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Low Back Pain Treatment by Athletic Trainers and Athletic Therapists: Biomedical or Biopsychosocial Orientation?

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Context: Low back pain (LBP) remains a societal burden due to consistently high rates of recurrence and chronicity. Recent evidence suggested that a provider's treatment orientation influences patient beliefs, the clinical approach, and subsequently, rehabilitation outcomes.

Objective: To characterize American athletic trainer (AT) and Canadian athletic therapist (C-AT) treatment orientations toward LBP.

Design: Cross-sectional study.

Setting: Online survey.

Patients or Other Participants: A total of 273 ATs (response rate = 13.3%) and 382 C-ATs (response rate = 15.3%).

Main Outcome Measure(s): Participants completed demographic questions and the Pain Attitudes and Beliefs Scale (PABS) for ATs/C-ATs. The PABS measures the biomedical and biopsychosocial treatment orientation of health care providers and is scored on a 6-point Likert scale. Descriptive statistics characterized the participants; *t* tests and 1-way analyses of variance identified differences between group means; and Spearman correlations assessed relationships between the biomedical and biopsychosocial scores and age, number of LBP patients per year, and years of experience.

Results: Athletic trainers treating 9 to 15 LBP patients per year had higher biomedical scores (35.0 ± 5.7) than ATs treating 16 to 34 (31.9 ± 5.5, $P = .039$) or >34 (31.7 ± 8.6, $P = .018$) LBP patients per year. The C-ATs treating 16 to 34 (31.8 ± 6.3, $P = .038$) and >34 (31.0 ± 6.7, $P < .001$) LBP patients per year had lower biomedical scores than those treating ≤8 LBP patients per year (34.8 ± 5.9). The C-ATs with ≤5 years of experience had higher biomedical scores than those with 10 to 15 (31.0 ± 6.7, $P = .011$) and 16 to 24 (29.8 ± 7.5, $P < .001$) years of experience. Canadian athletic therapists treating the general public had higher (31.7 ± 4.0) biopsychosocial scores than ATs treating athletes (31.3 ± 3.5, $P = .006$). The C-ATs ≤35.6 years of age had higher biomedical scores (33.1 ± 5.9) than those >35.6 years of age (30.5 ± 7.0, $P < .001$).

Conclusions: Athletic trainers and C-ATs who treated more LBP patients per year were more likely to score low on a biomedical treatment orientation subscale. Because this orientation has predicted poor outcomes in other health care providers, further research is needed to determine the effects of ATs' and C-ATs' biomedical orientations on rehabilitation outcomes.

Key Words: athletic therapy, athletic training, health care providers

Key Points

- Athletic trainers and Canadian athletic therapists were more likely to consider low back pain from a biomedical orientation than from a biopsychosocial orientation.
- Treating more low back pain patients per year was associated with a lower level of biomedical orientation for athletic trainers and Canadian athletic therapists, suggesting that exposure to this patient population may influence beliefs.
- Years of experience and the patient population may influence Canadian athletic therapists' biopsychosocial and biomedical orientation toward patients with low back pain.

Low back pain (LBP) continues to be highly prevalent worldwide and was identified in the latest Global Burden of Disease Study[1] as the leading cause of disability globally. In the United States, LBP has been the leading noncommunicable condition contributing to years lived with disability since 1990.[2] In Canada, 50.9% of chronic pain sufferers identified the upper or lower back as the location of their pain.[3] The huge personal, societal, and economic costs of LBP have led to decades of research attempting to uncover its underlying mechanisms to improve treatment and recovery; however, the concerning prevalence of LBP may stem from the biomedical lens that once dominated early treatment practices and remains influential today.

The *biomedical/biomechanical model of disease* focuses on physical injury or tissue damage as the cause of pain and disability; therefore, related treatment practices focus on identifying the injury or 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 the

relationship between pain and injury has been exceedingly variable in laboratory and clinical studies. Inconsistencies among tissue injury, pain, and dysfunction versus the medical management of LBP have shifted researchers toward a different approach to treatment.

In contrast, *biopsychosocial concepts* emphasize the importance of addressing patient-oriented beliefs and attitudes, such as fear of pain and catastrophizing, which could lead to maladaptive behaviors that contribute to disability and chronic pain.[6,7] Promoted as the new theoretical framework for LBP treatment, the biopsychosocial model emphasizes understanding human behavior through interactions among the individual's biological, social, and psychological aspects.[8] Treatment practices encourage education on pain, elements of cognitive behavioral therapy, and graded exercise programs. Statistically and clinically significant improvements in patient outcomes have been observed with these methods.[9] Furthermore, guidelines for LBP treatment now promote an approach that includes biopsychosocial principles to aid health care providers (HCPs) in addressing these psychological responses and do not recommend biomedical/biomechanical advice and instruction.[10]

Health care providers' orientations toward LBP can influence rehabilitation and alter patient outcomes.[11–13] A biomedical orientation tends to focus on finding and treating pain as a consequence of physical injury, whereas a biopsychosocial orientation also addresses the psychological and social states of the patient.[14,15] The choice of treatment and advice given to the patient regarding activity and work restrictions are ways in which the treatment orientation has been documented as influencing rehabilitation.[16,17] Measuring the treatment orientation of HCPs is therefore important, and the Pain Attitudes and Beliefs Scale for Physiotherapists (PABS-PT) is a tool that was developed for this purpose.

The PABS-PT is a 2-factor scale.[15] The first 10-item factor addresses a biomedical orientation (the biomedical subscale), and the second 9-item factor describes a biopsychosocial orientation (the biopsychosocial subscale).[15] Using the PABS-PT, investigators[11] reported that patients who received treatment from biopsychosocial-oriented physiotherapists (PTs) described better disability and pain outcomes than patients who received treatment from biomedical-oriented counterparts. In another study,[18] PTs and general practitioners (GPs) who scored high on the biomedical subscale of the PABS-PT were more likely to give work and activity advice that was not in line with LBP treatment guidelines. These findings suggested that the treatment orientation of an HCP, regardless of exercise prescription, influenced the use of LBP guidelines and, ultimately, rehabilitation outcomes. The existing literature has focused on PTs, GPs, and other rehabilitation therapists, but we were unable to find data on athletic trainers (ATs) in the United States and athletic therapists in Canada (C-ATs), even though ATs and C-ATs treat patients with LBP from both the general and athletic populations. Therefore, the purpose of our study was to measure the treatment orientations of ATs and C-ATs regarding LBP. In addition, we investigated how these beliefs varied based on the volume of LBP patients and the experience of the AT or C-AT.

METHODS

The National Athletic Trainers' Association (NATA) generated a random list of 2075 active members who were willing to be notified about research studies. These members were contacted via e-mail, which contained a link to our survey. The Canadian Athletic Therapists Association (CATA), with a significantly smaller membership than that of the NATA, e-mailed all members (including students) with a link to the survey. Respondents were included in this analysis if they were active members of the NATA or CATA, whereas student respondents were excluded. Concordia University's Human Ethics Committee approved the survey (certificate of ethical responsibility #300006431), and participants were asked to consent at the beginning of the survey (if they disagreed, they were disqualified).

The survey asked demographic questions about sex, age, education level, years of experience, work setting, post-professional training, specialization, number of LBP patients per year, personal episodes of LBP, and client base; questions were open response or multiple choice. We used the PABS-PT[15] to assess treatment orientation, modifying the name of the survey from "…for Physiotherapists" to "…for Athletic Trainers" or "…for Athletic Therapists" according to our sample (Table 1). The 19 items of the PABS-AT/C-AT were rated using a 6-point Likert scale ranging from *totally disagree* to *totally agree*. Scores on the PABS-AT/C-AT were calculated by summing the indicated number (1–6) for every item in each subgroup. Therefore, the biomedical subscale (10 items) had a potential score of 10 to 60, and the biopsychosocial subscale (9 items) had a potential score of 9 to 54. The reliability of the PABS-PT was previously found[15] to be satisfactory for both the biomedical (Cronbach $\alpha = 0.80$) and the biopsychosocial (Cronbach $\alpha = 0.68$) subscales. Also, validity was determined by associations between the PABS-PT and measures of similar constructs, including the Health Care Providers' Pain and Impairment Relationship Scale and the Tampa Scale for Kinesiophobia, whereby the PABS-PT predicted a judgment of harmfulness for certain daily activities.[15] The 19-item version of the PABS with modification for provider type has been used to study PTs in New Zealand, Sweden, The Netherlands, Quebec, Canada, the United Kingdom, and the United States; GPs in the United Kingdom; and chiropractors in Australia.[11,15,17–21] The survey was hosted on SurveyMonkey.com (San Mateo, CA). Responses were matched to an Internet protocol address and were time stamped but remained anonymous. Response data were downloaded as a Microsoft Excel (version 2011 for Mac; Redmond, WA) spreadsheet.

We completed the data analysis using SPSS (version 24.0; IBM Corp, Armonk, NY) statistical software; the α level was set a priori at .05 for statistical significance. Descriptive data were generated for demographic, educational, and work characteristics; mean biomedical and biopsychosocial scores were calculated for all ATs and C-ATs; and *t* tests and analyses of variance were used to identify significant differences between groups. When an analyses of variance identified a significant difference, a Tukey post hoc analysis was used to confirm where the significant differences occurred between groups. Spearman correlations were used to assess relationships between the

Table 1. Pain Attitudes and Beliefs Scale for Athletic Trainers and Athletic Therapists[a]

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.[b]

	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

[a] Questionnaire is reproduced in its original form.

[b] 1 = *totally disagree*, 2 = *largely disagree*, 3 = *disagree to some extent*, 4 = *agree to some extent*, 5 = *largely agree*, and 6 = *totally agree*.

biomedical and biopsychosocial scores and the AT or C-AT characteristics, including age, number of LBP patients per year, and years of experience.

RESULTS

Of the 2075 NATA-registered ATs invited to participate in our survey, 23 (1.1%) surveys were returned to the sender with error messages indicating incorrect addresses. Of the 2052 delivered e-mails, 355 members responded (response rate = 17.3%). We then excluded 82 respondents (9 were missing >1 response on each subscale of the PABS-AT, and 73 did not start or complete the survey). The total sample of ATs analyzed after exclusion (n = 273) was 13.3% of the total sample contacted.

The CATA contacted all approximately 2500 members to participate in our survey, and 484 responded (response rate = 19.4%). We excluded 102 respondents (9 were missing >1 response on each subscale of the PABS–C-AT, 76 did not complete the survey, and 17 were students). The total sample of C-ATs analyzed after exclusion (n = 382) was 15.3% of the total sample contacted.

When a respondent had only 1 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 no method has been published for dealing with missing data on the PABS-PT, our approach is an accepted solution to missing self-reported quantitative data.[18,22] During the analysis of demographic groups, we removed respondents who did not provide an answer or whose answers were not numeric (eg, "enough" in the category "low back pain patients per year").

Most ATs were female (56%) and had a master's degree (70%; Table 2). Because of the overall older population of ATs who responded compared with C-ATs, it is important to report the median values of interest. The majority of ATs who worked primarily in secondary schools treated a median (interquartile range) of 10 (7.5–23) LBP patients per year. As well, most of the ATs who identified high school athletes as their primary client base treated a median (interquartile range) of 11.5 (5–24.5) LBP patients per year, whereas the 34% of those who mostly treated the general public treated a median (interquartile range) of 50 (12–100) LBP patients per year. The youngest AT was age 22 and the oldest was age 75; the average age was 39.8 years.

Most C-ATs were female (66%), had a bachelor's degree (64%), and treated a client base of the general public (57%; means reported in Table 2). (Again because the data were skewed toward the younger population, we report the median values of interest.) The majority of C-ATs who worked primarily in private clinics treated a median (interquartile range) of 50 (25–150) LBP patients per year. Also, most of the C-ATs who identified the general public as their primary client base treated a median (interquartile range) of 50 (20–100) LBP patients per year. Interestingly, 13% (mean) of C-ATs chose *other* for their education, which included diplomas and postgraduate studies. One of the most frequently attended accredited athletic therapy institutions in Canada is Sheridan College. For a while, Sheridan College graduates earned a diploma for sports injury management, which explains the large number of *other* responses in this category. The youngest C-AT was age 21 and the oldest was age 69; the average age was 35.6 years.

Table 2. Demographic Characteristics and PABS-AT/C-AT Results for ATs and C-ATs

	Athletic Trainers (n = 273), PABS-AT			Athletic Therapists (n = 382), PABS-C-AT		
		Biomedical	Biopsychosocial		Biomedical	Biopsychosocial
Characteristic	n (%)	Mean ± SD		n (%)	Mean ± SD	
Age, y (n = 272)						
≤39.8	150 (55)	33.5 ± 6.6	29.9 ± 4.6			
>39.8	122 (45)	32.9 ± 6.5	29.8 ± 4.3			
≤35.6				219 (57)	33.1 ± 5.9[a]	31.0 ± 3.8
>35.6				163 (43)	30.5 ± 7.0	31.6 ± 4.4
Sex (n = 272)						
Female	152 (56)	33.6 ± 7.0	29.5 ± 4.2	251 (66)	32.0 ± 6.4	31.3 ± 3.9
Male	120 (44)	33.0 ± 6.2	30.1 ± 4.6	131 (34)	32.0 ± 6.8	31.2 ± 4.4
Years of experience						
0–5	62 (23)	33.7 ± 6.6	29.5 ± 4.2	136 (36)	33.9 ± 5.4	31.1 ± 3.7
6–9	41 (15)	33.9 ± 6.8	30.2 ± 4.7	80 (21)	31.5 ± 6.7	30.9 ± 4.0
10–15	45 (16)	32.8 ± 6.8	29.8 ± 4.5	80 (21)	31.0 ± 6.7[b]	31.3 ± 3.9
16–24	62 (23)	32.6 ± 5.2	29.9 ± 3.7	63 (16)	29.8 ± 7.5[b]	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						
Bachelor's	61 (22)	33.5 ± 6.9	29.8 ± 4.0	244 (64)	32.2 ± 6.5	31.1 ± 3.9
Master's	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 base						
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	29.7 ± 3.7[c]
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	NA	NA	NA
Low back pain patients treated per year	(N = 265)			(N = 350)		
0–8	73 (28)	34.0 ± 5.9	29.5 ± 4.3	57 (16)	34.8 ± 5.9	30.7 ± 3.2
9–15	71 (27)	35.0 ± 5.7	29.6 ± 4.1	50 (14)	32.0 ± 6.7	30.8 ± 3.6
16–34	58 (22)	31.9 ± 5.5[d]	30.2 ± 4.4	86 (25)	31.8 ± 6.3[e]	31.1 ± 4.6
>34	58 (22)	1.7 ± 8.6[d]	30.4 ± 4.8	156 (45)	31.0 ± 6.7[e]	31.5 ± 4.3
Job setting				(N = 369)		
College or 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
Postprofessional 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)		
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
Personal 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

Abbreviations: AT, athletic trainer; C-AT, Canadian athletic therapist; NA, not applicable; PABS, Pain Attitudes and Beliefs Scale.

[a] The biomedical score of C-ATs ≤35.6 years old was different from that of C-ATs >35.6 years old as indicated by *t* test ($P < .001$).

[b] The biomedical score of C-ATs with 10 to 15 and 16 to 24 years' experience were different from that of C-ATs with 0 to 5 as indicated by the Tukey honestly significant difference test ($P = .011$ and $P < .001$, respectively).

[c] The biopsychosocial score of C-ATs treating elite amateur athletes was different from that of those treating the general public ($P = .006$).

[d] The biomedical score of ATs who treated 16 to 34 and >34 low back pain patients per year was different from that of ATs who treated 0 to 8 low back pain patients per year ($P = .039$ and $P = .018$, respectively).

[e] The biomedical scores of C-ATs who treated 16 to 34 and >34 low back pain patients per year were different from the score of C-ATs who treated 0 to 8 low back pain patients per year ($P = .038$ and $P < .001$, respectively).

Table 3. Spearman Correlations Between Age, Years of Experience, and Number of Low Back Pain Patients Treated per Year and the PABS-AT/C-AT Subscales (Biomedical and Biopsychosocial)

	PABS-AT		PABS-C-AT	
Variable	Biomedical	Biopsychosocial	Biomedical	Biopsychosocial
Age	−0.147[a]	−0.104	−0.185[b]	0.088
Years of experience	−0.052	0.054	−0.166[b]	0.044
Low back pain patients treated per year	0.100	0.132[a]	−0.102	−0.010

Abbreviations: AT, athletic trainer; C-AT, Canadian athletic therapist; PABS, Pain Attitudes and Beliefs Scale.

[a] Correlation was significant at the 0.05 level.

[b] Correlation was significant at the 0.01 level.

Athletic Trainers

Biomedical scores differed based on the number of LBP patients treated per year ($F = 4.1$, $P = .007$). Post hoc comparisons using the Tukey honestly significant difference (HSD) test revealed that ATs who treated 9 to 15 LBP patients per year had a higher biomedical score (35.0 ± 5.7) than ATs who treated 16 to 34 (31.9 ± 5.5, $P = .039$) or >34 LBP patients per year (31.7 ± 8.6, $P = .018$; Table 2). The biomedical and biopsychosocial scores did not differ based on age, years of experience, or client base. A negative correlation was present between age ($r = –0.147$, $P = .015$) and the biomedical subscale score of the PABS-AT, and a positive correlation was observed between the average number of LBP patients treated per year and the biopsychosocial subscale score of the PABS-AT ($r = 0.132$, $P = .032$; Table 3).

Canadian Athletic Therapists

Biomedical scores differed according to the number of LBP patients treated per year ($F = 4.7$, $P < .003$). Post hoc comparisons using the Tukey HSD test revealed that C-ATs who treated 0 to 8 LBP patients per year (34.8 ± 5.9) had a higher biomedical score than C-ATs who treated 16 to 34 (31.8 ± 6.3; $P = .038$) or >34 (31.0 ± 6.7; $P < .001$) LBP patients per year (Table 2). Biomedical scores also differed based on years of experience ($F = 5.6$, $P < .001$). Post hoc comparisons indicated that therapists with 0 to 5 years of experience (33.9 ± 5.4) had higher biomedical scores than those with 10 to 15 (31.0 ± 6.7, $P = .011$) or 16 to 24 (29.8 ± 7.5; $P < .001$) years of experience. In addition, biopsychosocial scores varied with the client base ($F = 3.9$, $P = .010$). A post hoc Tukey HSD test showed that C-ATs treating the general public had higher biopsychosocial scores (31.7 ± 4.0) than those treating amateur elite athletes (29.7 ± 3.7; $P = .006$; Table 2). Independent t tests indicated that C-ATs ≤35.6 years old had higher biomedical scores (33.1 ± 5.9) than those >35.6 years old (30.5 ± 7.0; $P < .001$; Table 2). A negative correlation was noted between age ($r = –0.185$, $P < .001$) and years of experience ($r = –0.166$, $P = .001$) and the biomedical scale score of the PABS–C-AT (Table 3).

DISCUSSION

Previous researchers[11,15,17–21] investigated the pain-oriented beliefs of PTs, GPs, chiropractors, and other clinicians using the 19-item PABS. We aimed to characterize the biomedical and biopsychosocial beliefs and orientations of ATs and C-ATs. To our knowledge, these are the first data to measure treatment orientations among ATs and C-ATs. In other populations of HCPs, treatment orientation has been associated with changes in LBP patient outcomes. Because ATs and C-ATs treat LBP patients in the active and general populations, it is important for us to understand their orientations toward LBP treatment.

The ATs and C-ATs who treated more LBP patients per year had lower biomedical scores. Also, C-ATs who were older and had more years of experience displayed higher biopsychosocial scores, and C-ATs who primarily treated the general public had lower biomedical scores.

Although cross-sectional studies do not allow for causal inferences, many potential explanations are possible for these findings. We speculate that after treating more people with chronic LBP, ATs and C-ATs may naturally come to realize the poor correlation between the lesion site of LBP and patient function. This concept is similar to the biopsychosocial approach to LBP rehabilitation, which is noticeably different from the standard athletic training or health profession educational approach. Athletic training education, as well as education for almost all other HCPs, is based on the biomedical approach, which includes a systematic assessment process (from history to special tests) for identifying the lesion site of an injury and then treating it accordingly. Although this strategy works for most injuries, it is becoming accepted that the biomedical approach does not adequately explain the clinical nuances of chronic LBP, which ATs and C-ATs might be learning with experience and exposure over time. Another possible explanation may be postgraduate training. We found no relationship between education or specialized training and pain-oriented beliefs, but previous authors[17] reported lower biomedical scores and higher biopsychosocial scores among physiotherapists with postprofessional training in chronic pain management. Cultural aspects have been suggested as being influential as well.[23] At a minimum, we may need to increase exposure to biopsychosocial evidence-based studies to guide appropriate treatment orientations in future ATs and C-ATs.

Our sample of ATs responding to this survey described primarily treating high school and collegiate or university athletes. These practice settings may have predisposed them to see more patients with acute versus chronic injuries[24,25] and consequently believe that biopsychosocial principles were less effective with their practice population, a belief that is not supported by the literature.[26,27] Maladaptive pain beliefs, such as risk avoidance, delay recovery during the acute and subacute phases as well. Therefore, ATs should be able to appropriately incorporate biopsychosocial strategies with acutely injured patients to address psychological distress before chronic pain develops[28]—for example, earlier detection of when high levels of

Table 4. Summary of Existing International Studies Using 19 Items as Compared With ATs' and C-ATs' Pain Attitudes and Beliefs Scale Results

Study	Study Type	Population	Pain Attitudes and Beliefs Scale Results: Biomedical Subscale	Pain Attitudes and Beliefs Scale Results: Biopsychosocial Subscale	Study Conclusions
			Mean ± SD		
Current study	Cross-sectional	C-ATs	32.0 ± 6.5	31.2 ± 4.1	C-ATs who were older, had more years of experience, and treated more LBP patients/year were more likely to have lower biomedical scores. C-ATs who primarily treated the general public were more likely to have higher biopsychosocial scores.
Current study	Cross-sectional	ATs	33.2 ± 6.6	29.8 ± 4.4	ATs who treated more LBP patients/year were more likely to have lower biomedical scores.
Simmonds et al[17] (2012)	Cross-sectional	Canadian PTs	31.14 ± 6.7	32.08 ± 4.83	PTs with a stronger biomedical orientation were more likely to recommend delay of return to work and activities, whereas PTs with a stronger biopsychosocial orientation were more likely to encourage return to work and activity (in line with LBP guidelines).
Hendrick et al[20] (2013)	Cross-sectional	New Zealand PTs	31.12 ± 6.67	31.76 ± 4.30	PTs had a lower biomedical score.
Houben et al[15] (2005)	Validation	Therapists, chiropractors, and McKenzie therapists	29.5 ± 7.9	35.6 ± 5.6	Dutch PTs reported that LBP guidelines were helpful in clinical decision making. Therapists with a stronger biomedical orientation viewed activity 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 with biopsychosocial-oriented therapists.
Innes et al[21] (2015)	Cross-sectional	Australian chiropractors	34.5 ± 6.3	31.4 ± 4.1	Practitioners who saw larger numbers of patients per week were more likely to have a stronger biopsychosocial orientation.
Overmeer et al[33] (2009)	Interventional	Swedish PTs	Pretraining: 25.9 ± 7.6 Posttraining: 17.8 ± 6.3	Pretraining: 41.4 ± 4.8 Posttraining: 43.5 ± 4.7	Patients were equally satisfied with treatment before and after PTs received training.
			Other Information, Mean		
Beneciuk and George[11] (2015)	Interventional	PTs	Trained group: Pre 28.5 Post 24.0 6 mo post 23.0 Standard group: Pre 26.7 Post 28.7 6 mo later 26.7	Trained group: Pre 36.0 Post 41.5 6 mo post 40.5 Standard group: Pre 36.0 Post 36.7 6 mo later 36.1	Participants who received treatment from trained PTs were associated with greater improvements in pain and disability outcomes as compared with those who received treatment from standard trained PTs.
Bishop et al[18] (2008)	Cross-sectional	UK general practitioners and PTs	General practitioners 30.9 PTs 31.1 Overall 31.0	General practitioners 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 health care providers.

Abbreviations: AT, Athletic trainer; C-AT, Canadian athletic therapist; LBP, low back pain; PT, physiotherapist.

fear and avoidance are delaying activity progression after an acute injury and being able to adjust the treatment approach to directly alleviate the fear.

Studies from Canada,[17] New Zealand,[20] and the United Kingdom[18] indicate discouraging associations between treatment orientation and treatment behavior. Similar mean biomedical and biopsychosocial scores were associated with other HCPs' recommendations against (including delaying return to work and activity)[17,18] and disuse of the treatment guidelines (Table 4).[20] The reasons for misuse or disuse of treatment guidelines are concerning in that such behavior can have a negative effect on patient outcomes. For example, researchers[11] measuring the effect of biopsychosocial training on PTs described positive associations between treatment orientation and patient disability and pain outcomes. Specifically, posttraining biopsychosocial scores >40 were associated with less disability and pain in patients receiving treatment for LBP.[11]

FUTURE DIRECTIONS

This area of research would benefit from further measurement of factors influencing ATs' and C-ATs' treatment orientations and of the influence of orientation on patient outcomes. One potential step is to pursue reducing PABS–AT/C-AT biomedical scores in athletic training and athletic therapy populations, which has not yet been undertaken. Both the NATA and CATA have required certain educational competencies to be taught and evaluated in their training programs, including psychosocial principles, but neither organization provides specific and standardized guidelines regarding the actual instruction and dissemination of the material.[29,30] This is important because studies[29,31,32] published around the time of release of the current NATA educational competencies (2011) showed that ATs did not implement the most effective and appropriate psychosocial techniques, expressed low satisfaction with taught psychosocial interventions and referral content, and wished to learn more about psychosocial strategies. Future educational interventions, therefore, may be delivered to practicing ATs who lack crucial components of psychosocial education through continuing education courses, workshops, or conferences, but it may be more effective to deliver multiple biopsychosocial courses throughout a typical athletic training education program.[29] This is an important distinction because, although postgraduate training has been demonstrated as effective in influencing treatment orientation,[11,33] for a truly psychologically informed practice, therapists need to be able to incorporate elements of cognitive behavioral therapy to enhance their usual treatment practices and patient management.[34] These skills require practice and feedback from a mentor, an educational approach that is not typically offered in traditional continuing education courses.[35] Consequently, future researchers should aim to critically examine the acquisition of a biopsychosocial treatment orientation through educational bodies and how to enhance this orientation in practicing ATs and C-ATs.

LIMITATIONS

This study had several limitations. The open-ended design of some questions forced us to eliminate many respondents' answers: for example, those who chose to report a percentage instead of an approximate number of LBP patients seen per year. In a similar vein, we excluded a large number of respondents who did not complete the survey. One reason for noncompletion may have been that respondents found the survey too extensive, even though we informed them of the estimated 10-minute completion time in the first e-mail. The generalizability of our results may be hindered by the lower response rates from our populations. In addition, only a sample of the NATA population was contacted (a little more than 2000 ATs), whereas the entire CATA population was contacted (approximately 2500 people). Some of the e-mailed invitations sent to ATs may have been construed as spam because they were from the created e-mail "universitylowbackpain@gmail.com" rather than 1 of our official university-affiliated e-mails. If we had been able to send an e-mail from the NATA directly, we might have had a better response rate. Notably, our CATA e-mails were sent directly from a CATA representative, and the response rate was better. Our decision to include only 1 submission (the first) per Internet protocol address (to ensure that respondents completed the survey only once) may have also limited our total response rate (eg, in work environments where employees share computers). Many previous investigators included patient vignettes[17] or described patient treatments[11] to measure changes in treatment behavior and advice. We did not include these measures, so we cannot report on correlations between the observed treatment orientation and actual treatment behavior or advice. We selected age comparisons a priori that would come close to balancing the samples; however, this created different age categories between ATs and C-ATs that are difficult to compare. We also did not gather information on patient load, nor did we separate patients according to initial evaluations or follow-ups.

CONCLUSIONS

Athletic trainers and C-ATs may apply a more biomedical-oriented approach to LBP treatment, and such an orientation may represent a disconnect between what was learned during training and what is required in practice. Specifically, our survey findings suggest that gaps remain regarding the implementation of biopsychosocial training in the current educational standards. These results do not indicate that ATs and C-ATs should leave their biomedical orientation behind completely, but instead, they should adopt a psychologically informed approach to better address patients with LBP.

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