Low Back Pain Treatment by Athletic Trainers and Athletic Therapists: Biopsychosocial or biomedical orientation?

Hana MacDougall,

A Thesis
in
The Department
of
Exercise Science

Presented in Partial Fulfilment of the Requirements
for the Degree of
Masters (Exercise Science)
at
Concordia University,
Montreal, Quebec, Canada

May 2018

CONCORDIA UNIVERSITY

School of Graduate Studies

This is to certify that the thesis prepared

By: Hana MacDougall

Entitled: Low back pain treatment by Athletic Trainers and Athletic Therapists: Biopsychosocial or biomedical orientation?

and submitted in partial fulfilment of the requirements for the degree of

Masters of Exercise Science (Exercise Science)

complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

Signed by the final examining committee:

Dr. Peter Darlington	Chair
Dr. Richard DeMont	Examiner
Dr. Theresa Bianco	Examiner
Dr. Geoffrey Dover	Supervisor

Approved by _____

Chair of Department or Graduate Program Director

_____

Dean of Faculty

Date: _____

Abstract

Low back pain treatment by Athletic Trainers and Athletic Therapists: Biopsychosocial or biomedical orientation?

Low back pain's (LBP) continues to burden society and the individual through high rates of recurrence and chronicity. Recent evidence suggests that the way a clinician thinks about pain influences treatment practices and rehabilitation outcomes. Our study characterized the way American Athletic Trainer's (AT) and Canadian Athletic Therapist's (C-AT) think about LBP by measuring treatment orientation. 273 ATs and 382 C-ATs completed a questionnaire containing demographic questions and the Pain Attitudes and Beliefs Scale for Athletic Trainers/Therapists (PABS-AT/C-AT), which classifies treatment orientation as biomedical or biopsychosocial. We noted that overall ATs and C-ATs reported a stronger biomedical orientation than biopsychosocial. In addition, treating more LBP patients per year was associated with a decreased AT's and C-AT's biomedical orientation. Age and experience was associated with a decreased C-AT's biomedical orientation, and primarily treating the general public was associated with a stronger C-AT's biopsychosocial orientation. Further research is needed to determine the impact AT's and C-AT's biomedical orientation has on rehabilitation outcomes since this orientation in other clinicians has been predictive of poor rehabilitation outcomes in LBP patients.

Acknowledgements

This journey would not have been made possible without the encouragement and support of so many. I am indebted to my supervisor and mentor, Dr. Geoffrey Dover, for picking my email amongst many and giving me the invaluable opportunity to begin this project. Thank you Dover for your continued guidance. A special thanks to Dr. Steven George for his sage advice improving the quality of this manuscript and thesis, and to my committee, Dr. Richard DeMont and Dr. Theresa Bianco, for their interest and valuable feedback. To my family and friends, but in particular MM, JM, EM, CM, JGM, AM, BT, and exceptionally PRL, you should know that your support and encouragement was/is worth more than I can express on paper.

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Low Back Pain Treatment by Athletic Trainers and Athletic Therapists: Biopsychosocial or biomedical orientation?

Low back pain (LBP) continues to be a highly prevalent condition worldwide, and was identified by the latest Global Burden of Disease Study as the leading cause of disability worldwide.[1] In the United States, LBP has been the leading non-communicable condition contributing to years lived with disability since 1990.[2] In Canada, the upper and lower back were reported by 50.9% of chronic pain sufferers as the location of their pain.[3] LBP's significant personal, societal and economic costs have led to decades of research attempting to uncover underlying mechanisms to improve treatment and recovery, however, the dominating lens of the biomedical model in early research and treatment may have contributed to the current and concerning prevalence of LBP seen today.

The biomedical/biomechanical model of disease focuses on physical pathology or tissue damage as the cause of pain and disability, and so, related treatment practices focus on the identification of pathology and tissue damage and treating that as the source of pain. [4,5] In the last 20 years, the biomedical model has increasingly been questioned because in laboratory and clinical studies the relationship between pain and pathology has been exceedingly variable. For example, imaging results indicated disc degeneration in more than half of the participants who were asymptomatic, [6,7] whereas other studies have documented reports of pain from patients who did not present abnormal back pathologies.[8] Furthermore, patients presenting the same level of impairment, reported differing levels of pain,[8] and feeling pain in a variety of areas.[9] These inconsistencies between tissue pathology, pain, and dysfunction that did not fit within the features of the biomedical model pushed researchers towards an emerging paradigm, the biopsychosocial model.

Biopsychosocial concepts, as a contrast to the traditional biomedical model, were introduced early by researchers who emphasized the importance of addressing psychosocial aspects of the pain experience such as cognitive responses to pain including fear and catastrophizing. If fear of pain and catastrophizing in individuals remained high, it could lead to maladaptive behaviours that contribute to disability and chronic pain.[10,11]The biopsychosocial model, promoted as the new theoretic framework for LBP treatment, emphasizes an

understanding of human behaviour through interactions between biological, social, and psychological aspects of the individual.[12] The biological condition affects psychological factors, such as self-concept, and social contexts including a person's interpersonal relationships.[13] International guidelines for LBP treatment are encouraging health care providers (HCP) to incorporate biopsychosocial based treatment practices by highlighting the importance of addressing psychological responses to pain, and moving away from recommendations of delaying work and activity; advice that is influenced by the biomedical model.[14] Treatment practices, under the biopsychosocial model, encourage pain education, elements of cognitive behavioural therapy, and graded exercise programs, and statistically and clinically significant improvements in patient outcomes have been observed after the incorporation of these methods.[15]Further, current research continues to confirm the biopsychosocial model as a key theoretical underpinning for providing psychologically informed patient care, an approach which has been advocated for in the advancement of back pain care.[16]

Recently, evidence suggests that HCP's orientation towards LBP can influence rehabilitation and alter patient outcomes.[17-19] A HCP with a more biomedical orientation tends to focus on finding and treating pain as a consequence of physical injury, whereas a HCP with a more biopsychosocial orientation will address psychological and social states of the patient.[20,21] The choice of treatment, and advice given to the patient on activity and work are ways that treatment orientation has been documented as influencing rehabilitation.[22,23]Measuring treatment orientation of HCPs is, therefore, very important, and the Pain Attitudes and Beliefs Scale for Physiotherapists (PABS-PT) is a tool developed for this purpose. The PABS-PT measures two independent factors.[21] The first factor measures a biomedical orientation and is, consequently, called the biomedical subscale.[21] The second factor measures a biopsychosocial orientation and is, therefore, referred to as the biopsychosocial subscale.[21]

One study, utilizing the PABS-PT, found that patients who received treatment from biopsychosocial oriented physiotherapists (PT) reported better disability and pain outcomes, than patients who received treatment from a biomedical oriented counterpart.[17] Another study, reported that general practitioners (GP) and PTs who scored high on the biomedical scale of the PABS-PT were more likely to give work and activity advice that was not in line with LBP treatment guidelines.[24] These studies suggested that the treatment orientation of a HCP, regardless of exercise prescription, influences the use of LBP guidelines, and ultimately,

rehabilitation outcomes. Treatment orientation, in turn, has been shown to be influenced by factors such case load and experience.[23,25,26] Innes et al (2015) reported that chiropractors, who treated more patients per week, were more likely to believe that psychosocial factors play a role in their patients experience of LBP.

Existing literature has measured treatment orientation of PTs, GPs and other rehabilitation therapists; HCP's who treat LBP patients. Athletic Trainers (AT) in the United States and Athletic Therapists (C-AT) treat patients with LBP, but there is no existing data on their treatment orientation. We wanted to conduct a cross-national survey that would provide a unique measurement of the motivations behind Certified AT's and C-AT's approach to LBP treatment. Therefore the purpose of our study is to measure the pain beliefs and consequently the treatment orientation of ATs and C-ATs in the context of LBP. We will also investigate how these treatment orientation beliefs vary based on the caseload of LBP patients and experience by the ATs or C-ATs, respectively.

Literature Review

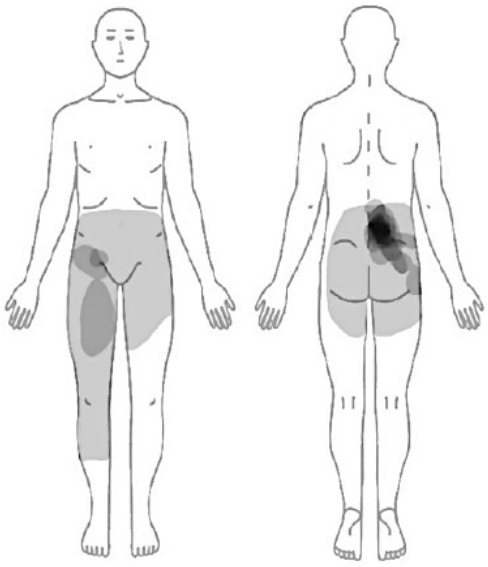
Low Back Pain

Biomedical perspective of treatment

The biomedical orientation towards LBP treatment is derived from the biomechanical model of disease. [21] The model focuses on the etiology and pathophysiology of pain, but there are several findings about pain that do not fit. For example, patients with the same degree of structural impairment reported different levels of pain.[8] Furthermore, patients presenting abnormal pathologies reported no pain, while other patients who did not present abnormal pathologies reported pain.[8] The high variability in pain experiences is well demonstrated in a study by O'Neill et al (2009), where they electrically stimulated the L3-L4 facet of 13 healthy patients for 10 minutes.[9] The initial assumption was that the presence of a consistent, painful stimulus in the same area for all patients would allow for similar diagnosis and treatment pathways, however, figure 1 demonstrates the wide self-reported distribution of pain found in this study. The varied pain responses suggest that finding the lesion site based on an individual's subjective pain response is near impossible. Based on these findings, for example, patients with an L3-L4 sprain may present pain down the leg, or localized around the buttocks and on opposite sides; neither hinting at the locus of injury, but rather that perhaps, the source of pain may not be

as important as once believed.[9] The high variability of pain distribution and intensity shifted LBP research away from tissue identification towards other influential factors.

Figure 1. Pain distribution of 13 patients after electrical stimulation to L3-L4 facet.[9]



Biopsychosocial perspective of treatment

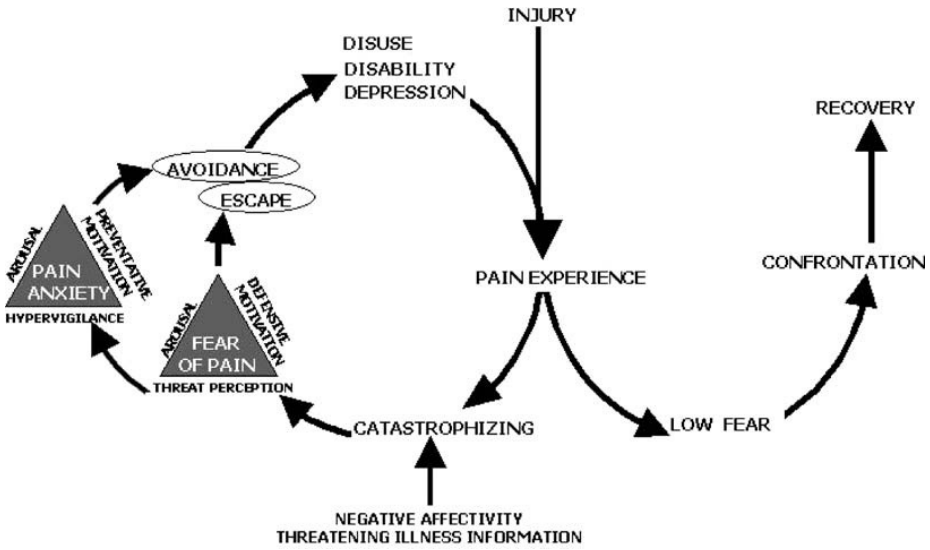
Amongst the challenging features to the biomedical model, the gate control theory of pain emerged as the physiologic basis for the biopsychosocial model.[4] This theory explains how psychological and social factors influence an individuals perception and experience of pain.[4] Painful stimuli will send signals to the central nervous system (CNS), which integrates all sensory information and responds accordingly, but external stimuli, such as the way a person perceives their pain (eg. As temporary or lasting), or even social circumstances during the time of the event (eg. Supportive social circle or not) has the ability to block or exacerbate the pain pathway to the CNS.[4]

The biopsychosocial model assumes that an acute form of physical pathology causes painful input that is perceived by the individual. The individual interprets and applies meaning to the pain based on beliefs they developed through past experiences, and which are amenable to responses by others.[13] Our cognitive responses to pain are, initially a protective mechanism, but certain beliefs, however, followed by subsequent behaviour are found to be counter-productive and maladaptive if they reinforce pain reduction beyond the acute phase of injury.[27] It is these

beliefs, including fear of pain, fear of movement/(re)injury, and catastrophic thinking, and avoidance/escape behaviours that have been identified as significant contributors to the development of chronic pain.[28-31]

Fear of pain, or the fear of experience pain and exacerbating injury has been observed as a key component in responses to injury in patients with chronic pain.[30] A specific type of fear of pain is kinesiophobia; the fear of (re)injury due to movement. Catastrophizing is an exaggerated psychological response to pain. [28] Fear of pain will lead to behaviours such as fear avoidance, which is the avoidance of behaviours believed to exacerbate pain and injury.[29] Fear avoidant behaviour is negatively reinforced because it relies on the anticipation of consequences; pain will be reduced by avoidance. [27,32] Figure 2 demonstrates the processes behind the development chronic pain.[5] A patient is injured, experiences pain, and has a cognitive response to the pain. If the cognitive response is adaptive, such as low fear, this is more likely to result in pain confrontation, whereby an individual recognizes their pain is temporary and is more willing to confront their personal pain barrier; this will lead to eventual recovery. If the cognitive response is maladaptive, such as catastrophizing, this is likely to result in further emotional responses such as fear of pain and/or pain anxiety, which encourages avoidant and escape behaviour. These behaviours lead to disuse, depression and disability, as the individual loses mobility and strength through inactivity, increases reactivity to threatening illness information, and often has difficulty maintaining social connects due to their invalid state.[10] The cycle continues because, although the individual is not reducing their pain, they are not increasing it either, and so, the belief remains uninterrupted that avoiding movement and exercise, and not returning to work does is protective from pain.

Figure 2. Updated Fear Avoidance model of chronic pain.[5]



In response to the understanding that these psychological and behavioural processes contribute to chronic pain, certain measures were created to provide practitioners the tools to recognize patients who may have these types of maladaptive responses to pain, and who are therefore, susceptible to developing chronic pain. Current tools of measure include the Fear of Pain Questionnaire III,[30] the Tampa Scale of Kinesiophobia, [31] the Fear Avoidance Behaviour Questionnaire (FABQ),[29], and the Pain Catastrophizing Scale. [28] Outcomes measured by the FABQ, for example, were reported as the strongest predictors of work and functional limitation in patients with LBP.[33]

Clinical Practice Guidelines for Low Back Pain

Since the publication of the first LBP clinical practice guidelines in 1987 by the Quebec Task Force,[34] there has been significant growth in research that has moved practice away from a biomedical approach to a more behavioural one. Current multi-national guidelines were developed to align practitioners with the best evidence available.[34] A review of recent guidelines issued by 15 national bodies, including those in Canada and the United States, noted consistent features amongst diagnostic and therapeutic recommendations.[34] All guidelines identify behavioural factors as major contributors to poor patient outcomes.[34] This consistency across guidelines reflects cross-national level recognition of the importance of these risk factors to the development of chronic pain and disability. There is also consensus on recommendations that

patients stay active, progressively increase their activity levels, and return to work early despite having pain still.[34] These recommendations demonstrate a major shift away from biomedical practices, particularly in the discouragement of bed rest.

Despite the guidelines emphasizing a behavioural approach to care, and evidence demonstrating that adherence is associated with better patient outcomes, [35,36] treatment behaviour of PTs and manual therapists seems to be inconsistent or even, contrary to the guidelines. Biomedical approaches to LBP treatment has been found to persist in GPs and PTs [24,26], and was associated with recommendations for work and physical activity that were not in line with guidelines. It has been suggested that attitudes and beliefs about pain held by PTs are likely to influence their approach to treating patients.[37]

Beliefs and Attitudes of Health Care Providers

The beliefs and attitudes of HCPs can be categorized by the two major schools of thought that dominate their education; biomedical and behavioural orientations.[20] There is evidence that these orientations influence behaviour and subsequently are associated with treatment decisions. For example, PTs and GPs, who were found to have a stronger biomedical orientation, were more likely to provide advice to LBP patients that were not in line with current national guidelines.[24,26] A recent systematic review of studies investigated an association between the attitudes and beliefs about chronic LBP of PTs and their clinical management of these patients.[37] The studies found that a majority of PTs still have a strong biomedical approach to low back treatment, placing importance on tissue abnormalities and related biomedical based interventions. Furthermore, these studies found that those PTs with stronger biomedical orientation and high fear-avoidance beliefs were more likely to recommend delaying return to work and activity.[37] These findings are not unique to PTs either, a systematic review of GPs, rheumatologists, orthopaedic surgeons, and other paramedical therapists reported that a majority of these HCPs continue to work within a biomedical framework, and that a biomedical orientation is negatively associated with patient education, adherence to guidelines, and reported work and activity recommendations. [38]

Beyond adherence to LBP treatment guidelines, identifying HCPs beliefs and attitudes becomes important in the context of patient outcomes. A study from Beneciuk and George (2015) found that PTs who had received behavioural based training, and were classified as more behavioural oriented, had patients report lower levels of disability and pain. Whereas, PTs who

were classified as more biomedical oriented had patients report higher levels of disability and pain.[17] This study speaks to two points, first that HCPs beliefs and attitudes are pliable, and are modifiable through intervention as demonstrated by the increase in mean biopsychosocial score and decrease in mean biomedical score post-training, and in their maintenance 6 months later (see Table 7 for detailed scoring). Second, that the real concern regarding HCPs beliefs and attitudes lies within their ability to negatively influence rehabilitation outcomes in terms of disability and pain levels. Referring back to Figure 2, the updated Fear avoidance model,[5] there are contributors that was not mentioned when previously explaining the model; being the influence of 'negative affectivity" and "threatening illness information." This is information that comes from the environment in which the patients find themselves, and may come in the form of having a conversation with a colleague, friends or family that contributes and perpetuates negative thinking regarding the patient's injury. These experiences speak to the social aspect of the biopsychosocial model. HCPs also play a contributing role to this psychosocial aspect, whereby, a consultation or treatment advice may negatively or positively impact a patients beliefs and attitudes about their pain and injury.

A majority of LBP patients tend to seek care at a primary level from the variety of aforementioned HCPs. HCPs, as first contact, are ideally positioned to address and help reframe behavioural aspects of injury and prevention. In order for HCPs to address a patients beliefs and attitudes about pain, it is necessary for HCPs to be cognizant of the role that their own beliefs and attitudes about pain and function play in the rehabilitation process. Beliefs and attitudes are directly or indirectly expressed through the overall clinical management of LBP, but as well, are projected onto patients who's own beliefs are impressionable to HCPs.[39]

Tools to Assess Health Care Providers Beliefs and Attitudes

Pain beliefs and attitudes of HCPs can be measured through a number of instruments, as identified in a recent systematic review by Bishop, Thomas and Foster (2007), and they include the Fear Avoidance Beliefs Questionnaire (FABQ),[29] the Health Care Providers Pain and Impairment Relationship Scale (HC-PAIRS),[39] a fear avoidance beliefs tool,[40],the Attitudes Beliefs Questionnaire for musculoskeletal practitioners, (ABS-mp)[41] and the Pain Attitudes and Beliefs Scale for physiotherapists (PABS-PT).[20,21]

The FABQ is a questionnaire developed by Waddell et al (1993) to measure fear avoidance beliefs of LBP patients about work and daily activity for use in a clinical setting. They

found that the FABQ was strongly correlated with self-reported disability in activities of daily living and work, and therefore, that it was an effective tool for predicting those LBP patients who are more likely to develop disability.[29]

The HC-PAIRS was developed by Rainville, Bagnall, and Phalen (1995) as a measure of HCPs beliefs and attitudes about the relationship between pain and disability, in other words, about their functional expectations for chronic LBP patients. The HC-PAIRS was determined to be a valid measure of the diverse beliefs and attitudes held by HCPs regarding chronic LBP.

A fear avoidance beliefs tool was developed by Linton, Vlaeyen, and Ostelo (1999). The authors modified questions from the Tampa Scale for Kinesiophobia, the FABQ, and the Pain and Impairment Relationship Scale to suit measuring fear avoidance beliefs of HCPs.

The ABS-mp was developed by Pincus et al (2006) to measure the impact of HCPs attitudes about LBP treatment, including towards patients psychological states, limiting treatment, and back pain in general. The authors found that this survey showed excellent psychometric properties and good face validity for measuring HCPs specific attitudes regarding the clinical management of LBP.

The 36-item PABS-PT was developed by Ostelo et al (2003), and later modified to a 19-item version by Houben et al (2005). The PABS-PT was developed to distinguish between PTs having a biomedical or biopsychosocial orientation towards LBP treatment.[20] Houben et al (2005) re-examined the factor structure of the PABS-PT and removed questions, strengthening the reliability and validity.[21]

The identification of only 5 different surveys reflects a relatively new interest in to the beliefs and attitudes of HCPs in regard to LBP.[42] The FABQ and the fear avoidance tool focus on identifying only one aspect of beliefs being fear avoidance. In addition, the validity and reliability of the FABQ in HCPs has yet to be established.[42] The ABS-mp requires more validity and reliability testing, but has potential to be a useful tool.[42] The HC-PAIRS and PABS-PT have both been used in multiple studies with a variety of HCPs, and have shown good validity, but it is important to note that they measure different concepts.

Pain Attitudes and Beliefs Scale for Physiotherapists (PABS-PT)

As mentioned, the PABS-PT was created as a tool to measure PTs LBP treatment orientation as more biomedical or more behavioural.[20] The 19-item version aimed to specifically strengthen the internal consistency of the behavioural factor of the original 36-item PABS-PT.[21]

After the amendment, the internal consistency of the behavioural factor was identified as satisfactory as it increased from 0.54 to 0.68. The biomedical factors' internal consistency remained the same, very good, between the two versions at 0.80. The PABS-PT's validity was demonstrated in a variety of studies, including one that found that both the biomedical and behavioural factors significantly predicted reported judgements of the harmfulness of activities on the Photographic Series of Daily Activities.[43]

In a recent systematic review, the PABS-PT, along with the HC-PAIRS, was identified as one of the more thoroughly tested tools used to measure LBP related beliefs.[42] It is also apparent that this survey is valid for use with a variety of HCPs, as the range of attitudes and beliefs held across and within professions are similar.[42]

Beliefs and Attitudes of Athletic Trainers and Therapists

Thus far, our definition of "health care provider," has included a variety of practitioners with one glaring omission, Athletic Trainers and Therapists. Athletic Trainers and Therapists are educated on the human musculoskeletal system, exercise physiology, biomechanics, and basic emergency care. They are certified in the domains of prevention, assessment, and intervention. Although they are typically thought to be the primary health care professional for injured athletes, they work in clinics and other healthcare settings with non-athletic populations where they will treat patients with LBP.

Multiple surveys have been conducted to better understand the perceptions of Athletic Trainers and Therapists regarding the psychological states of athletes during treatment, and the psychosocial techniques employed during rehabilitation of athletic injuries.[44-46] They have described typical symptoms associated with injury rehabilitation, but they do not elaborate on Athletic Trainers and Therapists beliefs or knowledge of psychological responses beyond those listed by the surveyed Athletic Trainers and Therapists that included anxiety, anger, and stress. A major critique of these existing surveys is that they also do not acknowledge Athletic Trainers and Therapists in the context of rehabilitating non-athletic populations, because as mentioned, Athletic Trainers and Therapists may treat patients with conditions beyond sports-related injuries. As well, existing surveys do not speak to catastrophizing or fear-avoidance behaviours-factors that predict chronicity in LBP patients. The extent of research on Athletic Trainers and Therapists is limited, but as more Athletic Trainers in the United States (ATs) and Athletic Therapists in Canada (C-ATs) work with increasing numbers of the general population it is

important to better understand their biopsychosocial beliefs and attitudes, and subsequent treatment orientation. The objectives of this study, therefore, are to distinguish between ATs and C-ATs who are more biomedical or biopsychosocial oriented, in the context of LBP, and to determine if factors such as caseload and experience influence scoring on the PABS-PT, as demonstrated by previous studies.[23,25,26]

HYPOTHESES

- ATs and C-ATs who treat more LBP patients/year will score higher on the biopsychosocial subscale and lower on the biomedical subscale.
- ATs and C-ATs with more years experience will score higher on the biopsychosocial subscale and lower on the biomedical subscale.

METHODS

Ethical Approval

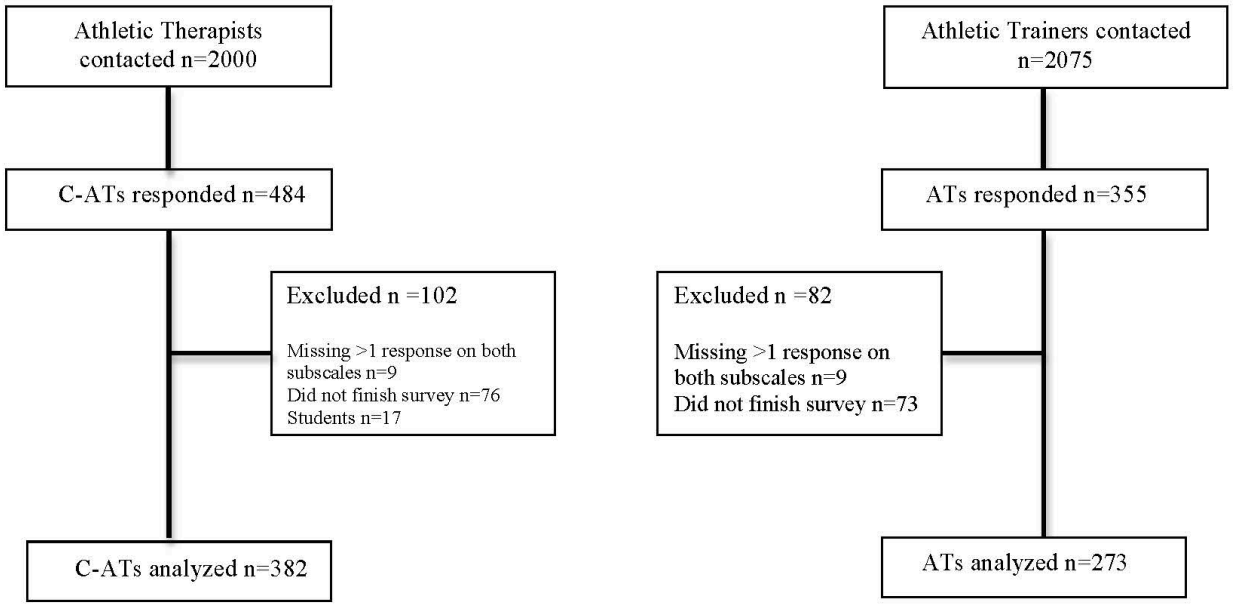
We submitted our ethics to the university human research ethics committee for approval in May 2016, and received a certificate of ethical acceptability (certification number 30006431) in June 2016.

Participants

We contacted the National Athletic Trainers' Association (NATA) to inquire about generating a random sample from their membership database. For research purposes, the NATA will randomly provide a sample of members who maintain active membership in the organization during any particular year and who have opted to participate in research upon membership renewal to receive, in our case, the survey. Therefore, any active certified AT who completed this option could be included in the study. We purchased 2000 random emails; the NATA supplied 2075 to account for emails that would bounce back. We created an email account "universitylowbackpain@gmail.com" from which we would send our emails to the random sample of NATA members inviting them to participate in our study. We contacted the Canadian Athletic Therapy Association (CATA) about surveying a random sample of their members, and being a significantly smaller membership as compared to the NATA, the CATA agreed and sent an invitation to all members (including students) to participate in our survey (approximately 2000 members). Therefore all members who were in good standing were included in the initial

invitation to participate in the study. All students who responded were excluded from the analysis **(**See figure 1 for a consort diagram of the participants).

Figure 3. Consort diagram of participants



Instrumentation

For consistency, we generated our surveys for both the NATA and CATA, through SurveyMonkey, an online survey platform. We replaced "for Physiotherapists" from the originally titled "Pain Attitudes and Beliefs scale for Physiotherapists," with "for Athletic Trainers" for the survey we would send to members of the NATA, and "for Athletic Therapists" for the survey we would send to members of the CATA. The first page of the survey contained information about the study and a place to provide consent to participate in the study, ATs and C-ATs could disagree to participate and were subsequently taken to a disqualification page.

Pages 2 through 9 contained a standardized self-report questionnaire included to gather demographic, educational and work information. Questions included sex, age, education level, years experience, work setting, post-professional training, specialization, number of back pain patients per year, personal episode of back pain, and client base. These questions were based on studies using the 19-items PABS-PT.[21,23-26] Post-professional was in reference to courses taken post-graduation, and specialization was in reference to certifications that extended beyond post-

graduate courses where an individual could identify themselves as a specialist afterwards.[21] Questions regarding "sex," "age," "education level," "years experience," and "low back pain patients per year" were open-response with no restrictions. For example participants could type in "10" or "ten" for years of experience. Page 12 introduces the second part of the survey using the same introduction found in the original 36-item Pain Attitude and Beliefs Scale for Physiotherapists (PABS-PT)[20]; "The purpose of this list is to help us analyze how you, the therapists approach the most common forms of back pain. We do not mean back pain resulting from a radicular syndrome, cauda equine syndrome, fractures, infections, inflammation, a tumour or metastasis. It is not our intention to test your knowledge of back pain. We would simply like to know how you approach the treatment of back pain. We are looking for your opinion; the opinions of others are not relevant. Scoring: We would like you to indicate the level to which you agree or disagree with each statement. 1=totally disagree, 2=largely disagree, 3=disagree to some extent, 4=agree to some extent, 5=largely agree, and 6=totally agree." We did not need to make any modifications to the introduction, as the wording is neutral, and may apply to all professions. Pages 13 through 31 contained the 19 questions of the Pain Attitude and Beliefs Scale for Physiotherapists (PABS-PT),[21] a validated tool of measure assessing the treatment orientation of pain therapists. The 19-items of the PABS-AT/C-AT are rated using a 6-point Likert scale ranging from "totally disagree" to "totally agree." Scores on the PABS-AT/C-AT were calculated by adding the indicated number, 1 through 6, on every item in each subgroup. The biomedical subscale (10 items), therefore, has a potential score range from 10-60, and the biopsychosocial subscale (9 items) has a potential score range from 9-54. Previously, the reliability of the PABS-PT was found to be satisfactory for both the biomedical (Cronbach a = .80) and the biopsychosocial (Cronbach a =.68) subscales.[21] The 19-item version of the PABS-PT, with modification to provider type, has been used on GPs in the UK, PTs in New Zealand, Sweden, Netherlands, Quebec, Canada, the UK, and the United States, and chiropractors in Australia.[17,21,23-26,47] As well, validity was determined by associations between the PABS-PT's and measures of similar constructs including the Healthcare Providers Pain and Impairment Relationship Scale and the Tampa Scale for Kinesiophobia; whereby the PABS-PT was predictive of results of judgment of harmfulness of activities on a photographic series of daily activities.[21]

Procedures

We opened our surveys for ATs and C-ATs in July and collected data until November. Multiple emails were sent to the entire group to encourage participation. SurveyMonkey time stamped survey responses, and collected IP addresses. In addition, the system has a built in mechanism where a member from the same IP address cannot complete the survey if they have already done so. We sent 3 emails in total, 1 initial and 2 reminders.

Data Reduction

We generated an excel document containing the completed survey data in a non-numerical format. We excluded ATs and C-ATs who had more than one response missing from each subscale on the PABS-AT/C-AT. We excluded 82 ATs who responded in total; 9 were missing more than one response on each subscale of the PABS-AT, and 73 did not start or completed the survey. We excluded 102 C-ATs who responded; 9 were missing more than one response on each subscale of the PABS-C-AT, 76 did not complete the survey, and the 17 respondents who were students. When a respondent had only one missing response on each respective subscale of the PABS-AT/C-AT, we averaged the rest of the responses on the subscale missing the response, and substituted the value as the missing response. Although there is no published method for dealing with missing data on the PABS-PT, our approach is an accepted solution to missing data in self-report qualitative data.[48] Our approach was also seen in other studies using the PABS-PT, for example, Bishop et al (2008) reported this same method for dealing with missing PABS-PT survey responses when measuring PT's and GP's, from the UK, attitudes and beliefs about LBP. The total number of respondents included for analysis was 273 certified ATs, and 382 certified C-ATs.

After the initial data reduction, the data was coded numerically. For both ATs and C-ATs, questions that required a yes or no answer were coded as 1 and 2, respectively, "sex" was coded as 1=female, and 2=male, and "education" was coded as 1=bachelor/undergraduate/university, 2=master's, 3=PhD, 4=other. For C-ATs the education group "other" included diplomas and post-graduate studies. For both ATs and C-ATs, "age" was split into two groups based on the average age of the respective population. The grouping and coding of "average number of low back pain patients/year" and "years experience," for both ATs and C-ATs, was done to ensure a roughly equal number of participants in each group. For "years experience," the groupings were coded as 1=0-5, 2=>5-9, 3=>9-15, 4=>15-24, 5=>24.

For “average number of low back pain patients/year,” the groupings were coded as 1=0-8, 2=>8-15, 3=>15-34, 4=>34.

A variable that some respondents struggled with was reporting the number of LBP patients they think they treat a year. Several participants would type non-numerical answers and therefore could not be coded for the analysis. Seven ATs and thirty-two C-ATs were removed from the category “low back pain patients per year” for non-numerical responses that included “enough” and “60% of my clients,” respectively. One AT was removed from “years experience” for not providing an answer; no C-ATs were removed from this group. No ATs were removed from “specialization,” but thirty C-ATs were removed from this group for not responding. No ATs were removed from “job setting,” thirteen C-ATs were removed from this group due to no response. No respondents were removed from the categories “post-professional training,” “education,” and “episode of low back pain” for both ATs and C-ATs.

Data Analysis

We completed our data analysis using SPSS 24.0; the α level was set a priori at .05 for statistical significance. Descriptive data were generated for demographic, educational, and work characteristics. Biomedical and biopsychosocial scores were calculated and analysed for all subgroups of sex, age, education level, years experience, work setting, post-professional training, specialization, number of back pain patients per year, personal episode of back pain, and client base. T-tests were used to identify differences between age, post-professional training, specialization and scores on the subscale. ANOVAs were used to identify significant differences between demographics with multiple groups, and scores on the subscales. When an ANOVA identified a significant difference, a Tukey post hoc analysis was used to identify the difference. In addition, we calculated effect sizes for the significant different means (eta-squared) by dividing the between sum of squares by the total sum of squares. We also computed Pearson’s correlations to assess the relationship between age, average number of low back pain patients treated per year, and years experience, and the PABS-AT/C-AT.

RESULTS

Response Rate (RR)

Of the 2075 NATA registered ATs we invited to participate in our survey, 23(1.1%) were returned to the sender with error messages indicating incorrect addresses. Thus, of the 2052

delivered emails**,** 355 members responded (RR 17.3%). After data reduction, we analysed a total sample of 273; 13.3% of the total contacted. The CATA contacted all, approximately 2000, members on our behalf to participate in our survey; 484 responded (RR 24.2%). After data reduction, we analysed a total sample of 382; 19% of the total contacted.

Demographics

Most ATs were female (56%), had a master's degree (70%), worked in secondary schools (86%), and had a client base of high school athletes (44%). The majority of ATs who worked primarily in secondary schools treated an average of 19.0(21.8, range 1-100) LBP patients per year. As well, the majority of ATs who identified high school athletes as their primary client base, treated an average of 18.6(20.1, range 0-100) LBP patients per year, whereas the 34% of ATs who mostly treated the general public, treated an average of 196.7(393.7, range 0-1750) LBP patients per year. Most of the C-ATs were female (66%), had a bachelor's degree (64%), had 0-5 years of experience (36%), worked in a private clinic (46%) and had a client base of the general public (57%). The majority of C-ATs who worked primarily in private clinics treated an average of 130.3(198.9, 0-1500) LBP patients per year. As well, the majority of C-ATs who identified the general public as their primary client base treated an average of 112.9(188.6, range 0-1500) LBP patients per year. Interestingly, 13% of C-ATs chose "other" as their education, which included diplomas and post-graduate studies, while ATs did not indicate "other" at all. One of the most commonly attended accredited athletic therapy institutions is Sheridan College. For a while, Sheridan college graduates earned a diploma of sports injury management, which is what accounts for the large amount of responses in the "other" category. The youngest AT was age 22 and the oldest was age 75, with an average age of 39.8 years. The youngest C-AT was age 21 and the oldest was age 69, with an average age of 35.6 years. (See table 1 in the appendix for demographic results).

Athletic Trainers (ATs) Results

The analysis of variance revealed a statistically significant difference in biomedical scores based on the number of LBP patients treated in a year ($F=4.1$, $p=.007$, $\eta^2=0.045$). Post hoc comparisons using the Tukey HSD, revealed that ATs who treat 15 LBP patients or less per year had a significantly higher biomedical score (35.0±5.7) than ATs who treat more than 15 (31.9±5.5, $p=.039$), and more than 34 LBP patients per year (31.7±8.6, $p=.018$) (see table 2). There was no

difference between the biomedical or biopsychosocial score based on years experience, client base and age for ATs. There was a significant negative correlation between age (r=-.152, *p*=.012) and the biomedical scale of the PABS-AT, and a positive significant correlation between average number of LBP patients treated per year and the biopsychosocial scale of the PABS-AT (r=0.132, *p*=.032) (see table 6 for summarized correlation results).

				95% confidence interval	
Means	Mean difference	Std. Error	Sig.	Lower Bound	Upper bound
34.04-34.99	-.946	1.061	0.809	-3.69	1.8
34.04-31.95	2.09	1.129	0.251	-.83	5.01
34.04-31.66	2.38	1.123	0.15	-.53	5.28
34.99-31.95	3.04*	1.135	0.039	0.1	5.97
34.99-31.66	3.33*	1.13	0.018	0.4	6.25
31.95-31.66	2.87	1.194	0.995	-2.80	3.37

Table 2. Tukey HSD post-hoc results between number of LBP patients/year and PABS-AT biomedical subscale
*.Mean difference significant at 0.05 level

Athletic Therapists (C-ATs) Results

Analysis of variance revealed a statistically significant difference among biomedical scores according to the number of LBP patients treated per year (F=4.7, *p*=.003, η^2=0.039, 95% CI). Post hoc comparisons using the Tukey HSD test revealed that C-ATs who treated 0-8 LBP patients a year (34.8±5.9) had a significantly higher biomedical score than C-ATs who treated >15-34 (31.8±6.3, *p*=.038), and >34 (31.0±6.7, p<.001) LBP patients a year (see table 3). Analysis of variance also identified a statistically significant difference in biomedical scores based on years experience (F=5.6, *p*<.001, η^2=0.056). Post hoc comparisons also indicated that therapists having 0-5 years of experience (33.9±5.4) had significantly higher biomedical scores than those having >9-15 (31.0±6.7, *p*=.011), and >15-24 (29.8±7.5, *p*<.001) years of experience (see table 4). Analysis of variance also revealed a statistically significant difference in biopsychosocial scores based on client type (F=3.9, *p*=.010, η^2=0.030). Post hoc comparisons, finally, indicated that C-ATs treating the general public had significantly higher biopsychosocial scores (31.7±4.0) than those C-ATs treating amateur elite athletes (31.3±3.5 *p*=.006) (see table 5). Independent t-tests indicated that C-ATs 35 years and younger had significantly higher biomedical (33.1±5.9) scores, than the biomedical (30.5±7.0, *p*<.001) scores

of C-ATs older than 35 years. There was a significant negative correlation between age (r=-.165, *p*=.001), and years experience (r=-.165, *p*=.001) and the biomedical scale of the PABS-C-AT (see table 6 for summarized correlation results).

				95% confidence interval	
Means	Mean Difference	Std. Error	Sig.	Lower Bound	Upper Bound
34.77-31.96	2.81	1.24	0.109	-.398	6.025
34.77-31.84	2.94*	1.10	0.038	0.112	5.767
34.77-31.05	3.73*	0.991	0.001	1.170	6.288
31.96-31.84	0.126	1.15	1	-2.833	3.085
31.96-31.05	0.915	1.05	0.818	-1.789	3.619
31.84-31.05	0.789	0.866	0.799	1.445	3.024

Table 3. Tukey HSD post-hoc results between number of LBP patients/ year and the PABS-C-AT biomedical subscale
*. Mean difference is significance at 0.05 level

				95% Confidence Interval	
Means	Mean Difference	Std. Error	Sig.	Lower Bound	Upper Bound
33.92-31.47	2.45	0.897	0.052	-.01	4.91
33.92-31.01	2.91*	0.90	0.011	0.45	5.37
33.92-29.79	4.13*	0.971	<0.001	1.47	6.79
33.92-31.84	2.08	1.44	0.597	-1.86	6.02
31.47-31.01	0.46	1.01	0.991	-2.30	3.22
31.47-29.79	1.68	1.07	0.52	-1.26	4.62
31.47-31.84	-.367	1.51	0.99	-4.50	3.76
31.01-29.79	1.22	1.07	0.787	-1.70	4.16
31.01-31.84	-.827	1.51	0.982	-4.60	3.30
29.79-31.84	-2.05	1.55	0.679	-6.30	2.21

Table 4. Tukey HSD post-hoc results between number of years experience and the PABS-C-AT biomedical subscale
*.Mean difference is significant.

Means Mean Difference		Std. Error	Sig.	95% confidence interval	
				Lower Bound	Upper Bound
31.73-31.34	0.39	0.734	0.953	-1.51	2.28
31.73-29.66	2.07*	0.632	0.006	0.44	3.7
31.73-30.88	0.88	0.527	0.369	-.51	2.21
31.34-29.66	1.68	0.888	0.232	-.61	3.97
31.34-30.88	0.47	0.816	0.940	-1.64	2.57
29.66-30.88	-1.22	0.726	0.339	-3.09	0.66

Table 5. Tukey HSD post-hoc results between client base and the PABS-C-AT biopsychosocial subscale
*.Mean difference Is significant at 0.05 level

	PABS-C-AT		PABS-AT	
Variable	Biomedical	Biopsychosocial	Biomedical	Biopsychosocial
Age	-0.165**	0.063	-.152*	-0.084
Years Experience	-0.165**	0.037	-0.520	0.054
LBP patients/year	-0.100	-0.009	-0.100	0.132*

Table 6. Pearson's correlations between age, years experience, and number of low back pain patients/year and the PABS-C-AT/AT subscales (biomedical and biopsychosocial).
*. Correlation is significant at 0.05 level.
**. Correlation is significant at 0.01 level

DISCUSSION

Previous research has primarily investigated PTs, GPs, chiropractors, and other paramedical therapists in relation to the 19 item PABS. [17,21,23-26,47] This current study aimed to characterize the biomedical and biopsychosocial beliefs and orientation of ATs and C-ATs, and is the first data to address measurement aspects of treatment orientation among ATs and C-ATs.

Number of low back pain patients treated per year and treatment orientation

One of the particular characteristics that influenced scoring on the PABS-AT/C-AT was the number of LBP patients treated per year. We noted that ATs and C-ATs who treated more LBP patients per year were more likely to have a lower biomedical score. This is similar to trends found in research using the fear avoidance model.[29,49] The fear avoidance model was originally designed to explain why some people developed chronic LBP and others did not. One of the reasons for examining the fear avoidance model was that there was a poor correlation between the actual tissue damage in a person with LBP and the patient's function. For example, a high percentage of people with a degenerative or bulging disc do not have LBP.[50] The poor

correlation between LBP imaging and reported pain was one of the reasons to examine biopsychosocial factors. Now, the fear avoidance is a robust predictor of function in people with LBP.[33] It is possible that ATs and C-ATs with more experience with treating LBP naturally come to realize that there is a poorer correlation between the lesion site of LBP and the function of that patient. This is noticeably different from our Athletic Training/therapy education. The Athletic Training/therapy education as well as almost all other HCPs is based on the biomedical approach. The biomedical approach includes a systematic assessment process from history to special tests to identify the lesion site of an injury and treat accordingly. While this system works for most injuries, it is becoming accepted that this does not work for chronic LBP; something that our study suggests ATs and C-ATs might be learning with experience over time.

Age, Experience, Client base and Treatment Orientation

For C-ATs only, we found that C-ATs who were older and had more years experience were more likely to have higher biopsychosocial scores, and C-ATs who primarily treated the general public were more likely to have lower biomedical scores. These findings further suggest that beliefs and attitudes of clinicians are pliable, in that, exposure to more patients with biopsychosocial needs, over time or population-based, leads to an adaptation of necessary treatment orientation. At a minimum, it seems important to expose our future ATs and C-ATs to more biopsychosocial evidence based studies to cement appropriate treatment orientation early on.

The higher reported mean biomedical score as compared to the reported mean biopsychosocial score of ATs and C-ATs suggests that, despite the required presence of psychological skills in educational competencies, there is still a disconnect between what is learned and what is required in practice. Since 1999, the Commission on Accreditation of Athletic Training Education required certain educational competencies to be taught and evaluated in athletic training education programs (ATEP). Currently, the 5th edition of the educational competencies, released in 2011, includes 8 content areas with one entitled "psychosocial strategies and referral" (PSR);[51] a reflection of the growing importance and recognition of psychosocial support during rehabilitation. However, research has showed that there are no existing specific and standardized guidelines regarding the actual instruction of the material,[52] and that still appears to be the case.

The CATA currently has 6 domains of educational competencies, and each domain is subdivided into 3 categories including "cognitive domain," "psychomotor domain," and "Affective Domain."[53] Psychosocial principles is not overtly listed, however, may fall under "psychology" which is listed. The educational competencies, alike the NATA's, were developed as a guide to entry-level curriculum design, but do not detail instructional methods for disseminating the material.[53] Interestingly, of the 7 Canadian universities with accredited athletic therapy programs, 4 universities have one core course entitled "psychology of sport," or a variation of that, one university provides one elective entitled "psychological skills in sport and life", and the other 2 do not offer a core or elective course entitled similarly at all.

Despite possible gaps in current education standards regarding biopsychosocial training, our research does present promising results observed between age, more years of experience, more back pain patients seen, and treatment orientation. Our results suggest that as ATs and C-ATs see more LBP patients, possible by treating more members of the general public, these clinicians will have lower biomedical scores. Furthermore, C-ATs who were older, and had more years experience were more likely to have higher biopsychosocial scores. These results suggest that with more exposure to psychological consequences of injury, ATs and C-ATs are more likely to utilize biopsychosocial techniques. Based on cited research, however, we need to ensure ATs and C-ATs are implementing the most effective and appropriate biopsychosocial methods.

It is necessary to note that a majority of ATs identified treating high school and college/university athletes as their primary client base, as compared to the majority of C-ATs who identified the general public as their primary client base. This is important because adolescents and elite athletes tend not to be chronic pain patients, but rather acute. Research has shown, however, that the functional level of patients with acute, primary, and unilateral ACL reconstruction was inversely related to fear of movement/(re)injury.[54] Chmielewski et al (2008) found that low scores on Tampa Scale of Kinesiophobia-II, a measure of fear of movement/(re)injury, was associated with high scores on the International Knee Documentation Committee form, a measure of functional limitation and knee symptoms. Further in patients with acute LBP, Swinkels-Meeswise et al (2006) found that pain related fear was the strongest predictor of physical performance. They reported that patients with higher pain related fear was associated with a shorter time period in which the patient was able to hold a weighted hand.[55] Injury in general, in college athletes, was found to negatively impact physical, psychological and social health dimensions and treatment strategies that use and target biopsychosocial aspects of

health were recommended to facilitate rehabilitation.[56] LBP injuries, in particular, are common in athletes. Trunk/back injuries account for 13.2% of all injuries in games, and 10.0% of all injuries in practices of the 15 sports examined by the National Collegiate Athletic Association injury surveillance system.[57] Utilizing psychosocial based treatment practices, therefore, is still important in adolescent athletic populations who will experience LBP.

Total Biomedical v Biopsychosocial score for ATs and C-ATs

AT's reported mean biomedical score (33.2±6.6) was higher than their mean biopsychosocial score (29.8±4.4). Moreover, C-AT's reported mean biomedical score (32.0±6.5) was higher than their mean biopsychosocial score (31.2±4.1). Despite interest in understanding the differences, we could not make a direct comparison between the reported biomedical and biopsychosocial scores, since these subscales measure two different constructs and are calculated using a different number of responses. Regardless, one possible reason for the nature of the biomedical score and biopsychosocial score may be the current educational guidelines that exist for both ATs and C-ATs.

Both the NATA and CATA have certain requisite educational competencies taught and evaluated in their training programs including for psychosocial principles. Research, however, has shown that there are no existing specific and standardized guidelines within the NATA regarding the actual instruction of the material,[52] and similarly, the instructional methods for disseminating the material are not detailed through the CATA either.[53] This is important to note because studies published around the release of the current NATA educational competencies in 2011, reported that ATs do not implement the most effective and appropriate psychosocial techniques, express low satisfaction with taught PSR content, and a desire to learn more about psychosocial strategies.[44,52,58] At a minimum, it seems important to determine whether future ATs and C-ATs may need exposure to biopsychosocial approaches linked to improved clinical outcomes so that educational curriculum can be updated accordingly.

Comparison of ATs and C-ATs orientation to existing studies

Although we can't make direct comparisons with other studies reported in the literature, the surveys' results provide some preliminary evidence that AT and C-AT's may not be providing care consistent with psychologically informed approaches. For example, HCPs in the

Netherlands and Sweden reported lower biomedical and higher biopsychosocial scores than our ATs and C-ATs. The Dutch PTs reported a mean biomedical score of 29.5, 2.6 and 4.1 points lower than our ATs and C-ATs, respectively. This mean biomedical score not only categorized the Dutch PTs as more biomedical oriented, but as well was associated with advice that was not inline with current LBP treatment guidelines. [21] The Swedish PTs reported scores on the PABS-PT scores before and after receiving biopsychosocial-based training. [59] Post-training, the mean biomedical score was decreased from 25.9 to 17.8, and the mean biopsychosocial score was increased from 41.4 to 43.5, and were associated with patient reports of high satisfaction with outcome. [59] Both the biomedical and biopsychosocial pre-training and post-training mean scores of the Swedish PTs are noticeably lower and higher than our AT's and C-AT's reported biomedical and biopsychosocial mean scores. Further, HCPs in Canada, New Zealand and the UK reported mean biomedical and mean biopsychosocial scores that were similar to our AT's and C-AT's, but were associated with recommendations against treatment guidelines, including delaying return to work and activity, [23,24] and with a general disuse of the treatment guidelines. [26] Based on the reported outcomes of these studies, we may want to ask whether ATs and C-ATs are providing optimal treatment advice, or whether patient satisfaction with treatment is high.

Our ATs and C-ATs reported mean biomedical scores were noticeably higher, and mean biopsychosocial scores were noticeably lower, as compared to the mean biomedical and biopsychosocial scores reported by PTs in the Beneciuk and George study (2015), previously mentioned in this paper. This is critical to recognize as Beneciuk and George's post-training scores are associated with better treatment outcomes (2015), but our ATs' and C-ATs' mean subscale scores do not compare at all. There is the suggestion, therefore, that AT's and C-AT's orientation may be affecting treatment outcome (see Table 7 for a summary of existing international studies 19 item PABS results). The Beneciuk and George (2015) study is also a good indicator of statistical versus clinical significance of PABS outcomes. Although our biomedical scores appear to be higher than our biopsychosocial score, it is difficult to determine what this would mean in a clinical setting. Beneciuk and George (2015) however, identify not only statistical but clinical significance as patients who reported better pain and disability outcomes received treatment from PTs whose mean biomedical score and mean biopsychosocial score were changed after receiving biopsychosocial based training. The results suggest that a

decrease of 4.5 points on the biomedical scale, and an increase of 5.5 points on the biopsychosocial scale produce meaningful change.

Study	Study type	Population	PABS Results		Study conclusions
			Biomedical subscale(SD)	Biopsychosocial subscale(SD)	
MacDougall, George & Dover	Cross-sectional	Canadian Athletic Therapists (C-AT)	32.0(6.5)	31.2(4.1)	C-ATs who are older, have more years experience, and treat more LBP patients/year= more likely to have lower biomedical score. C-ATs who primarily treat the general public=more likely to have higher biopsychosocial score.
MacDougall, George & Dover	Cross-sectional	American Athletic Trainers (AT)	33.2(6.6)	29.8(4.4)	ATs who treat more LBP patients/year=more likely to have lower biomedical score.
Beneciuk & George (2013)	Interventional	American Physical Therapists (PT)	Trained group: Pre 28.5 Post 24.0 6months post 23.0 Standard group: Pre 26.7 Post 28.7 6months later 26.7	Trained group: Pre 36.0 Post 41.5 6months post 40.5 Standard group: Pre 36.0 Post 36.7 6months later 36.1	Participants who received treatment from trained PTs were associated with significantly greater improvements in pain and disability outcomes as compared to those who received treatment from standard trained PTs.
Bishop et al. (2008)	Cross-sectional	United Kingdom General practitioners and Physiotherapists	GPS 30.9 PTs 31.1 overall 31.0	GPs 33.7 PTs 32.5 overall 33.0	Advice to remain off work (not in-line with LBP treatment guidelines) was significantly associated with higher biomedical and lower biopsychosocial scores of the HCPs.
Simmonds, Degharzarian & Vlaeyan. (2011)	Cross-sectional	Canadian Physiotherapists	31.14(6.7)	32.08(4.83)	Physiotherapists with a stronger biomedical orientation are more likely to recommend delay of return to work and activities, whereas physiotherapists with a stronger biopsychosocial orientation are more likely to encourage return to work and activity (in line with LBP guidelines).
Hendrick et al. (2012)	Cross-sectional	New Zealand Physiotherapists	31.12(6.67)	31.76(4.30)	Physiotherapists with a lower biomedical score was more likely to report that LBP guidelines are helpful in clinical decision making.
Houben et al. (2005)	Validation	Dutch Physiotherapists, Manual Therapists, Chiropractors, and McKenzie Therapists	29.5(7.9)	35.6(5.6)	Therapists with a stronger biomedical orientation view activitiy as more harmful than therapists with a stronger biopsychosocial orientation. Biomedical therapists may be more inclined to advise delaying activity and return to work compared to biopsychosocial oriented therapists.
Innes et al. (2012)	Cross-sectional	Australian Chiropractors	34.5(6.3)	31.4(4.1)	Practitioners who see larger numbers of patients per week were more likely to have a stronger biopsychosocial orientation.
Overmeer et al. (2009)	Interventional	Swedish Physiotherapists	Pre training: 25.9(7.6) Post training: 17.8(6.3)	Pre training: 41.4(4.8) Post training: 43.5(4.7)	Patients were equally satisfied with treatment before and after physiotherapists received training.

Table 7. Summary of existing international studies' who used the 19 item PABS

Future Directions

The nature of our research did not allow us to identify the potential effect that treatment orientation of ATs and C-ATs may have on treatment in terms of advice given, and most importantly patient outcome. Future researchers should aim to distinguish treatment orientation, and measure effects on rehabilitation outcomes.

Further, researchers have not pursued reducing PABS-AT/C-AT biomedical scores in athletic training and athletic therapy populations, but Stiller-Ostrowksi, Gould & Covassin (2009), for example, implemented an educational intervention designed to improve Athletic Trainers knowledge of and skills related to psychology of injury. The intervention mirrored how a course could be implemented within an athletic training education program. The intervention effectively increased ATs knowledge of psychology of injury from baseline to the end of the course, and although scores on the outcome measurements decreased post-intervention, they were still higher than those at baseline.[52] The study suggested that future educational interventions may be delivered to practicing ATs missing crucial components of psychosocial education, but that it may be more effective to develop multiple biopsychosocial courses delivered throughout a typical 4 year athletic training education programs. This is an important distinction to make because for a truly psychologically informed practice, therapists need to be able to incorporate elements of cognitive behavioural therapy and biopsychosocial approaches to enhance the usual treatment practices and patient management;[60] skills that don't necessarily develop through a continued education course.

LIMITATIONS

There are several limitations to the results of this study. The open-ended question design of some questions forced us to eliminate many respondents' answers; for example, those who chose to comment percentage of clientele instead of an approximate number when reporting low back pain patients seen per year. In a similar vein, we excluded a large number of respondents who did not complete the survey. A reason for non-completion may have been that respondents found the survey too extensive even though we informed the respondents of the estimated completion time of 10 minutes in the first email. The generalizability of our results may be hindered due to the lower response rate from our populations. Email invitations sent to American Athletic Trainers may have been construed as spam as they were sent from the created email

"universitylowbackpain@gmail.com" rather than one of our official university affiliated emails. If we were able to send an email from the NATA directly we may have had a better response rate. Notably, our CATA emails were sent from a university email, and we were able to get a better response rate for the CATA members. Our decision to include only one submission per IP address to ensure that respondents only submitted one response to the survey may have also limited our total response rate. There are some work environments including some clinics, universities/colleges, and high schools where employees share computers, and therefore, different respondents may have submitted a different response but through the same IP address. We have only collected the first response from each IP address. Many previous studies included patient vignettes[23] or patient treatment[17] to measure changes in treatment behaviour and advice. However, our study did not include anything of this nature so we cannot report correlations between the observed treatment orientation and actual treatment behaviour or advice. We also did not gather information on patient load, nor did we separate patients seen into evaluations and follow-ups.

CONCLUSIONS

The present study demonstrates that ATs and C-ATs may still retain a more biomedical approach to LBP treatment, but that further research is needed on the impact that AT's and C-AT's treatment orientation may have on patient outcomes. As well, in the current study, we can't infer causality or a temporal relationship from the finding that the number of LBP patients treated per year may change the biomedical orientation towards LBP for ATs and C-ATs, but it does provide another direction for future studies. Future research, should also aim to critically examine orientation acquisition through respective educational bodies, and how to shift existing orientations of practicing ATs and C-ATs.

APPENDIX

Table 1. Demographic and PABS-AT/C-AT mean results for 273 Athletic Trainers and 382 Athletic Therapists.

*.Significance at 0.05 level.

CHARACTERISTIC	ATHLETIC TRAINERS (N=273)			ATHLETIC THERAPISTS (N=382)		
		PABS-AT			PABS-C-AT	
	N(%)	BIOMEDICAL (SD)	BIOPSYCHOSOCIAL (SD)	N(%)	BIOMEDICAL (SD)	BIOPSYCHOSOCIAL (SD)
AGE	(N=272, excluded 1)					
<39	150(55)	33.5(6.6)	29.9(4.6) <35	219(57)	*33.1(5.9)	31.0(3.8)
>39	122(45)	32.9(6.5)	29.8(4.3) >35	163(43)	30.5(7.0)	31.6(4.4)
SEX	(N=272, excluded 1)					
Female	120(44)	33.6(7.0)	29.5(4.2)	251(66)	32.0(6.4)	31.3(3.9)
Male	152(56)	33.0(6.2)	30.1(4.6)	131(34)	32.0(6.8)	31.2(4.4)
YEARS EXPERIENCE						
0-5	62(23)	33.7(6.6)	29.5(4.2)	136(36)	33.9(5.4)	31.1(3.7)
>5-9	41(15)	33.9(6.8)	30.2(4.7)	80(21)	31.5(6.7)	30.9(4.0)
>9-15	45(16)	32.8(6.8)	29.8(4.5)	80(21)	*31.0(6.7)	31.3(3.9)
>15-24	62(23)	32.6(5.2)	29.9(3.7)	63(16)	*29.8(7.5)	32.1(5.0)
>24	62(23)	33.3(7.6)	29.9(4.9)	23(6)	31.8(5.8)	31.0(4.2)
EDUCATION						
Bachelors	61(22)	33.5(6.9)	29.8(4.0)	244(64)	32.2(6.5)	31.1(3.9)
Masters	192(70)	33.2(6.7)	29.7(4.5)	76(20)	31.6(29.7)	31.3(4.3)
PhD	19(7)	32.8(4.7)	31.2(4.6)	12(3)	29.7(9.1)	31.4(5.4)
Other	1(.4)	36.0	29.0	50(13)	31.6(6.7)	31.7(4.2)
CLIENT TYPE						
General public	34(13)	32.5(8.7)	30.9(4.9)	216(57)	32.0(7.0)	31.7(4.0)
High school athletes	121(44)	33.9(6.4)	29.9(4.0)	35(9)	31.6(6.0)	31.3(3.5)
Elite amateur athletes	8(3)	32.5(3.2)	29.1(5.2)	50(13)	33.1(5.7)	*31.3(3.5)
College/University athletes	83(30)	33.3(5.7)	29.8(4.2)	80(21)	31.2(5.9)	30.9(4.3)
Other	27(10)	31.5(7.6)	28.4(5.8)	-	-	-
LOW BACK PAIN PATIENTS/YEAR	(N=265, excluded 8)			(N=350,excluded 32)		
0-8	73(28)	34.0(5.9)	29.5(4.3)	57(16)	34.8(5.9)	30.7(3.2)
>8-15	71(27)	35.0(5.7)	29.6(4.1)	50(14)	32.0(6.7)	30.8(3.6)
>15-34	58(22)	*31.9(5.5)	30.2(4.4)	86(25)	*31.8(6.3)	31.1(4.6)
>34	58(22)	*31.7(8.6)	30.4(4.8)	156(45)	*31.0(6.7)	31.5(4.3)
JOB SETTING				(N=369, excluded 13)		
College/University	81(30)	33.5(5.8)	29.8(3.9)	75(20)	31.5(6.3)	31.4(4.2)
Secondary school	86(32)	33.9(5.9)	29.6(4.2)	20(5)	32.6(4.4)	31.0(3.9
Private clinic	14(5)	33.9(5.9)	29.9(4.2)	169(45)	31.9(7.1)	32.0(4.4)
Specialty clinic	30(11)	33.7(8.6)	29.7(6.0)	43(11)	32.9(6.5)	31.5(4.5)
Sports teams	7(2.5)	34.4(5.7)	29.9(3.1)	46(12)	32.9(6.2)	30.0(3.9)
Hospital	15(5)	32.9(5.4)	29.1(4.1)	3(1)	25.5(6.1)	31.3(7.6)
Emerging setting	9(3)	34.0(9.8)	27.2(5.9)	7(1)	31.3(4.1)	30.9(4.4)
Academic setting	7(2.5)	32.9(9.2)	29.3(7.9)	13(3)	30.9(5.2)	33.2(4.5)
Other	24(9)	30.3(8.4)	31.2(5.0)	12(2)	32.9(6.7)	30.0(2.7)
POST-PROFESSIONAL TRAINING						
Yes	260(95)	33.3(6.6)	29.9(4.4)	351(92)	34.1(6.3)	30.7(3.5)
No	13(5)	32.6(5.3)	28.5(5.4)	31(8)	31.8(6.5)	31.3(4.1)
SPECIALIZATION				(N=352,excluded 30)		
Yes	52(19)	32.8(6.7)	30.1(4.6)	86(24)	32.3(6.0)	31.2(3.8)
No	221(81)	33.4(6.5)	29.8(4.4)	266(76)	31.7(6.7)	31.3(4.2)
EPISODE OF LOW BACK PAIN						
Yes	212(78)	33.1(6.5)	30.0(4.4)	327(86)	32.0(6.7)	31.0(4.1)
No	61(22)	33.7(6.9)	29.1(4.6)	55(14)	32.1(5.5)	31.0(4.0)

Figure 4. 19 item Pain Attitudes and Beliefs Scale for Athletic Trainers/Athletic Therapists (PABS-AT/C-AT)

		Totally Disagree					Totally Agree
1	Mental stress can cause back pain even in the absence of tissue damage	1	2	3	4	5	6
2	The cause of back pain is unknown	1	2	3	4	5	6
3	pain is a nociceptive stimulus , indicating tissue damage	1	2	3	4	5	6
4	A patient suffering from severe back pain will benefit from physical exercise	1	2	3	4	5	6
5	Functional limitations associated with back pain are the result of psychosocial factors	1	2	3	4	5	6
6	Patients with back pain should preferably practice only pain free movements	1	2	3	4	5	6
7	Therapy may have been successful even if pain remains	1	2	3	4	5	6
8	Back pain indicates the presence of organic injury	1	2	3	4	5	6
9	If back pain increases in severity, I immediately adjust the intensity of my treatment accordingly	1	2	3	4	5	6
10	If therapy does not result in a reduction in back pain, there is a high risk of severe restrictions in the long term	1	2	3	4	5	6
11	Pain reduction is a precondition for the restoration of normal functioning	1	2	3	4	5	6
12	Increased pain indicates new tissue damage or the spread of existing damage	1	2	3	4	5	6
13	There is no effective treatment to eliminate back pain	1	2	3	4	5	6
14	Even if the pain has worsened, the intensity of the next treatment can be increased	1	2	3	4	5	6
15	If patients complain during exercise, I worry that damage is being caused	1	2	3	4	5	6
16	The severity of tissue damage determines the level of pain	1	2	3	4	5	6
17	Learning to cope with stress promotes recovery from back pain	1	2	3	4	5	6
18	Exercises that may be back straining should not be avoided during treatment	1	2	3	4	5	6
19	In the long run, patients with back pain have a higher risk of developing spinal impairments	1	2	3	4	5	6

Factor 1: 16, 12, 3, 9, 15, 6, 11, 10, 8, 19
Factor 2: 17, 4, 14, 18, 7, 2, 5, 13, 1

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