"[Mesh] OR "Manipulation, Chiropractic"[Mesh]))
- (((shoulder dislocation) OR "Shoulder Dislocation"[Mesh])) AND ((chiropract*) OR ("Chiropractic"[Mesh] OR "Manipulation, Chiropractic"[Mesh]))
- (((acromioclavicular joint injuries) OR "Acromioclavicular Joint"[Mesh])) AND ((chiropract*) OR ("Chiropractic"[Mesh] OR "Manipulation, Chiropractic"[Mesh]))
- (((("Emergency Medical Services"[Mesh] OR "Emergency Treatment"[Mesh])) OR emergency care)) AND ((chiropract*) OR ("Chiropractic"[Mesh] OR "Manipulation, Chiropractic"[Mesh]))
- (((myositis ossificans) OR "Myositis Ossificans"[Mesh])) AND ((chiropract*) OR ("Chiropractic"[Mesh] OR "Manipulation, Chiropractic"[Mesh]))
- (apophysitis) AND ((chiropract*) OR ("Chiropractic"[Mesh] OR "Manipulation, Chiropractic"[Mesh]))
- (posterolateral corner knee) AND ((chiropract*) OR ("Chiropractic"[Mesh] OR "Manipulation, Chiropractic"[Mesh]))
- (((iliotibial band syndrome) OR "Iliotibial Band Syndrome"[Mesh])) AND ((chiropract*) OR ("Chiropractic"[Mesh] OR "Manipulation, Chiropractic"[Mesh]))
- (((carpal tunnel syndrome) OR "Carpal Tunnel Syndrome"[Mesh])) AND (((chiropract*) OR ("Chiropractic"[Mesh] OR "Manipulation, Chiropractic"[Mesh]))
- (((shin splints) OR medial tibial stress syndrome) OR "Medial Tibial Stress Syndrome"[Mesh])) AND (((chiropract*) OR ("Chiropractic"[Mesh] OR "Manipulation, Chiropractic"[Mesh]))
- (((performance) OR "Athletic Performance"[Mesh])) AND (((chiropract*) OR ("Chiropractic"[Mesh] OR "Manipulation, Chiropractic"[Mesh]))

- (((achilles tendon rupture) OR “Achilles Tendon”[Mesh])) AND (((chiropract*) OR (“Chiropractic”[Mesh] OR “Manipulation, Chiropractic”[Mesh])))

ICL Searches

- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND Subject:”Hockey\” OR All Fields:Hockey
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND Subject:”Baseball\” OR All Fields:Baseball
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND Subject:”Soccer\” OR All Fields:Soccer
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND Subject:”Running\” OR All Fields:Running
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND Subject:”Football\” OR All Fields:Football
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND All Fields:Rugby
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND All Fields:Sprint*
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND Subject:”Tennis\” OR All Fields:Tennis
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND Subject:”Martial Arts\” OR All Fields:Martial Arts
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND Subject:”Bicycling\” OR All Fields:Bicycling OR All Fields:Cycling
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND Subject:”Swimming\” OR All Fields:Swimming
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND Subject:”Physical Endurance\” OR All Fields:Endurance
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND Subject:”Basketball\” OR All Fields:Basketball
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND Subject:”Skiing\” OR All Fields:Skiing
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND All Fields:snowboarding
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND Subject:”Gymnastics \” OR All Fields:Gymnastics
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND Subject:”Dancing\” OR All Fields:Dancing
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND All Fields:Rowing
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND All Fields:Lacrosse
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND All Fields:Speed Skating
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND All Fields:Figure Skating
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND Subject:”Track and Field \” OR All Fields:Track and Field
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND All Fields:Triathl*
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND Subject:”Diving\” OR All Fields:Diving
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND Subject:”Racquet Sports\” OR All Fields:Racquet sports
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND All Fields:Luge
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND All Fields:Bobsled
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND Subject:”Wrestling\” OR All Fields:Wrestling
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND All Fields:Motorcross
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND All Fields:Volleyball
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND All Fields:Archery
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND Subject:”Boxing\” OR All Fields:Boxing
- Subject:”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND All Fields:Kayaking

- Subject:"Manipulation, Chiropractic" OR All Fields:Chiropract* AND All Fields:Canoeing
- Subject:"Manipulation, Chiropractic" OR All Fields:Chiropract* AND Subject:"Golf" OR All Fields:Golf
- Subject:"Manipulation, Chiropractic" OR All Fields:Chiropract* AND Subject:"Menisci, Tibial" OR All Fields:Meniscus
- Subject:"Manipulation, Chiropractic" OR All Fields:Chiropract* AND Subject:"Triangular Fibrocartilage / injuries" OR All Fields:Triangular fibrocartilage complex
- Subject:"Manipulation, Chiropractic" OR All Fields:Chiropract* AND Subject:"Platelet-Rich Plasma" OR All Fields:Platelet Rich Plasma Therapy
- Subject:"Manipulation, Chiropractic" OR All Fields:Chiropract* AND Subject:"Graston Technique" OR All Fields:Graston OR All Fields:Instrument assisted soft tissue
- Subject:"Manipulation, Chiropractic" OR All Fields:Chiropract* AND Subject:"Active Release Technique" OR All Fields:Active Release Technique
- Subject:"Manipulation, Chiropractic" OR All Fields:Chiropract* AND Subject:"Therapy, Soft Tissue" OR All Fields:Soft Tissue Therapy
- Subject:"Manipulation, Chiropractic" OR All Fields:Chiropract* AND Subject:"Tendon Injuries" OR Subject:Tendon injury
- Subject:"Manipulation, Chiropractic" OR All Fields:Chiropract* AND Subject:"Tendinopathy" OR All Fields:Tendinopathy
- Subject:"Manipulation, Chiropractic" OR All Fields:Chiropract* AND Subject:"Brain Concussion" OR All Fields:Concussion
- Subject:"Manipulation, Chiropractic" OR All Fields:Chiropract* AND Subject:"Anterior Cruciate Ligament" OR All Fields:Anterior Cruciate Ligament
- Subject:"Manipulation, Chiropractic" OR All Fields:Chiropract* AND Subject:"Posterior Cruciate Ligament" OR All Fields:Posterior Cruciate Ligament
- Subject:"Manipulation, Chiropractic" OR All Fields:Chiropract* AND Subject:"Medial Collateral Ligament, Knee" OR All Fields:Medial Collateral Ligament
- Subject:"Manipulation, Chiropractic" OR All Fields:Chiropract* AND All Fields:Lateral Collateral Ligament
- Subject:"Manipulation, Chiropractic" OR All Fields:Chiropract* AND Subject:"Rotator Cuff" OR All Fields:Rotator Cuff
- Subject:"Manipulation, Chiropractic" OR All Fields:Chiropract* AND Subject:"Patellofemoral Pain Syndrome" OR All Fields:Patellofemoral Pain Syndrome
- Subject:"Manipulation, Chiropractic" OR All Fields:Chiropract* AND Subject:"Fractures, Bone" OR All Fields:Fracture
- Subject:"Manipulation, Chiropractic" OR All Fields:Chiropract* AND Subject:"Tennis Elbow" OR All Fields:Tennis Elbow
- Subject:"Manipulation, Chiropractic" OR All Fields:Chiropract* AND All Fields:Golfer's elbow
- Subject:"Manipulation, Chiropractic" OR All Fields:Chiropract* AND All Fields:Little league shoulder
- Subject:"Manipulation, Chiropractic" OR All Fields:Chiropract* AND All Fields:Little league elbow
- Subject:"Manipulation, Chiropractic" OR All Fields:Chiropract* AND All Fields:Scapular dyskinesia
- Subject:"Manipulation, Chiropractic" OR All Fields:Chiropract* AND All Fields:Hamstring strain
- Subject:"Manipulation, Chiropractic" OR All Fields:Chiropract* AND Subject:"Ankle Injuries" OR All Fields:Ankle sprain
- Subject:"Manipulation, Chiropractic" OR All Fields:Chiropract* AND Subject:"Abdominal Pain" OR All Fields:Exercise related transient abdominal pain
- Subject:"Manipulation, Chiropractic" OR All Fields:Chiropract* AND All Fields:Athletic pubalgia

- Subject:\”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND Subject:\”Femoroacetabular Impingement\” OR All Fields:Femoroacetabular impingement
- Subject:\”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND All Fields:Labral tear
- Subject:\”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND Subject:\”Shoulder Dislocation\” OR All Fields:Shoulder Dislocation
- Subject:\”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND Subject:\”Acromioclavicular Joint\” OR All Fields:Acromioclavicular joint
- Subject:\”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND Subject:\”Emergency Medical Services\” OR All Fields:Emergency care
- Subject:\”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND Subject:\”Myositis Ossificans\” OR All Fields:Myositis Ossificans
- Subject:\”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND All Fields:Apophysitis
- Subject:\”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND All Fields:Posterolateral corner syndrome
- Subject:\”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND Subject:\”Iliotibial Band Syndrome\” OR All Fields:Iliotibial Band Syndrome
- Subject:\”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND Subject:\”Carpal Tunnel Syndrome\” OR All Fields:Carpal Tunnel Syndrome
- Subject:\”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND All Fields:Medial tibial stress syndrome
- Subject:\”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND Subject:\”Athletic Performance\” OR All Fields:Performance
- Subject:\”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND Subject:\”Achilles Tendon\” OR All Fields:Achilles Tendon
- Subject:\”Manipulation, Chiropractic\” OR All Fields:Chiropract* AND Subject:\”Bursitis\” OR All Fields:Bursitis

Appendix 2.

Information power analysis of the present study – utilizing the framework by Malterud et al.²⁴

Higher information power ←————→ Lower information power

Study aim		
Narrow	Our aim in this study is to identify and extract research priorities from interviews with sports chiropractic researchers and leaders. This aim sits in the middle of the spectrum of narrow and broad aims.	Broad
<input checked="" type="checkbox"/>		
Sample specificity		
Dense	We will be sampling from a dense and specific sample. We will use purposive sampling methods to target participants that have characteristics that are highly specific to the study's aim. Our sample will be comprised of specialized experts in the sports chiropractic field, which is a relatively small field of study.	Sparse
<input checked="" type="checkbox"/>		
Established theory		
Applied	This is a second phase study in a three-phase plan to develop a research agenda for sports chiropractors. The first phase study interviewed sports chiropractors and explored their discourse about their opinions about research direction using quantitative text analysis methods. ¹¹ This phase one study provided some applied theory about the research question sought in this present study and informed the development of the interview guide for this qualitative study. Previous Delphi studies that investigated research priorities for the general chiropractic field have categorized research priorities into research themes and categories. ^{15,16} These previous studies helped guide our methods for this present study.	None
<input checked="" type="checkbox"/>		
Dialogue		
Strong	This qualitative study will interview researchers and leaders from the sports chiropractic field about research priorities. This is a topic area that our participants will be highly familiar with. Moreover, the investigators of this present study are also sports chiropractic researchers who possess sufficient knowledge about the topic area to facilitate strong dialogue during the interviews to obtain information related to this study's research aim. In addition, the preceding phase one exploratory study ¹¹ helped inform the topics likely to be encountered in the interviews, and it helped inform the interview guide for this present study. Considering these factors, we anticipate a strong dialogue between the interviewers and the participants.	Weak
<input checked="" type="checkbox"/>		
Analysis		
Case	This is a qualitative description study designed to identify research priorities from researchers and leaders from the sports chiropractic field. The unit of analysis will be the interview transcripts for each participant. We will be conducting a qualitative content analysis of the interview transcriptions using an interpretivist perspective. The intention of an interpretivist approach is to describe and interpret, but not to develop a substantive theory. We will be extracting research priorities and themes from the transcripts. We will be interviewing researchers and leaders from the sports chiropractic field from different geographical regions; however, we will not be conducting any cross-case analyses between the participants or groups of participants in our analysis.	Cross-case
<input checked="" type="checkbox"/>		

Smaller Sample Size (n) ←————→ Larger Sample Size (n)

After analyzing this study's characteristics against these items theorized to impact the information power of the data that we intend to gather, and guided by a previous investigation that demonstrated data saturation in interview studies can occur in homogenous samples as low as 6 to 8 subjects to up to 12 to 30 subjects when looking for disconfirming evidence or trying to achieve maximum variation,²⁵ we anticipate a sample size of approximately 20-30 participants.

Appendix 3. *Interview guide*

A qualitative study investigating research priorities and investigative capacity in sports-focused chiropractic research.

Introduction

Thank you for participating in this interview/focus group. We are investigating research priorities and investigative capacity in sports-focused chiropractic research. Please note that this interview/focus group will be audio recorded and all information collected will be confidential. Please note this is a voluntary process, and your consent may be withdrawn at any time.

For the purposes of our interview/focus group today, “Sports-focused research” is defined as a field of research directly related or relevant to anyone involved in the sport, athletic, or exercise community. These topics may include but are not limited to the following: injuries, injury prevention, treatment, rehabilitation, biomechanics, performance, assessment metrics, nutrition, epidemiology, diagnostic imaging, emergency care, athletic event coverage, team travel, education, exercise physiology, and sport psychology.

Describe the purpose for the interview or focus group

- Identify research priorities that can be utilized as voting items in a future Delphi study to determine a consensus of a research agenda in sports chiropractic.
- Gain insight into research capacity issues within sports-focused chiropractic research.

Outline the rules and procedures for the interview or focus group

- This session will be audio recorded, and will be transcribed and analyzed by the investigators. Confidentiality will be maintained as identified by the consent form provided upon entry to the study.
- Once transcribed, you will receive a copy of your responses. You may choose to alter your responses or remove them entirely if you wish.
- All comments are important, please express your opinions freely.

(Focus group only)

- I would like to walk you through the consent form that is in front of you (go through consent form).

- First and foremost, everyone’s views are welcome and important.
- We will be audio recording this focus group interview, and upon transcription we will be removing your names from any transcripts by using a unique pseudonym instead of your name.
- While we may identify and present quotes from the discussion in our published reports or presentations, we will use a pseudonym so that we can protect your confidentiality.
- Because of the nature of small communities or groups, it is possible that people could link participants in this room to quotes in our report/presentations. This is why we need to talk about confidentiality.
- In a small community like sports chiropractic in Canada, it is possible that people may be identifiable to some degree by their views and opinions. As a result, we ask that all participants keep what has been shared in this focus group confidential, and do not share what was said to others outside of this room.
- Having said this, and having made these requests, we cannot guarantee that the request will be honoured by everyone in the room. Inherent in focus group studies, there is a risk that information discussed might be shared to others outside of the study.
- So, we are asking you to make only those comments that you would be comfortable making in a public setting; and to hold back making comments that you would not say publicly.
- Overall, anything heard in the room should stay in the room.
- A few other housekeeping rules: Please allow one person to speak at a time so that the audio recording is captured clearly, and please identify yourself with your first name when you speak, unless the facilitator does so for you.

Facilitator: XXXXX

Observers/Recorders: XXXXXX

Since we are aiming to identify as many research priorities as possible in this study to help develop a Delphi study to obtain consensus on a research agenda, please expand as much as possible in your answers

Section 1: Research Priorities Questions

1. What research do you think we need to conduct to advance the sports chiropractic field?
PROBES: Research that will enhance the profession, or advance the science of sports chiropractic practices
2. What research do you think would impact sports-focused chiropractic clinical practice the most?
PROBES: Clinical practice guidelines, Topics and consensus statements around diagnosis or treatment
3. What research do you think would impact sports chiropractic field work the most?
PROBES: Event coverage, Performance, Emergency care
4. Where do you feel sports-focused chiropractic research is lacking?
PROBES: Quantity of research, Quality of methodology, Specific research topics
5. What research do you think would improve inter-professional relationships and collaboration? (Between professions, eg. chiro/physio/AT/MD/biomechanists/nutritionists/physiologists/etc.)
PROBES: Research with other professions such as orthopedic surgeons and topics such as post-operative treatment/rehab/recovery time
6. What research do you think would improve intra-professional relationships and collaboration? (within our own profession)
PROBES: Research with other chiropractors such as SMT or STT research
7. What collaborations could benefit sports-focused research?
PROBES: Universities, Orthopedic Surgeons, Sports Medicine Doctors
8. What research would help set sports chiropractic apart from other sports healthcare providers?
PROBES: Research that defines a niche for sports chiropractors such as SMT and performance

9. What sports-focused chiropractic research do you feel could benefit patients/athletes the most?
PROBES: Research that could impact the patients or athletes such as rehab protocols, return to play guidelines

End this section with this question –

10. Since we are aiming to identify as many research priorities as possible in this study to help develop a Delphi study to obtain consensus on a research agenda, are there any other research priorities you have not mentioned that you can think of that would help us further advance the sports chiropractic field?

If required, see “Additional Interview Guide Probes” document for possible follow-up probes that are topic-specific to Athletic Event Coverage, Biomechanics, Diagnostic Imaging, Education, Emergency Care, Epidemiology, Exercise Physiology, Injuries (Concussion, Tendinopathies, etc.), Injury Prevention, Nutrition, Performance, Position Statements, Rehabilitation, Spinal Manipulative Therapy, Sports Psychology, Team Travel, and Treatment.

Section 2: Research Capacity Questions

In this section of the interview, we will be asking you questions about Research Capacity within the sports chiropractic field. When thinking about your answers for this section, please keep in mind one of the aims of our study is to identify research capacity issues within our field, and obtain opinions on how to address them.

11. How can we improve the research capability and capacity within the sports chiropractic field?
PROBES: Ways to improve our ability to conduct research, Do you have opinions on how to solve it?
12. Do you have any opinions on how we can build our resources to successfully conduct sports-focused research in our field?
PROBES: Reach out to NSOs, Collaborate
13. What do you see as barriers to conducting research in chiropractic and sport?
PROBES: Finances, Time, Logistics

14. What do you see as enablers for research success in chiropractic and sport?
PROBES: Grants for sports-focused research, NSOs
15. What do you see are the opportunities for chiropractic research in sport?
PROBES: Research collaborations, Professional athlete research
16. What can individual sports-focused chiropractors do to improve our potential to conduct research?
PROBES: Collaborate, Share resources and knowledge
17. How do we go about building sustainable research programs in chiropractic and sport?
PROBES: Collaborations, Funding initiatives
18. What types of research methodology would you like to see in sports-focused chiropractic research?
PROBES: Prospective studies, RCT, Case studies
19. Since one of the aims of our study is to identify research capacity issues within our field, and obtain opinions on how to address them. Prior to ending this interview, are there any other research capacity issues you can think of, and possible solutions on how to address them?

Additional interview guide probes

Additional Interview Guide Probes

This document includes topic-specific probes to be used with the interview guide questions if required.

PART 1: RESEARCH INITIATIVES

Athletic Event Coverage

PROBES: Emergency care, Injury prevention, Performance enhancement

Biomechanics

PROBES: Throwing mechanics, Hip mechanics, Gait mechanics

Diagnostic Imaging

PROBES: US, MRI, MRA, fMRI, bone scan, CT, ECG, Education/Training, Referral rates

Education

PROBES: sports chiropractic education, Inter-professional education – Orthopedic surgeons, Sports medicine Medical Doctors, Physiotherapists

Emergency Care

PROBES: emergency preparedness, protocols for equipment removal, first aid, etc.

Epidemiology

PROBES: Populations – Elite athletes, Competitive athletes, Non-competitive athletes, Adolescents, Seniors, Adults, injury rates, injury surveillance

Exercise Physiology

PROBES: Chronic exercise adaptations, Metabolic changes, Acute response to exercise, overtraining, sports specialization, performance enhancement

Specific Injuries (Concussion, Tendinopathies, etc)

PROBES: Treatment, Management, Prevention, Rehabilitation, Diagnosis, Return to Play, Diagnostic accuracy, injury prevention

Injury Prevention

PROBES: How to prevent injuries, What injuries are preventable, which injuries to study for prevention, manual therapy (SMT/STT/Taping) for prevention

Nutrition

PROBES: Performance enhancement, Exercise recovery

Performance

PROBES: Speed, Agility, Reaction time, Dose-response, When to treat, validity studies, outcome measure, specific interventions

Position Statements

PROBES: Concussion, Burn out, Nutrition, cap-

acity to conduct position statements, collaborate on position statements

Rehabilitation

PROBES: development of specific rehabilitation protocols, post-surgical rehab, specific injuries

Spinal Manipulative Therapy/ Extremity Manipulative Therapy

PROBES: mechanisms, clinical trial, performance, dosage, types of adjustments

Sport Psychology

PROBES: is this important, what type of research, affect clinical practice

Team Travel

PROBES: Frequency of treatment, Utilization rates, Type of treatment provided

Treatment

PROBES: Treatment protocols, Effectiveness, mo-

dalities, manual methods, soft tissue, biological effects, clinical trials, pre-operative care, post-operative care

PART 2: RESEARCH CAPACITY

Barriers

PROBES: Finances, Logistics, Resources, Time, prioritize barriers, how to overcome them

Enablers

PROBES: how to increase research capacity, how to leverage enablers, individual chiropractor contributions

Sustainability

PROBES: funding, mentorship, collaborations, how to take advantage of enablers

Methodology

PROBES: types of methodology for sports research, performance research