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Clinical Specialization and Adherence to Evidence-Based Practice Guidelines for Low Back Pain Management: A Survey of US Physical Therapists

STUDY DESIGN: Electronic cross-sectional survey.

BACKGROUND: The American Physical Therapy Association (APTA) evidence-based practice guideline for low back pain (LBP) elaborated on strategies to manage nonspecific LBP in routine physical therapy practice. This guideline described LBP associated with mobility deficit, leg pain and a directional preference, coordination impairment (lumbar instability), and fear-avoidance behavior.

OBJECTIVES: To assess American physical therapists' adherence to the clinical practice guidelines (CPGs) for LBP of the Orthopaedic Section of the APTA, and to compare adherence among physical therapists with different qualifications.

METHODS: The investigators contacted 1861 members of the Orthopaedic Section of the APTA and 1000 members of the American Academy of Orthopaedic Manual Physical Therapists (AAOMPT). Participants made treatment choices for 4 clinical vignettes: LBP with mobility deficit, coordination impairment, leg pain (directional preference), or fear-avoidance behavior. The investigator used logistic regression analyses to compare guideline adherence among physical therapists with the following qualifications: orthopaedic clinical specialists (PTOs), Fellows of the AAOMPT (PTFs), PTOs and PTFs (PTFOs), and physical therapists without clinical specialization but with a musculoskeletal interest (PTMSs).

RESULTS: A total of 410 physical therapists completed all sections of the survey (142 PTOs, 110 PTFOs, 74 PTFs, and 84 PTMSs). Adherence to the APTA's CPG was highest for LBP associated with leg pain and a directional preference (72.2%), followed by LBP with mobility deficit (57.1%), LBP with coordination impairment (46.1%), and fear-avoidance behavior (29.5%). Physical therapists who were PTFOs adhered better to the CPG for LBP than did PTMSs for all 4 patient vignettes. Orthopaedic clinical specialists adhered better to the CPG for LBP for the vignettes of mobility deficit and of LBP with fear-avoidance behavior than did PTMSs.

CONCLUSION: Physical therapists who were PTFOs and PTOs adhered better to the CPG than did PTMSs. Based on our preliminary results, further education on the CPG for LBP management is needed, particularly for managing LBP with coordination impairment and with fear-avoidance behavior. *J Orthop Sports Phys Ther 2017;47(5):347-358. Epub 3 Mar 2017. doi:10.2519/jospt.2017.6561*

KEY WORDS: *fellow of orthopaedic manual therapy, orthopaedic clinical specialists, physical therapy, survey*

Low back pain (LBP) is the most common musculoskeletal condition seen by American physical therapists.[15] In 2005, American spine health care costs were approximately $85 billion.[49] These costs have increased over the last 10 years, particularly for physician specialists.[20,25] Early physical therapy intervention before physician consultation may reduce LBP health care cost.[29-31] Early physical therapy intervention based on evidence-based practice (EBP) has been shown to reduce health care costs, and there is strong evidence to support the cost-effectiveness of nonsurgical treatments for LBP endorsed by EBP guidelines.[14,46] Evidence-based practice is the gold standard clinical practice method for physical therapists and other health care professionals.[52,55,58] To facilitate the use of EBP, researchers have published clinical practice guidelines (CPGs) to help clinicians make decisions about the best health care for LBP. These CPGs function to influence clinical decision making by presenting the clinician with clear recommendations about what to do in particular situations.[12]

In the last 10 years, 7 American EBP CPGs were published to influence clinical decision making for the nonsurgical management of LBP.[15,17,22,32,33,63,65] Two of these guidelines were monodisciplinary (chiropractic and osteopathic) and focused on spinal manipulation, but did not comprehensively address treatment strategies employed by physical therapists.[32,63] For

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example, they did not discuss management of LBP associated with leg pain and a directional preference, nor did they address LBP associated with fear-avoidance behavior. Four guidelines[15,17,33,65] were multidisciplinary and had a primary care focus that did not include routine physical therapy specialist care[11,42]; for example, they did not explain how to prioritize when spinal manipulation should be used versus exercise (directional preference or stabilization), nor did they describe when directional preference exercises should be utilized versus stabilization exercises.[15,33] The Orthopaedic Section of the American Physical Therapy Association (APTA) published the remaining guideline for LBP management.[22] This study was the first to investigate adherence to these APTA CPG recommendations.

The APTA CPG is consistent with American multidisciplinary guidelines for LBP and specifies when to prioritize certain exercises and/or spinal manipulation. The APTA guideline and the American multidisciplinary guidelines recommend that clinicians educate patients to stay active, to pursue an active lifestyle, and to avoid passive interventional approaches (laser, ultrasound, electrical therapy, cryotherapy) when managing patients with LBP.[15,17,33,65] However, the broad treatment recommendations for exercise and spinal manipulation in multidisciplinary guidelines were not geared to the physical therapy audience and could omit contextual details unique to physical therapy musculoskeletal care.[11] The APTA CPG for management of LBP helps practitioners identify contextual clinical patterns (treatment-based classification subgroups)[18,19,21] unique to physical therapy to assist clinicians in optimizing patient outcomes.[22,27] Identification and management of clinical patterns are an important part of physical therapy education and are essential in professional specialization.[18,19,21]

The *Guide to Physical Therapist Practice* indicates that clinical specialization is crucial to help clinicians advance their clinical skills and optimize patient outcomes.[5] Clinical specialization has been shown to be associated with better patient functional outcomes[54,56] and better clinical decision making when diagnosing and managing musculoskeletal disorders.[39] In its 2020 vision, the APTA anticipates specialist physical therapists to lead the profession in the management of movement disorders.[3,4] The American Board of Physical Therapy Residency and Fellowship Education confers 2 specialty credentials in the field of LBP management: orthopaedic clinical specialization (OCS) and fellowship in orthopaedic manual therapy (FOMT).[2] It is unclear whether physical therapists with an OCS (PTOs) or with a FOMT (PTFs) adhere to EBP guidelines and thus set an example for the profession when managing LBP.

The purpose of the current investigation was to describe and to compare the adherence to EBP guidelines for LBP among physical therapists with distinct clinical qualifications. More specifically, the first objective of the current investigation was to describe how physical therapists with different clinical credentials—PTOs, PTFs, physical therapists with both OCS and FOMT credentials (PTFOs), and physical therapists with a musculoskeletal interest without a clinical specialization (PTMSs)—adhere to EBP guidelines for LBP with mobility deficit (hypomobility/somatic dysfunction), coordination impairment (lumbar instability), leg pain and a directional preference (discogenic pain), or fear-avoidance behavior. The second objective of the study was to determine whether physical therapist specialization (PTFOs, PTFs, PTOs, or PTMSs) was a predictor of adherence to practice guidelines for LBP with mobility deficit, coordination impairment, leg pain and a directional preference, or fear-avoidance behavior.

METHODS

Subjects

The authors recruited participants from the Orthopaedic Section of the APTA and the American Academy of Orthopaedic Manual Physical Therapists (AAOMPT). At the time of the data collection (December 2014 to February 2015), the Orthopaedic Section of the APTA had approximately 11 789 PTMSs and 5349 PTOs, and the AAOMPT had 1000 PTFs.[1,6] Note that 810 PTFs were members of both the AAOMPT and the Orthopaedic Section of the APTA (personal communication with AAOMPT Association Coordinator Melanie Taylor, November 2015). Therefore, the target population was a total of 17 328 physical therapists.

The investigators wanted the sample to represent the targeted population of 17 328 with a margin of error of ±5 percentage points (95% confidence interval [CI]) for a dichotomous outcome variable; hence, the investigators needed a sample of approximately 376 individuals (PTFs, PTOs, and PTMSs) to represent the combined population above.[13] Based on recent electronic survey response rates for health care professionals (ranging from 10% to 17%),[35,37,43] the plan was to e-mail 3000 potential participants to obtain an estimated sample between 300 and 510 participants. The authors attempted to contact all PTFs (approximately 1000 individuals) from the AAOMPT and a random sample of 2000 APTA Orthopaedic Section members (stratified into 1000 PTOs and 1000 PTMSs). The authors obtained a random sample of 1000 PTOs and 1000 PTMSs. However, only 861 of the 1000 PTOs had an e-mail address. Thus, the authors sent the recruitment e-mail to 2861 subjects: 1000 PTFs, 861 PTOs, and 1000 PTMSs (**FIGURE**).

Research Design

The investigation had a cross-sectional design. The data for the study were collected with an electronic survey (**APPENDICES A** and **B**, available at www.jospt.org). The study was approved by the Institutional Review Board of the Health Professions Division committee at Nova Southeastern University. Subjects consented electronically prior to participating in the study. Participants were asked

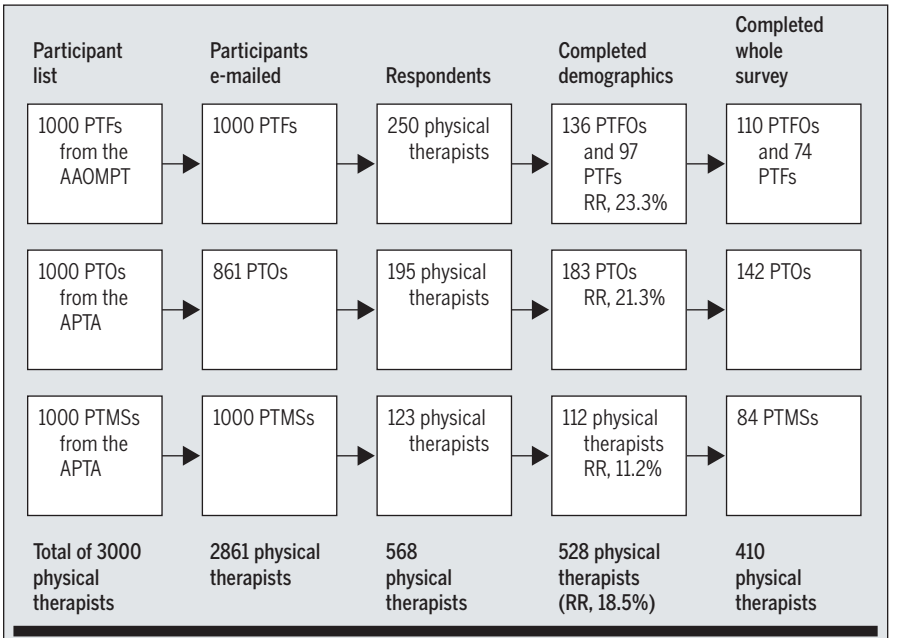

FIGURE. Subject selection proces from potential participants to final sample. Abbreviations: AAOMPT, American Academy of Orthopaedic Manual Physical Therapists; APTA, American Physical Therapy Association; PTF, fellow of orthopaedic manual therapy; PTFO, physical therapist with both fellowship and orthopaedic specialization; PTMS, physical therapist with musculoskeletal interest; PTO, physical therapist with orthopaedic clinical specialization; RR, response rate.

to make their management choices based on hypothetical patient vignettes, as in prior studies.[7,39,43,44] Clinical vignettes are valid and acceptable tools to measure clinical decision making and observance of EBP guidelines.[8,39,57] Study participants were presented with 4 distinct vignettes (**APPENDIX B**): (1) acute LBP with mobility deficit (hypomobility/somatic dysfunction), (2) acute LBP with movement coordination impairment (lumbar instability), (3) acute LBP with associated lower extremity pain (discogenic pain with a directional preference), and (4) subacute LBP with signs and symptoms of fear-avoidance behavior.

For the purpose of determining adherence to EBP guidelines, the physical therapists were instructed to select a minimum of 1 and a maximum of 5 preferred management procedures (**APPENDIX B**) that they would use to manage the patient in each of the 4 clinical scenarios during the first week of treatment. Adherence to EBP guidelines was based on recommendations from the LBP CPG from the APTA Orthopaedic Section[22] and applied to the 4 clinical vignettes previously discussed (**APPENDIX B**).

For a physical therapist to meet adherence standards for the first patient with acute LBP and mobility deficits (manipulation group), the physical therapist had to select spinal manipulation (thrust or nonthrust) plus exercise (strengthening and/or coordination/stability) or education to stay active and pursue an active lifestyle. For the second patient with acute LBP and coordination impairment (stabilization group), the physical therapist had to choose coordination exercises (strengthening and stability exercises) plus education (stay active and pursue an active lifestyle or symptom-relieving posture/movements). For the third patient with acute LBP and related lower extremity pain (specific directional preference), the physical therapist had to choose directional preference exercise plus education (stay active and pursue an active lifestyle or symptom-relieving posture/movements). For the fourth patient with subacute LBP and signs and symptoms of fear-avoidance behavior, the physical therapist had to choose strategies/education to address fear of movement and education to stay active and pursue an active lifestyle.

To assess guideline adherence, the physical therapist had to select all interventional options required in each specific patient vignette. If the physical therapist selected additional interventions that were not part of the criteria, the physical therapist was still considered guideline adherent. For example, for LBP with leg pain, if a participant selected directional preference exercises, education in symptom-alleviating posture/movements, and an intervention not addressed in the CPG by the Orthopaedic Section of the APTA (eg, ultrasound or fitness exercise), then the participant would still be considered adherent. On the other hand, if a participant selected directional preference exercises but neither education to stay active nor education in symptom-relieving posture/movements, then the participant was not considered adherent.

Three physical therapist experts validated the specific treatment approaches selected for the survey. All 3 experts were PTFOs and had a postprofessional terminal academic doctorate (PhD or EdD) and multiple peer-reviewed publications in musculoskeletal physical therapy. Two experts had the title of associate professor and one of clinical professor in American physical therapy programs. Each patient vignette was independently reviewed from the same treatment list offered to study participants.

The physical therapists answering the survey were not trained in the criteria for guideline adherence used in this study. This is similar to previous studies that investigated therapist adherence to LBP guidelines in the United States[26] and the United Kingdom.[8] The intent of the study was not to investigate whether therapists were aware of or trained in the utilization of EBP guidelines; instead, the purpose of the study was to determine whether ther-

apists made treatment recommendations consistent with the APTA LBP CPG.

Survey

The authors surveyed potential participants from December 2014 to February 2015. The authors adapted the current survey from the studies published by Li and Bombardier,[45] Jette et al,[39] and Ladeira et al[43] (**APPENDICES A** and **B**). The electronic survey was created with the Opinio software (Version 7.1.1; ObjectPlanet, Inc, Oslo, Norway).[51] Interitem reliability was not assessed statistically because it did not include multiple items addressing the same content areas. The scenarios in the survey scored 100% on the Flesch Reading-Ease test and the Flesch-Kincaid Grade Level Readability test[24]; these readability scores indicated that the English used in the survey was extremely easy to comprehend.[34,64]

The survey was tested prior to data collection with 10 physical therapists in a pilot study, and took between 15 and 25 minutes to be completed. The recruitment e-mail had a web link directing the physical therapists to the website where the survey was located. To improve survey response rate, each subject was e-mailed 3 times, with an interval of 2 weeks between e-mails. The subjects had 4 weeks to answer the survey after the last e-mail was sent.

Data Analysis

The first objective of the study was addressed descriptively; adherence to practice guidelines was described in percentages for each clinical vignette (LBP with mobility deficit, coordination impairment, leg pain and a directional preference, or fear-avoidance behavior). In addition, descriptive statistics were used in the study to describe the demographic characteristics of the sample (age, sex, clinical experience, clinical specialization, professional education, postprofessional education, work setting, weekly patient case load, and LBP case load) (**APPENDIX A**). The physical therapists were given 27 management options to choose from to manage LBP (**APPENDIX B**).

For the second objective of the investigation, the authors used binary logistic regression analyses to test the null hypothesis that physical therapist specialization (PTFO, PTO, PTF, and PTMS) does not predict adherence to practice guidelines. The authors used multiple binary logistic regression to adjust for covariates previously shown to influence adherence to EBP guidelines for LBP management: clinical experience, outpatient practice setting, high LBP case load (50% or greater), sex, and postprofessional education (master or doctorate).[37,43,44] The significance level for the regression analyses was set at $\alpha = .05$.

RESULTS

Of the 568 physical therapists who replied to the survey, 40 did not complete the demographic section of the survey and were excluded from the analysis. Of the remaining 528 participants, 410 completed all sections of the survey and 118 completed the demographic section but did not complete the clinical vignette section of the survey (**FIGURE**). Calculation of the response rate (18.5%) was based on the recommendations of the American Association for Public Opinion Research (528 complete and incomplete surveys out of 2861 potential respondents).[41,53] The sample represented the members of the Orthopaedic Section of the APTA with ±4.11 percentage points (95% CI). Response rate varied among different clinical specialties: PTMSs, 11.2%; PTOs, 21.3%; combined PTFOs and PTFs, 23.3% (**FIGURE**).

Physical therapists with a musculoskeletal interest had a statistically lower response rate than PTOs ($\chi^2 = 24.72$, $P = .001$) and PTFs/PTFOs ($\chi^2 = 35.59$, $P = .001$) (**APPENDIX C**, available at www.jospt.org). There was no difference in incomplete survey response rate between PTOs and combined PTFs/PTFOs. To test our null hypothesis that physical therapist specialization is not a predictor for adherence to practice guidelines, we only utilized the 410 respondents who completed the demographic and the vignette sections of the survey (**FIGURE**).

The demographics of the participants are displayed in **TABLE 1**. The analyses of potential confounding variables are displayed in **APPENDIX D** (available at www.jospt.org). Agreement was high (κ = 0.80-0.94) (**APPENDIX E**, available at www.jospt.org) between the 3 expert investigators coding the treatment approaches for each vignette. Note that postprofessional education, high LBP case load, and sex did not influence adherence to the CPG. Clinical experience influenced adherence to the LBP CPG with regard to hypomobility, directional preference, and fear-avoidance behavior. Outpatient practice setting only influenced adherence to the LBP CPG with regard to fear-avoidance behavior (**APPENDIX D**).

For the first objective of the study, the descriptions of adherence to the CPG are displayed in **TABLES 2** through **5**. For the second objective of the study, the results of the comparison among physical therapists with distinct qualifications are displayed in **TABLE 6**. For lumbar hypomobility (first vignette), the PTFOs (odds ratio [OR] = 2.62; 95% CI: 1.39, 4.94; $P = .003$) and PTOs (OR = 1.90; 95% CI: 1.05, 3.45; $P = .034$) adhered significantly better to guidelines than did PTMSs. For lumbar instability (second vignette), the PTFOs adhered significantly better to guidelines than did PTMSs (OR = 2.03; 95% CI: 1.11, 3.70; $P = .021$). For LBP with a directional preference (third vignette), PTFOs did significantly better than PTMSs (OR = 4.60; 95% CI: 2.16, 9.81; $P = .001$). For LBP with fear-avoidance behavior (fourth vignette), both PTFOs (OR = 5.00; 95% CI: 2.13, 11.77; $P = .001$) and PTOs (OR = 5.98; 95% CI: 2.61, 13.70; $P = .001$) did significantly better than PTMSs.

DISCUSSION

Adherence to the APTA CPG for LBP varied in different patient scenarios. Guideline adherence in our study varied from 29.5% (LBP with fear-avoidance behavior) to 72.2% (low back

TABLE 1 Description of the Survey Respondents

Variable	PTMS (n = 84, 20.5%)	PTF (n = 74, 18.1%)	PTO (n = 142, 34.6%)	PTFO (n = 110, 26.8%)	Total (n = 410, 100%)
Age, y*	46.5 ± 12.4	41.0 ± 8.6	42.5 ± 9.4	42.3 ± 9.3	42.9 ± 10.1
Sex, n (%)					
Female	41 (48.8)	27 (36.5)	56 (39.4)	28 (25.5)	152 (37.1)
Male	43 (51.2)	47 (63.5)	86 (60.6)	82 (74.5)	258 (62.9)
Experience, y*	17.8 ± 12.3	14.9 ± 9.1	16.8 ± 9.6	16.7 ± 9.9	17.2 ± 10.5
Professional degree					
Bachelor	38 (45.2)	17 (23.0)	49 (34.5)	37 (33.6)	141 (34.4)
Master	26 (31.0)	39 (52.7)	59 (41.5)	39 (35.5)	163 (39.8)
Doctor	14 (16.7)	17 (23.0)	32 (22.5)	32 (29.1)	95 (23.2)
Other	6 (7.1)	1 (1.4)	2 (1.4)	2 (1.8)	11 (2.7)
Postprofessional degree†					
None	39 (46.4)	34 (45.9)	70 (49.3)	49 (44.5)	192 (46.8)
MS	13 (15.5)	6 (8.1)	14 (9.9)	9 (8.2)	42 (10.2)
Transitional DPT	14 (16.7)	21 (28.4)	39 (27.5)	42 (38.2)	116 (28.3)
PhD	2 (2.4)	12 (16.2)	12 (8.5)	13 (11.8)	39 (9.5)
Practice					
Outpatient orthopaedics	63 (75.0)	66 (89.2)	125 (88.0)	89 (80.9)	343 (83.7)
Case load‡					
>20 patients	58 (69.0)	63 (85.1)	128 (90.1)	79 (71.8)	328 (80.0)
>40 patients	36 (42.9)	44 (59.5)	86 (60.6)	62 (56.4)	228 (55.6)
>60 patients	9 (10.7)	13 (17.6)	121 (85.2)	15 (13.6)	158 (38.5)
LBP case load‡					
>20%	53 (63.1)	68 (91.9)	99 (69.7)	90 (81.8)	310 (75.6)
≥50%	16 (19.0)	10 (13.5)	8 (5.6)	9 (8.2)	43 (10.5)

Abbreviations: LBP, low back pain; PTF, fellow of orthopaedic manual therapy; PTFO, physical therapist with both fellowship and orthopaedic clinical specialization; PTMS, physical therapist with musculoskeletal interest; PTO, physical therapist with orthopaedic clinical specialization.
**Values are mean ± SD.*
†Participants could have several postprofessional degrees.
‡Results reflect cumulative participants (percentage).

and leg pain with a directional preference). This was consistent with the findings of Rutten et al,[57] who used 3 distinct patient scenarios to measure guideline adherence in the Netherlands: specific LBP and radiculopathy, nonspecific LBP and normal recovery, and nonspecific LBP and delayed recovery. Rutten et al[57] reported that adherence to guidelines varied from 53.3% (LBP with radiculopathy) to 74% (LBP with delayed recovery) on their patient vignettes. Our results, together with the findings of Rutten et al,[57] indicate that EBP guideline adherence depends on the clinical presentation of individual patients.

Adherence to the APTA CPG for acute LBP with mobility deficits (**TABLE 2**) was moderate, ranging from 42.9% to 66.4%, with PTFOs and PTOs showing significantly better adherence than PTMSs. Adherence for LBP with coordination impairment (**TABLE 3**) was moderate, ranging from 36.9% to 55.5%, with PTFOs showing significantly better adherence than PTMSs. Adherence to guidelines for acute LBP with referred leg pain and a directional preference (**TABLE 4**) was moderate to high, ranging from 58.1% to 88.2%, with PTFOs showing significantly better adherence than PTMSs. Adherence to the guideline for subacute LBP with fear-avoidance behavior (**TABLE 5**) was low to moderate, ranging from 10.7% to 38.7%, with PTFOs and PTOs showing significantly better adherence than PTMSs.

After adjustment for the potential confounding variables, the odds of adherence to guidelines for PTFOs on all 4 LBP vignettes were 2.03 to 5.00 times higher than those for PTMSs. In addition, the odds of adherence to guidelines for PTOs were 1.90 and 5.98 times higher than those for PTMSs for LBP with mobility deficits and for LBP with fear-avoidance behavior, respectively. Note that the odds for PTFs to manage LBP with fear-avoidance behavior were also significantly better than those for PTMSs before the adjustment for the confounding variables, but not after (**TABLE 6**). The overall adjustment for all 5 confounding variables made the significant difference between PTFs and PTMSs fade. In par-

TABLE 2 Results Relating to Acute LBP and Mobility Deficit (Hypomobility/Somatic Dysfunction)*

Physical Therapist	PTMS (n = 84, 20.5%)	PTF (n = 74, 18.1%)	PTO (n = 142, 34.6%)	PTFO (n = 110, 26.8%)	Total (n = 410, 100%)
Adherence to guidelines	36 (42.9)	40 (54.1)	85 (59.9)	73 (66.4)	234 (57.1)
APTA Orthopaedic Section recommendations					
Education to stay active and pursue an active lifestyle	24 (28.6)	20 (27.0)	68 (47.9)	55 (50)	167 (40.7)
Exercises: strengthening and coordination	34 (40.5)	35 (47.3)	51 (35.9)	49 (44.5)	169 (41.2)
Spinal nonthrust manipulation	46 (54.8)	36 (48.6)	74 (52.1)	58 (52.7)	214 (52.2)
Spinal thrust manipulation	25 (29.8)	51 (68.9)	81 (57.0)	80 (72.7)	237 (57.8)
Spinal manipulation: thrust or nonthrust	61 (72.6)	66 (89.2)	124 (87.3)	102 (92.7)	353 (86.1)
APTA Orthopaedic Section does not address					
Acupuncture and dry needling	4 (4.8)	4 (5.4)	11 (7.7)	4 (3.6)	23 (5.6)
Back school	7 (8.3)	7 (9.5)	17 (12.0)	5 (4.5)	36 (8.8)
Directional preference exercises	20 (23.8)	12 (16.2)	16 (11.3)	17 (15.5)	65 (15.9)
Education in symptom-alleviating movement and posture	45 (53.6)	44 (59.5)	73 (51.4)	56 (50.9)	218 (53.2)
Education in HEP	58 (69.0)	53 (71.6)	101 (71.1)	75 (68.2)	287 (70.0)
Education for negative affective tendencies	12 (14.3)	12 (16.2)	29 (20.4)	23 (20.9)	76 (18.5)
Endurance and fitness exercises	10 (11.9)	3 (4.1)	16 (11.3)	7 (6.4)	36 (8.8)
Passive intervention†	40 (47.6)	9 (12.2)	30 (21.1)	10 (9.1)	89 (21.7)
Work modification	2 (2.4)	3 (4.1)	4 (2.8)	4 (3.6)	13 (3.2)

Abbreviations: APTA, American Physical Therapy Association; HEP, home exercise program; LBP, low back pain; PTF, fellow of orthopaedic manual therapy; PTFO, physical therapist with both fellowship and orthopaedic clinical specialization; PTMS, physical therapist with musculoskeletal interest; PTO, physical therapist with orthopaedic clinical specialization.
**Values are n (%).*
†Laser, ultrasound, heat or ice packs, electrical therapy, or bed rest.

ticular, the adjustment for clinical experience and outpatient orthopaedic setting must have had the largest impact to eliminate this significant difference, because the latter 2 covariates confounded guideline adherence with respect to the vignette of LBP with fear-avoidance behavior the most (**APPENDIX D**).

From a descriptive analysis, it is interesting to note that adherence to guidelines appears to be better for patients with acute LBP and mobility deficits (57.1%) or acute LBP with referred leg pain (72.2%) than for patients with acute LBP and coordination impairment (46.1%) or LBP with fear-avoidance behavior (29.5%). The finding that adherence to guidelines was lower for patients with coordination impairment (lumbar instability) may be explained by the fact that physical therapists have more difficulty identifying patients with acute LBP and coordination impairment (lumbar instability) than patients with acute LBP and mobility deficits or patients with acute LBP and referred leg pain with a directional preference.[38,60] The interrater reliability for physical therapists to identify LBP with coordination impairment (lumbar instability) is worse than that for LBP and referred leg pain with a directional preference and LBP with mobility deficits.[35] The clinical presentation of patients with LBP and coordination impairment (lumbar instability) is less clear for physical therapists than that of LBP with mobility deficits and LBP with referred leg pain and a directional preference.

The result that only 29.5% of physical therapists adhered to the CPG for the vignette describing subacute LBP and fear-avoidance behavior is consistent with the results of a recent Canadian study,[16] where only 32% of graduate physical therapy students recognized a patient with subacute LBP and signs and symptoms of fear-avoidance behavior. In addition, it appears that even when physical therapists do recognize psychosocial warnings for cognitive dysfunction, they do not utilize appropriate interventional strategies to manage patients with LBP and cognitive dysfunction.[7] This difficulty in managing LBP with fear-avoidance behavior may be explained by the fact that management of LBP associated with symptoms of fear-avoidance behavior has not been part of routine physical therapy practice as described in treatment-based classification subgroups, unlike LBP and mobility deficits, LBP with referred leg pain (directional preference), or LBP with coordination impairment (lumbar instability).[21,27,28,36,42]

The descriptive results of the study suggest that physical therapists may adhere better to recommendations that originate from treatment-based classification subgroups[21,27,60] than to those initiated in multidisciplinary LBP practice guidelines.[15,17,33,65] For instance, for the patient with acute LBP and coordination

TABLE 3 Results Relating to Acute LBP and Coordination Impairment (Lumbar Instability)*

Physical Therapist	PTMS (n = 84, 20.5%)	PTF (n = 74, 18.1%)	PTO (n = 142, 34.6%)	PTFO (n = 110, 26.8%)	Total (n = 410, 100%)
Adherence to guidelines	31 (36.9)	33 (44.6)	64 (45.1)	61 (55.5)	189 (46.1)
APTA Orthopaedic Section recommendations					
Exercise: coordination, endurance, strengthening	49 (58.3)	50 (67.6)	111 (78.2)	96 (87.3)	306 (74.6)
Education to stay active and pursue an active lifestyle	17 (20.2)	19 (25.7)	42 (29.6)	40 (36.4)	118 (28.8)
Education in symptom-alleviating movement and posture	39 (46.4)	63 (85.1)	63 (44.4)	44 (40.0)	209 (51.0)
APTA Orthopaedic Section does not address					
Back school	18 (21.4)	10 (13.5)	30 (21.1)	12 (10.9)	70 (17.1)
Exercise: directional preference	8 (9.5)	4 (5.4)	11 (7.7)	8 (7.3)	31 (7.6)
Exercise: endurance and fitness	19 (22.6)	15 (20.3)	30 (21.1)	32 (29.1)	96 (23.4)
Education: HEP	52 (61.9)	47 (63.5)	86 (60.6)	69 (62.7)	254 (62.0)
Education for negative affective tendencies	8 (9.5)	4 (5.4)	11 (7.7)	8 (7.3)	31 (7.6)
Nonthrust manipulation	52 (61.9)	47 (63.5)	86 (60.6)	69 (62.7)	254 (62.0)
Passive intervention†	19 (22.6)	6 (8.1)	13 (9.2)	7 (6.4)	45 (11.0)
Referral to diagnostic imaging	7 (8.3)	5 (6.8)	6 (4.2)	10 (9.1)	28 (6.8)
Thrust manipulation	39 (46.4)	39 (52.7)	63 (44.4)	44 (40.0)	185 (45.1)
Work modification	14 (16.7)	9 (12.2)	15 (10.6)	15 (13.6)	53 (12.9)

Abbreviations: APTA, American Physical Therapy Association; HEP, home exercise program; LBP, low back pain; PTF, fellow of orthopaedic manual therapy; PTFO, physical therapist with both fellowship and orthopaedic clinical specialization; PTMS, physical therapist with musculoskeletal interest; PTO, physical therapist with orthopaedic clinical specialization.
**Values are n (%).*
†Laser, ultrasound, heat or ice packs, electrical therapy, or bed rest.

impairment (lumbar instability), physical therapists were much more likely to utilize coordination and strengthening exercises (74.6%) than education to stay active and pursue an active lifestyle (28.8%) (**TABLE 3**). For the patient with acute LBP and referred leg pain with a directional preference, physical therapists were much more likely to recommend specific directional preference exercise (89.0%) than education to stay active and pursue an active lifestyle (25.4%) (**TABLE 4**). Nonetheless, the utilization of specific exercise to manage LBP did not contradict the recommendations from American multidisciplinary guidelines. Goertz et al[33] advised using any exercise to manage acute nonspecific LBP, and Chou et al[15] endorsed any exercise to manage patients with subacute nonspecific LBP.

In a similar manner, even when physical therapists were aware that education to stay active and pursue an active lifestyle was part of multidisciplinary practice guidelines for LBP,[44] they did not directly educate patients to stay active in clinical practice. However, for all LBP scenarios in the present study, the majority of physical therapists did indirectly educate patients to stay active with a home exercise program (mobility deficit, 70.0%; coordination impairment, 62.0%; leg pain and directional preference, 59.0%; and signs and symptoms of fear-avoidance behavior, 50.7%). This active approach to manage LBP was consistent with American multidisciplinary practice guidelines.[15,17,33,65] It is noteworthy that education in a home exercise program has been utilized in physical therapy for several decades.[5,21] Home exercise programs are popular in physical therapy because they can be tailored to the individual needs of the patient (directional preference, strengthening and coordination, etc).[23,43] This finding indicates that physical therapists would rather educate their patients based on traditional beliefs from clinical practice than on recent multidisciplinary guideline recommendations.

The reason physical therapists may not follow multidisciplinary guideline recommendations has been researched. Jette et al[40] reported that American physical therapists did not follow multidisciplinary guideline recommendations because they did not feel the guidelines applied to their individual patient clinical presentations. Côté et al[19] explained that Canadian physical therapists would not follow general guideline recommendations because their interventions had to be tailored to each patient's condition (specific exercises, manual therapy, etc), which went against published Canadian CPGs. This may explain why the physical therapists in the current study followed the recommendations sprouting from physical therapy practice (specific exercise, home exercise program) more often than those originating from multidisciplinary guidelines (stay active and pursue an active lifestyle).

TABLE 4 Results Relating to Acute LBP and Leg Pain (Discogenic Pain, Directional Preference)*

Physical Therapist	PTMS (n = 84, 20.5%)	PTF (n = 74, 18.1%)	PTO (n = 142, 34.6%)	PTFO (n = 110, 26.8%)	Total (n = 410, 100%)
Adherence to guidelines	52 (61.9)	43 (58.1)	104 (73.2)	97 (88.2)	296 (72.2)
APTA Orthopaedic Section recommendations					
Exercise: directional preference	68 (81.0)	56 (75.7)	133 (93.7)	108 (98.2)	365 (89.0)
Education to stay active and pursue an active lifestyle	10 (11.9)	18 (24.3)	38 (26.8)	38 (34.5)	104 (25.4)
Education in symptom-alleviating movement and posture	56 (66.7)	46 (62.2)	97 (68.3)	88 (80.0)	287 (70.0)
APTA Orthopaedic Section does not address					
Back school	9 (10.7)	7 (9.5)	9 (6.3)	4 (3.6)	29 (7.1)
Exercise: coordination and strengthening	15 (17.9)	20 (27.0)	17 (12.0)	15 (13.6)	67 (16.3)
Education: HEP	52 (61.9)	46 (62.2)	87 (61.3)	57 (51.8)	242 (59.0)
Education for negative affective tendencies	7 (8.3)	7 (9.5)	9 (6.3)	11 (10.0)	34 (8.3)
Mechanical traction	16 (19.0)	15 (20.3)	23 (16.2)	7 (6.4)	61 (14.9)
Neurodynamic mobilization	21 (25.0)	23 (31.1)	47 (33.1)	39 (35.5)	130 (31.7)
Nonthrust manipulation	32 (38.1)	44 (59.5)	66 (46.5)	58 (52.7)	200 (48.8)
Passive intervention†	31 (36.9)	5 (6.8)	22 (15.5)	8 (7.3)	66 (16.1)
Thrust manipulation	8 (9.5)	17 (23.0)	16 (11.3)	20 (18.2)	61 (14.9)
Work modification	6 (7.1)	6 (8.1)	13 (9.2)	15 (13.6)	40 (9.8)

Abbreviations: APTA, American Physical Therapy Association; HEP, home exercise program; LBP, low back pain; PTF, fellow of orthopaedic manual therapy; PTFO, physical therapist with both fellowship and orthopaedic clinical specialization; PTMS, physical therapist with musculoskeletal interest; PTO, physical therapist with orthopaedic clinical specialization.
**Values are n (%).*
†Laser, ultrasound, heat or ice packs, electrical therapy, or bed rest.

If we consider the patient described in the vignette of acute LBP and mobility deficits in the current survey to be similar to the patient with acute nonspecific LBP (without signs of directional preference, radiculopathy, spinal instability, and fear-avoidance behavior) portrayed in a Florida survey[43] performed in 2008, the rate for adherence to practice guidelines for acute LBP and mobility deficits among physical therapists without clinical specialization (PTMSs) might have improved in the United States (42.9%) compared to Florida (20.8%).[43] This probable improvement in guideline adherence is most likely associated with an increase in spinal manipulation utilization (thrust or nonthrust) from 2008 to 2015.

Spinal manipulation was a required outcome variable for guideline adherence in the present study as well as the Floridian investigation.[43] In the present study, 72.6% of PTMSs utilized spinal manipulation to manage LBP with mobility deficits, compared to 41.8% of Floridian physical therapists who used manipulation to manage nonspecific LBP. This increase in utilization of spinal manipulation is probably a reflection of the efforts of an APTA task force to promote the practice of thrust manipulation in professional physical therapy curricula in the 2000s.[9,48] The percentage of physical therapy programs requiring formal spinal manipulation training in the United States rose from 46% in 2004 to 99% in 2012.[10,50] The APTA Manipulation Task Force and the higher number of physical therapists who graduated with formal spinal manipulation training in the last 10 years contributed to this probable increase in guideline adherence for LBP with mobility deficit.

It is difficult to compare the results of the present study with the results of other foreign studies about adherence to EBP guidelines because these foreign studies did not differentiate LBP with mobility deficits from LBP with a directional preference, with coordination impairment, or with fear-avoidance behavior.[37,61,62] Hendrick et al[37] did not describe the patient portrayed in their clinical vignette of nonspecific LBP. Strand et al[61] and Swinkels et al[62] did not use patient vignettes in their studies and did not discuss the signs and symptoms of the patients they used to determine guideline adherence.

Limitations of the Study

The participants in the current study were members of the APTA or the AAOMPT, and, therefore, the results cannot be generalized to physical therapists who are not members of these associations in the United States. The results of the study were delimited to the validity and reliability of the survey, including clinical vignettes. The respondents' reports of appropriate practice may not directly transfer to their actual guideline adherence in the clinic. The authors did not perform a test-retest reliability of the survey.

The electronic response rate in the present survey (18.5%) was low when

TABLE 5 Results Relating to Subacute LBP Associated With Fear-Avoidance Behavior*

Physical Therapist	PTMS (n = 84, 20.5%)	PTF (n = 74, 18.1%)	PTO (n = 142, 34.6%)	PTFO (n = 110, 26.8%)	Total (n = 410, 100%)
Adherence to guidelines	9 (10.7)	18 (24.3)	55 (38.7)	39 (35.5)	121 (29.5)
APTA Orthopaedic Section recommendations					
Education to address negative affective tendencies	29 (34.5)	34 (45.9)	87 (61.3)	77 (70.0)	227 (55.4)
Education to stay active and pursue an active lifestyle	19 (22.6)	26 (35.1)	74 (52.1)	56 (50.9)	175 (42.7)
APTA Orthopaedic Section does not address					
Acupuncture and dry needling	3 (3.6)	10 (13.5)	8 (5.6)	11 (10.0)	32 (7.8)
Exercise: coordination and strengthening	23 (27.4)	21 (28.4)	41 (28.9)	43 (39.1)	128 (31.2)
Education: HEP	46 (54.8)	39 (52.7)	75 (52.8)	48 (43.6)	208 (50.7)
Education: symptom-alleviating movement and posture	41 (48.8)	32 (43.2)	78 (54.9)	46 (41.8)	197 (48.0)
Exercise: endurance and fitness	9 (10.7)	8 (10.8)	11 (7.7)	9 (8.2)	37 (9.0)
Exercise: directional preference	29 (34.5)	21 (28.4)	46 (32.4)	33 (30.0)	129 (31.5)
Neurodynamic mobilization	8 (9.5)	6 (8.1)	14 (9.9)	13 (11.8)	41 (10.0)
Nonthrust manipulation	23 (27.4)	27 (36.5)	37 (26.1)	36 (32.7)	123 (30.0)
Passive intervention†	35 (41.7)	4 (5.4)	32 (22.5)	8 (7.3)	79 (19.3)
Physician referral	29 (34.5)	13 (17.6)	26 (18.3)	15 (13.6)	83 (20.2)
Thrust manipulation	9 (10.7)	12 (16.2)	10 (7.0)	13 (11.8)	44 (10.7)

Abbreviations: APTA, American Physical Therapy Association; HEP, home exercise program; LBP, low back pain; PTF, fellow of orthopaedic manual therapy; PTFO, physical therapist with both fellowship and orthopaedic clinical specialization; PTMS, physical therapist with musculoskeletal interest; PTO, physical therapist with orthopaedic clinical specialization.

**Values are n (%).*

†Laser, ultrasound, heat or ice packs, electrical therapy, or bed rest.

compared to regular postal surveys.[35] However, it was similar to the response rates of the following comparable electronic surveys: Corkery et al[18] (15.9%) for management of whiplash injuries (APTA Orthopaedic Section members), Ladeira et al[43] (14.5%) for management of nonspecific LBP (physical therapists practicing in Florida), Rodeghero et al[56] (21%) for management of musculoskeletal disorders (physical therapists in the Focus On Therapeutic Outcomes database), and Hendrick et al[37] (16%-17.2%) for management of nonspecific LBP (physical therapists belonging to the New Zealand Manipulative Physiotherapists Association and Sports Physiotherapy New Zealand). The professional education (bachelor, 34.4%; master, 39.8%; doctor, 23.2%) and practice setting (outpatient orthopaedics, 83.7%) of our participants were similar to the education (bachelor, 33.5%; master, 31.8%; doctor, 31.1%) and practice settings (hospital and private practice outpatient orthopaedics, 89.1%) of the 1001 APTA Orthopaedic Section members of Madson and Hollman's postal survey[47] investigating the management of LBP with traction.

We looked at our response bias by comparing participants who filled out the survey completely versus incompletely. We analyzed the 5 variables previously shown to predict adherence to practice guidelines (**APPENDIX C**). There was no difference between physical therapists with complete and incomplete surveys in clinical experience and in postprofessional education. However, PTMSs who filled out the survey incompletely had a lower LBP case load than PTMSs who filled out the survey completely. In addition, these PTMSs with incomplete surveys were less likely to work in outpatient orthopaedic settings than physical therapists with specializations. These latter 2 findings may indicate that PTMSs with incomplete surveys were less motivated and probably less knowledgeable about LBP management than our participants with complete surveys. These findings were consistent with the lower survey response rate among PTMSs observed in our study; the reduced response rate among PTMSs may simply reflect less motivation, probably associated with less knowledge about managing LBP.

There were more men (62.9%) in our study than women (37.1%), which is a reflection of the high number of specialists in our survey. The majority (66.2%) of PTFs are male (personal communication with AAOMPT Association Coordinator Melanie Taylor, March 2016). This is consistent with the results of Corkery et al's[18] survey (65% were male), which also had a high number of PTFs (43%) and PTOs (63%), and different from the findings of Madson and Hollman's[47] survey, which reported a majority of female participants (60%), with only 20% of participants being PTOs.

Our survey was designed to target clinical specialists, and our sample

TABLE 6 Results of the Binary Logistic Regression Analysis*

	Vignette 1: Hypomobility		Vignette 2: Lumbar Instability		Vignette 3: Directional Preference		Vignette 4: Fear-Avoidance Behavior	
Predictor Variable	**OR†**	***P* Value**	**OR†**	***P* Value**	**OR†**	***P* Value**	**OR†**	***P* Value**
Univariate analysis								
PTFO	2.63 (1.46, 4.73)	.001‡	2.13 (1.19, 3.81)	.010‡	4.59 (2.22, 9.50)	.001‡	5.02 (2.19, 11.47)	.001‡
PTO	1.99 (1.15, 3.44)	.013‡	1.40 (0.81, 2.44)	.230	1.68 (0.95, 3.00)	.075	5.66 (2.53, 12.64)	.001‡
PTF	1.57 (0.84, 2.95)	.160	1.38 (0.73, 2.60)	.326	0.85 (0.45, 1.61)	.854	2.62 (1.05, 6.54)	.035‡
Multivariate analysis§								
PTFO	2.62 (1.39, 4.94)	.003‡	2.03 (1.11, 3.70)	.021‡	4.60 (2.16, 9.81)	.001‡	5.00 (2.13, 11.77)	.001‡
PTO	1.90 (1.05, 3.45)	.034‡	1.37 (0.77, 2.42)	.284	1.61 (0.87, 2.96)	.128	5.98 (2.61, 13.70)	.001‡
PTF	1.25 (0.64, 2.44)	.521	1.27 (0.66, 2.45)	.468	0.76 (0.39, 1.49)	.425	2.63 (0.97, 6.28)	.059

Abbreviations: OR, odds ratio; PTF, fellow of orthopaedic manual therapy; PTFO, physical therapist with both fellowship and orthopaedic clinical specialization; PTO, physical therapist with orthopaedic clinical specialization.
**The indicator variable utilized in the regression analyses was physical therapists with a musculoskeletal interest.*
†Values in parentheses are 95% confidence interval.
‡Statistically significant (P<.05).
§Adjusted for potential confounding variables of sex, postprofessional degree, high low back pain case load (50% or greater), clinical experience, and outpatient orthopaedic practice setting.

had more specialists than any recent electronic[37,43] or postal[44,47] surveys that investigated adherence to LBP guidelines. Because of the high percentage of specialists, our participants were more motivated and probably more up to date on the treatment of LBP than were the nonresponders. The self-selection bias was probably worst among PTMSs, because PTMSs had a lower response rate (11.2%) than PTFs/PTFOs (23.3%) and PTOs (21.3%). Hence, the results of the current study might have underestimated the better adherence to practice guidelines among physical therapists with clinical specialization when compared to PTMSs; this was a limitation of the study.

CONCLUSION

Based on the overall results, the authors rejected the null hypothesis. Two clinical specialties (PTFOs and PTOs) performed better than PTMSs; PTFOs were better predictors of guideline adherence than PTMSs for all 4 patient vignettes, and PTOs were better predictors of guideline adherence than PTMSs for the vignettes of LBP and mobility deficits, as well as those of LBP and fear-avoidance behavior.

The descriptive results indicated that physical therapists adhere better to guidelines for patients with common clinical presentations (LBP with mobility deficit and LBP with a directional preference) than for patients with less familiar presentations (LBP with coordination impairment [lumbar instability] and LBP with fear-avoidance behavior). The current survey indicated that clinical specialization programs and professional educational programs may want to elaborate better on how to recognize and manage patients with LBP and coordination impairment (lumbar instability), as well as patients with LBP and signs and symptoms of fear-avoidance behavior.

Future studies should investigate how a monodisciplinary guideline relevant to regular physical therapy practice affects the beliefs about EBP in the United States and abroad. It would also be interesting to investigate how physical therapists from different countries with distinct clinical backgrounds adhere to this monodisciplinary guideline. This EBP guideline from the Orthopaedic Section of the APTA was published in a journal with an international audience and global scientific and practice repercussions.[59]

KEY POINTS

FINDINGS: Physical therapists with both orthopaedic clinical specialization and American Academy of Orthopaedic Manual Physical Therapists (AAOMPT) Fellowship credentials had the best adherence to evidence-based practice in the United States among physical therapists with and without specialization for the management of low back pain (LBP) with mobility deficit, with coordination impairment (lumbar instability), with leg pain and a directional preference (discogenic pain), and with signs and symptoms of fear-avoidance behavior. Physical therapists with and without a clinical specialization had more difficulty recognizing and managing LBP with signs and symptoms of fear-avoidance behavior in the vignettes.

IMPLICATIONS: Only 29.5 % of all physical therapists adhered to the American Physical Therapy Association (APTA) clinical practice guidelines (CPGs) for the management of LBP with signs and symptoms of fear-avoidance behavior, and only 46.1% of physical therapists adhered to the CPGs for management of LBP with coordination impairment (lumbar instability). Professional and postprofessional programs need to

improve physical therapy training in the recognition and management of patients with lumbar instability, as well as patients with fear-avoidance behavior. **CAUTION:** The low response rate in the survey may not reflect how the majority of American physical therapists with a musculoskeletal interest practice. Results may not generalize to physical therapists who are not APTA and/or AAOMPT members and may reflect a nonresponse and self-selection bias, because the respondents were probably more motivated to answer the survey because they were more up to date on the management of LBP than were nonresponders.

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APPENDIX A

SURVEY PARTICIPANT DEMOGRAPHICS

This section of the survey contains 10 demographic questions about you. It should not take longer than 3 or 5 minutes to complete. If, after clicking the START button at the end of this section, you return here, please review your answers below and correct all replies highlighted in red.

1. How old are you? _____

2. What is your gender?
   - ☐ Male
   - ☐ Female

3. Which year did you graduate from entry-level PT school? _____

4. What is your entry-level PT degree?
   - ☐ Diploma
   - ☐ Bachelor
   - ☐ Master
   - ☐ Doctorate
   - ☐ Other

5. Do you have any postprofessional academic degree (additional to your entry-level PT degree)? Check all that apply.
   - ☐ None
   - ☐ Master of Arts
   - ☐ Master in Health Sciences
   - ☐ Postprofessional master in PT
   - ☐ Transitional DPT
   - ☐ Doctor of Health Sciences
   - ☐ PhD
   - ☐ ScD or DSc
   - ☐ EdD
   - ☐ Other (specify) _____

6. Do you have any of the following clinical certifications or specializations? Check all that apply.
   - ☐ None
   - ☐ COMT
   - ☐ FAAOMPT
   - ☐ MDT
   - ☐ MTC
   - ☐ OCS
   - ☐ OMT
   - ☐ Other (specify) _____

7. In the last 12 months, what was your employment setting?
   - ☐ Outpatient orthopaedics
   - ☐ Inpatient orthopaedics
   - ☐ Inpatient and outpatient orthopaedics
   - ☐ Academia
   - ☐ Other (specify) _____

8. How many years of clinical experience do you have? Years that you worked only in academia or only in administration do not count.
   Years ____

APPENDIX A

9. In the past year, on average, how many patient visits have you had per week?
   - ☐ None
   - ☐ Between 11 and 20
   - ☐ Between 21 and 30
   - ☐ Between 31 and 40
   - ☐ Between 41 and 50
   - ☐ Between 51 and 60
   - ☐ Above 60

10. What percentage of your case load consists of patients with low back pain?
   - ☐ 0%
   - ☐ 10% or less
   - ☐ Between 11% and 20%
   - ☐ Between 21% and 30%
   - ☐ Between 31% and 40%
   - ☐ Between 41% and 50%
   - ☐ Between 51% and 60%
   - ☐ Above 60%

APPENDIX B

SURVEY PATIENT VIGNETTES AND INTERVENTIONAL OPTIONS

This section of the survey contains 4 clinical scenarios of patients with low back pain. This section should not take longer than 20 minutes. If, after clicking the FINISH button at the end of the survey, you return here, please review your answers below and correct all replies highlighted in red.

Clinical Scenario 1: Low Back Pain With Mobility Deficit (Somatic Dysfunction)

History: A 28-year-old woman has suffered from low back pain after lifting a 20-lb box at work a week ago. She has been unable to do her job managing a cafeteria since then. While anxious to return to work, she feels immobilized by the pain. In terms of activities, she can sit about 10 minutes and walk 1 block before she has to stop due to pain. She is able to sleep through the night; however, her back is stiff in the morning and the stiffness lasts about 10 minutes. There is no history of trauma. The pain is limited to the low back area, without radiation.

Physical Examination: Vital signs are a blood pressure of 120/80 mmHg and a pulse rate of 70. Range-of-motion testing is within normal limits for the lumbar spine, with pain at end-range flexion and right-side flexion on the right side. Neurological testing was within normal limits. Straight leg raise testing stretched the hamstrings bilaterally, but did not reproduce back pain. Accessory motion testing provoked symptoms on the right side of the low back, which was stiff between L4 and L5.

Please choose the preferred procedures you would use to manage the patient in the FIRST WEEK OF THE PLAN OF CARE. **Choose a MINIMUM of 1 and a MAXIMUM of 5 options to manage the patient in the clinical scenario.**

Acupuncture or dry needling	Exercises: centralization and directional preference	Lumbar brace or corset	Refer to a psychologist without intervention
Back school	Exercises: coordination, endurance, and strengthening	Mechanical traction	Spinal nonthrust manipulation
Bed rest	Exercises: endurance and fitness	Neurodynamic mobilization	Spinal thrust manipulation
Education to pursue or maintain an active lifestyle	Exercises: lumbar flexion	Radiographs or magnetic resonance imaging	Work conditioning or hardening
Education: home exercise program	Interferential current or transcutaneous electrical nerve stimulation	Refer to a physician	Work modification
Education in symptom-alleviating posture and movements	Ice or heat	Refer to a physician without intervention	Other; specify in the space below
Education to address negative affective tendencies	Laser or ultrasound	Refer to a psychologist	

Clinical Scenario 2: Low Back Pain With Coordination Impairment (Lumbar Instability)

History: A 40-year-old man has suffered from low back pain for the last year. This is the third time he has come to physical therapy in the last 12 months. The first 2 times he received physical therapy, he was treated with spine manipulation and general exercises. His symptoms improved with physical therapy, but they were not completely abolished. Last weekend, he was moving and his back flared up. He was unloading a truck when his symptoms flared up. He is working full time with discomfort and pain. His symptoms are better in the morning when he wakes up and worsen as the day goes by. He cannot stay still for too long in the same position; otherwise, his back pain worsens. He is able to sleep through the night. The pain is limited to the low back area, without radiation. Medical history is unremarkable. He is taking Tylenol for pain relief.

Physical Examination: Vital signs are a blood pressure of 130/80 mmHg and a pulse rate of 80. He has full back range of motion, but he feels a catch at the end range of lumbar flexion and needs to help himself with his hands on his knees to straighten his spine to the neutral position and stand up straight. Straight leg raise testing and neurological testing were both negative. Palpation and accessory motion testing were negative for stiffness, but reproduced back pain at the L4-5 segment.

APPENDIX B

Please choose the preferred procedures you would use to manage the patient in the FIRST WEEK OF THE PLAN OF CARE. **Choose a MINIMUM of 1 and a MAXIMUM of 5 options to manage the patient in the clinical scenario.**

Acupuncture or dry needling	Exercises: centralization and directional preference	Lumbar brace or corset	Refer to a psychologist without intervention
Back school	Exercises: coordination, endurance, and strengthening	Mechanical traction	Spinal nonthrust manipulation
Bed rest	Exercises: endurance and fitness	Neurodynamic mobilization	Spinal thrust manipulation
Education to pursue or maintain an active lifestyle	Exercises: lumbar flexion	Radiographs or magnetic resonance imaging	Work conditioning or hardening
Education: home exercise program	Interferential current or transcutaneous electrical nerve stimulation	Refer to a physician	Work modification
Education in symptom-alleviating posture and movements	Ice or heat	Refer to a physician without intervention	Other; specify in the space below
Education to address negative affective tendencies	Laser or ultrasound	Refer to a psychologist	

Clinical Scenario 3: Low Back Pain With Lower Extremity Pain and Directional Preference

History: A 30-year-old man has suffered from low back pain after lifting a 30-lb box at work 2 weeks ago. He was unloading a truck when he got hurt. He has been unable to do his job as a supermarket manager since then. He is motivated to return to work, but he feels immobilized by the pain. In terms of activities, he can sit down for 15 minutes before he needs to stand up to relieve the pain. Symptoms are worse when he sits compared to when he stands. He is able to walk about 3 blocks before he has to stop due to pain. He is able to sleep through the night; however, his back is stiff in the morning and the stiffness lasts about 15 to 30 minutes. There is no history of trauma. The pain radiates from the low back area to the right lower extremity (posterior thigh and calf). He denies any history of any type of medical disease, hospitalization, and previous surgery. He is only taking over-the-counter Tylenol.

Physical Examination: Vital signs are a blood pressure of 120/80 mmHg and a pulse rate of 75. Range-of-motion testing shows restricted back flexion (by 50%), with increased back pain and peripheralization of symptoms to the right lower extremity. Back extension reduced back pain. Straight leg raise testing on the left was positive at 50° of hip flexion on the right side (reproduction of leg and back pain). Palpation and accessory motion testing provoked symptoms on the right side of the low back, which was stiff between L4 and L5.

Please choose the preferred procedures you would use to manage the patient in the FIRST WEEK OF THE PLAN OF CARE. **Choose a MINIMUM of 1 and a MAXIMUM of 5 options to manage the patient in the clinical scenario.**

Acupuncture or dry needling	Exercises: centralization and directional preference	Lumbar brace or corset	Refer to a psychologist without intervention
Back school	Exercises: coordination, endurance, and strengthening	Mechanical traction	Spinal nonthrust manipulation
Bed rest	Exercises: endurance and fitness	Neurodynamic mobilization	Spinal thrust manipulation
Education to pursue or maintain an active lifestyle	Exercises: lumbar flexion	Radiographs or magnetic resonance imaging	Work conditioning or hardening
Education: home exercise program	Interferential current or transcutaneous electrical nerve stimulation	Refer to a physician	Work modification
Education in symptom-alleviating posture and movements	Ice or heat	Refer to a physician without intervention	Other; specify in the space below
Education to address negative affective tendencies	Laser or ultrasound	Refer to a psychologist	

APPENDIX B

Clinical Scenario 4: Low Back Pain With Associated Affective Disorder

History: A 50-year-old man has been suffering from low back pain for the past 6 weeks. He comes to see you via direct access. The pain started after he helped his son renovate a house. He did not lift any heavy objects. The pain is continuous and radiates to the left buttock. He called in sick due to the back pain and has still not gone back to work. He is an electrician in a hardware store. The pain has not reduced over the past 6 weeks despite the fact that he lies down regularly. He loves to play golf, but he has not tried to play golf since he developed back pain; he believes that playing golf will exacerbate the problem. He takes Tylenol for the pain as necessary, varying from 0 to 5 tablets per day.

Physical Examination: Vital signs are a blood pressure of 110/70 mmHg and a pulse rate of 60. During range-of-motion testing, he experienced some pain during back extension and lateral flexion, particularly to the right (these were not noticeably limited), but back flexion is nearly impossible. The straight leg raise test on the left provoked back pain at 80°. He is not willing to lift a 10-kg weight from the floor, because he expects it will further damage his back. He assesses his own control over the pain as low, and lacks confidence that he could control the pain. Palpation and accessory motion testing did not reproduce low back pain symptoms; however, tenderness was noted diffusely and bilaterally from L1 to L5.

Please choose the preferred procedures you would use to manage the patient in the FIRST WEEK OF THE PLAN OF CARE. **Choose a MINIMUM of 1 and a MAXIMUM of 5 options to manage the patient in the clinical scenario.**

Acupuncture or dry needling	Exercises: centralization and directional preference	Lumbar brace or corset	Refer to a psychologist without intervention
Back school	Exercises: coordination, endurance, and strengthening	Mechanical traction	Spinal nonthrust manipulation
Bed rest	Exercises: endurance and fitness	Neurodynamic mobilization	Spinal thrust manipulation
Education to pursue or maintain an active lifestyle	Exercises: lumbar flexion	Radiographs or magnetic resonance imaging	Work conditioning or hardening
Education: home exercise program	Interferential current or transcutaneous electrical nerve stimulation	Refer to a physician	Work modification
Education in symptom-alleviating posture and movements	Ice or heat	Refer to a physician without intervention	Other; specify in the space below
Education to address negative affective tendencies	Laser or ultrasound	Refer to a psychologist	

APPENDIX C

COMPARISON BETWEEN PARTICIPANTS WITH COMPLETE VERSUS INCOMPLETE SURVEYS*

Therapist	Incomplete PTMS (n = 28, 5.3%)	Complete PTMS (n = 84, 15.9%)	Incomplete PTCS (n = 90, 17.1%)	Complete PTCS (n = 326, 61.7%)	Total (n = 528, 100%)
Sex, n (%)					
Female	18 (64.3)†	41 (48.8)‡	30 (33.3)‡	111 (34.0)†	200 (37.9)
Male	10 (35.7)	43 (51.2)	60 (66.7)	215 (66.0)	328 (62.1)
Clinical experience†	19.4 ± 13.7	7.8 ± 12.3	17.8 ± 10.1	16.4 ± 09.6	17.4 ± 10.6
Postprofessional degree, n (%)					
No	18 (64.3)	39 (46.4)	41 (45.6)	153 (46.9)	251 (47.5)
Yes	10 (35.7)	45 (53.6)	49 (54.4)	173 (53.1)	277 (52.5)
Outpatient orthopaedics, n (%)					
No	11 (39.3)§	21 (25)†	19 (21.1)	46 (14.1)§	97 (18.4)
Yes	17 (60.7)	63 (75)	71 (78.9)	280 (85.9)	431 (81.6)
Case load: LBP 50% or greater, n (%)					
No	28 (100)‖	68 (81)‖	77 (85.6)	299 (91.7)	472 (89.4)
Yes	0 (0)¶	16 (19)	13 (14.4)¶	27 (8.3)	56 (10.6)

Abbreviations: LBP, low back pain; PTCS, physical therapist with clinical specialization; PTMS, physical therapist with musculoskeletal interest.
**Significant difference comparisons were made between complete and incomplete survey groups at P<.05.*
†*Values are mean ± SD*
‡$\chi^2 = 10.178$, $P = .001$.
§$\chi^2 = 5.689$, $P = .017$.
‖$\chi^2 = 12.098$, $P = .001$.
¶$\chi^2 = 6.222$, $P = .013$.
#$\chi^2 = 4.545$, $P = .033$.

APPENDIX D

BINARY LOGISTIC REGRESSION OF POTENTIAL CONFOUNDING VARIABLES

	Vignette 1: Hypomobility		Vignette 2: Lumbar Instability		Vignette 3: Directional Preference		Vignette 4: Fear-Avoidance Behavior	
Confounding Variable	OR*	*P* Value	OR*	*P* Value	OR*	*P* Value	OR*	*P* Value
High LBP case load†	1.72 (0.84, 3.51)	.136	1.05 (0.54, 2.03)	.885	0.88 (0.43, 1.81)	.729	1.03 (0.45, 2.23)	.947
Male sex	0.77 (0.49, 1.20)	.251	0.97 (0.64, 1.48)	.892	0.64 (0.39, 1.05)	.076	0.86 (0.53, 1.41)	.557
Postprofessional education	1.18 (0.74, 1.88)	.480	1.38 (0.89, 2.13)	.151	1.36 (0.83, 2.23)	.216	1.26 (0.75, 2.13)	.385
Outpatient orthopaedics	1.15 (0.64, 2.02)	.636	0.87 (0.50, 1.51)	.609	0.75 (0.39, 1.47)	.408	0.42 (0.25, 1.90)	.022‡
Clinical experience	0.94 (0.92, 0.96)	.001‡	0.98 (0.96, 1.00)	.063	0.96 (0.94, 0.99)	.002‡	0.95 (0.92, 0.98)	.001‡

Abbreviations: LBP, low back pain; OR, odds ratio.
**Values in parentheses are 95% confidence interval.*
†*Defined as 50% or greater.*
‡*Statistically significant (P<.05).*

APPENDIX E

OUTCOME VARIABLES AND AGREEMENT AMONG EXPERTS

Vignette	Variables Required for Guideline Adherence	Agreement, %*	Kappa†
Mobility deficits	Education to stay active and pursue active lifestyle or exercises (strengthening, coordination)	100	0.85
	Spinal manipulation (thrust or nonthrust)	100	
Lumbar instability	Education to stay active and pursue active lifestyle	0	0.94
	Exercises (strengthening, coordination)	100	
Directional preference	Education to stay active and pursue active lifestyle or education on symptom-relieving posture/movements	100	0.84
	Exercises (specific directional preference)	100	
Fear-avoidance behavior	Education to stay active and pursue active lifestyle	100	0.80
	Strategies/education to address fear of movement	100	

**Individual agreement between outcome variables.*

†Fleiss' kappa and agreement for all 27 interventional variables.