The Influence of Experience and Specialty Certifications on Clinical Outcomes for Patients With Low Back Pain Treated Within a Standardized Physical Therapy Management Program

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Study Design: Secondary analysis of a randomized trial.
Objectives: To examine the influence of experience and specialty certification on outcomes for patients with low back pain receiving a standardized manipulation or stabilization exercise intervention program.
Background: Little research has examined the impact of therapist-related factors on the outcomes of clinical care for patients with low back pain. It is assumed that therapists with more clinical experience or specialty certification will achieve better clinical outcomes; however, few studies have examined this hypothesis.
Methods and Measures: One hundred thirty-one participants in a randomized trial were included (70 randomized to receive manipulation, 61 stabilization). All subjects completed an Oswestry Disability Questionnaire at baseline, and after 1 and 4 weeks of treatment. Therapists were categorized based on total years of experience, years of experience with manual therapy, and specialty certification status. Two-way repeated-measures analyses of covariance were performed within each intervention group to examine the effects of the therapist characteristics on outcomes. Hierarchical linear regression models were used to examine the relative effects of therapist characteristics and intervention on clinical outcomes.
Results: Thirteen therapists participated (average 6.0 years of experience [standard deviation, 4.0], 4 (30.8%) with specialty certification). A significant interaction between time and specialty certification status ($P = .04$) was detected for subjects receiving the manipulation intervention. No significant interactions were detected in the stabilization group. The regression models found that the intervention group significantly contributed to explaining clinical outcomes, but that therapist characteristics did not.
Conclusions: With the standardized protocol utilized in this study, it appears that the therapist-related factors of increased experience and specialty certification status do not result in an improvement in patients' disability associated with low back pain. *J Orthop Sports Phys Ther 2004;34:662-675.*

Key Words: *experience, expertise, low back pain manipulation, stabilization*

As with any aspect of physical therapy practice, numerous factors interact to determine the outcomes of clinical care for patients with low back pain (LBP). The majority of research efforts have focused on identifying the most effective therapeutic approaches[32,47] and the importance of patient-related factors, such as the nature and behavior of symptoms, psychosocial factors, and work and family support.[7,8,14,39,50] Less attention has been directed towards examining the impact of therapist-related factors on the outcomes of clinical care for patients with LBP, such as experience, educational preparation, personal traits, etc.[24,25] It has

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been hypothesized that therapist-related factors do contribute to the outcome of care. Although little research has been performed, a few studies do suggest that expert therapists achieve superior clinical outcomes.[24,25,45]

Numerous therapist-related factors have been proposed to contribute to achieving expert status as a physical therapist.[23-25] One factor commonly presumed to characterize an expert is a greater number of years of clinical experience.[23] The American Physical Therapy Association (APTA) and other professional associations, such as the American Academy of Orthopedic Manual Physical Therapists (AAOMPT), have also established mechanisms to formally recognize therapists believed to possess expert knowledge and skills through specialist certification or fellowship programs. Although these designations are believed to indicate expertise, their influence on the outcomes of clinical care has not been adequately examined.

Three retrospective studies, both utilizing data from the Focus on Therapeutic Outcomes (FOTO) database, investigated the relationship between therapist-related factors and patient outcomes. Resnik and Hart[40] analyzed data from over 24 000 patients with LBP. Patient self-reports of health-related quality of life (HRQL) were collected at the initial physical therapy evaluation and at discharge. Participating therapists were categorized based on their aggregated patient outcomes. Those therapists who had aggregated patient outcomes in the top 10% and middle 10% were included in the analysis. The characteristics of therapists whose patients demonstrated a large improvement (ie, a good outcome) did not differ from the characteristics of therapists whose patients achieved an average outcome with respect to years of clinical experience or professional degree. The influence of specialty certification was unclear due to the small number of therapists holding these designations.[40] In an earlier study, Hart and Dobrzykowski[18] specifically investigated the effect of orthopaedic clinical specialist certification (OCS) on both clinical outcomes and clinical efficiency. Data from 258 adult patients with a variety of musculoskeletal disorders were included. Although therapists with OCS certification were more efficient than non-OCS therapists (fewer visits and less estimated cost over the same treatment duration), clinical outcomes were similar between groups. Finally, Resnik and Hart[41] utilized retrospective analysis to assess outcomes of care for over 24 000 patients with LBP. In this study, improvements in clinical outcomes were positively affected by therapist certification in manual therapy, but were not influenced by therapist OCS certification or completion of an AAOMPT-approved residency program. Although these studies provide some insights into the relationship between therapist-related factors and clinical outcomes, both suffer from the inherent shortcomings of retrospective design, such as susceptibility to the bias created by missing observations, incomplete follow-up, and biased patient selection.[19]

Although the relationship of therapist-related factors to the outcomes of specific types of interventions has not been examined, it seems reasonable to suspect that this relationship may vary based on the intervention of interest. For example, manipulation is an intervention with evidence for its effectiveness in patients with LBP.[2,46,48] There is a tacit assumption that therapist-related factors, particularly years of clinical experience, will influence the clinical outcomes associated with manipulation interventions.[5,11,17] The presumed importance of experience with manipulative interventions is evidenced by studies of manipulation that require a certain level of experience for the practitioners administering the manipulation interventions.[1,20,22,36] Exercise interventions, including spinal stabilization programs, have also been shown to improve clinical outcomes in patients with LBP.[21,38] The expertise of the therapist has been suggested to play an important role in the success with stabilization exercise interventions,[37] although it does not appear that as much attention has been focused on therapist-related factors and their influence on the outcomes of exercise interventions.

Despite the assumption that therapist-related factors influence outcomes of care for patients with LBP, particularly those receiving spinal manipulation, the existing literature is sparse and has produced inconclusive results. Studies performed to date[18,40,41] have been limited by their retrospective designs. The completeness of data entry must also be considered when examining studies based on large clinical databases. Only 2 previous studies[40,41] have focused exclusively on patients with LBP, but these studies did not permit analysis of the influence of expertise on specific types of interventions. The purpose of the present analysis was to further examine the relationship between aspects of expertise, such as clinical experience and specialty certification, and the outcomes of care for patients with LBP receiving either a standardized spinal manipulation or a standardized stabilization exercise intervention within a prospective, randomized clinical trial.

METHODS

Subjects

This study reports a secondary analysis of a randomized clinical trial that was performed to examine the validity of a clinical prediction rule developed to identify patients with LBP likely to benefit from spinal manipulation.[4] Subjects in this trial were randomized to receive a manipulation-plus-exercise intervention, or a lumbar stabilization exercise intervention. This secondary analysis explores the

TABLE 1. Baseline characteristics for the entire sample and each intervention group. Results represent mean (standard deviation) unless otherwise indicated. No statistically significant baseline differences existed between the intervention groups.

Variable	All Patients (n = 131)	Manipulation Group (n = 70)	Stabilization Exercise Group (n = 61)
Age (y)	33.9 (10.9)	33.3 (11.2)	34.6 (10.6)
Gender (% female)	42.0	42.9	41.0
Body Mass Index (kg/m^2)	27.1 (4.5)	27.7 (4.7)	26.3 (4.1)
Prior history of LBP (%)	67.9	65.7	70.5
Received manipulation for prior episodes (%)	25.2	18.6	32.8
Received exercise for prior episodes (%)	35.1	31.4	39.3
Duration of current symptoms (median number of days)	27	22	30
$<$2 wk duration (%)	32.8	35.7	29.5
2-8 wk duration (%)	39.7	41.4	39.4
$>$8 wk duration (%)	27.5	22.9	31.1
Symptoms distal to the knee (%)	23.7	25.7	21.3
Fear-Avoidance Beliefs Questionnaire work scale score	17.0 (10.3)	16.5 (10.1)	17.4 (10.5)
Oswestry disability score	41.2 (10.4)	41.4 (10.1)	40.9 (10.8)

relationship between therapist-related factors and clinical outcomes within each intervention group. The study included subjects with primary complaints of LBP recruited from 8 outpatient physical therapy clinics located in a variety of settings throughout the United States. The study was approved by each data collection site's Institutional Review Board. Inclusion criteria were age between 18 and 60 years, a primary complaint of LBP with or without referral into the lower extremities, and a baseline Modified Oswestry Disability Index (OSW) score of at least 30%. Subjects who were pregnant, exhibited signs consistent with nerve root compression (ie, positive straight leg raise at less than 45°, diminished lower extremity strength, sensation, or reflexes), history of prior lumbar spine or buttock surgery, or a history of osteoporosis or spinal fracture were excluded from the study.

The study involved 131 subjects, with 70 subjects randomized to the manipulation group and 61 subjects to the stabilization exercise group (Table 1). Subjects had a mean age of 33.9 years (SD, 10.9), 55 (42%) were female, and the median duration of their symptoms was 27 days. The subjects' mean Oswestry disability score was 41.2% (SD, 10.4), and their mean pain rating was 5.8/10 (SD, 1.6). No statistically significant baseline differences were found between the intervention groups ($P>.05$).

Therapists and Therapist Training

Both intervention groups were treated by licensed physical therapists. A total of 13 therapists from the 8 clinical sites participated in the study. All therapists received 1 training session prior to the study. The purpose of the training session was to insure that all study procedures, including the intervention techniques, were performed in a similar fashion by each therapist. One of the investigators conducted all of the training sessions. The investigator instructed and observed each therapist in the performance of all the intervention techniques. Each training session lasted approximately 4 hours, including approximately 15 minutes dedicated to demonstration and practice of the manipulation technique used in this study and 30 to 40 minutes for the exercise interventions. Each site was provided with a detailed manual that outlined all study procedures, including operational definitions of each physical examination and intervention procedure, and instruction on exercise progression. Intervention logs were provided for each therapy session for both intervention groups to remind therapists of the intervention program to be administered at each session. Prior to the training session, each therapist completed an experience and training survey. Included on this survey were (1) number of years of practice following entry-level training, (2) advanced or specialist certification from the APTA (OCS) or AAOMPT (FAAOMPT), and (3) number of years of experience using manual therapy procedures.

Intervention

After completing a baseline examination, subjects were randomized to either the manipulation or stabilization exercise group. Both groups attended 5 therapy sessions and were assigned a home exercise program that was to be performed daily on days when therapy was not attended. All subjects received an exercise instruction booklet outlining the proper performance of each exercise and were advised to maintain usual activity within the limits of pain. Two

therapy sessions took place in the first week of the study, followed by once-weekly sessions over the next 3 weeks.

Subjects in the manipulation group received the manipulation intervention for the first 2 sessions. Beginning on the third session, subjects in the manipulation group began receiving the same exercise intervention as the subjects in the stabilization exercise group. No further manipulation was provided after the first 2 sessions. During the first 2 sessions, each subject received the same manipulation technique. This technique was selected because it has been shown to be effective for reducing pain and disability for patients with LBP.[9,10,13] The technique was performed with the subject supine. The therapist stood opposite the side to be manipulated and passively moved the patient into side bending towards the side to be manipulated, then rotated the patient in the opposite direction. A high-velocity, low-amplitude thrust was delivered to the anterior superior iliac spine in a posterior and inferior direction (Figure 1).

The side to be manipulated was the more symptomatic side, based on the patient's self-report. If the patient was unable to specify a more symptomatic side, the therapist selected either side to be manipulated. After the manipulation was performed, the therapist recorded whether a cavitation (ie, a pop) was either heard or felt by the therapist or subject. If a cavitation occurred, the therapist proceeded to instruct the subject in a range-of-motion (ROM) exercise (10 repetitions of supine anterior-posterior tilting of the pelvis). If no cavitation was produced, the subject was repositioned and the manipulation was attempted again. If no cavitation occurred on the second attempt, the therapist attempted the manipulation on the opposite side. A maximum of 2 attempts per side was permitted. If no cavitation was produced after the fourth attempt, the therapist proceeded to instruct the subject in the ROM exercise.

FIGURE 1. Manipulation procedure used in this study.

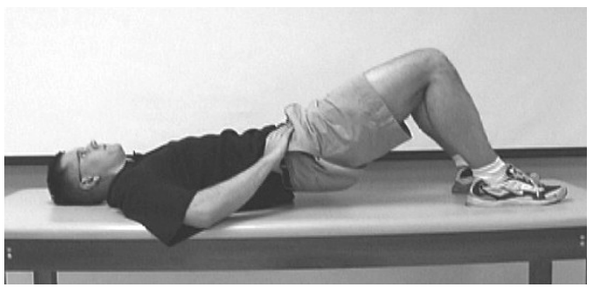

FIGURE 2. Bridging exercise performed with the drawing-in maneuver.

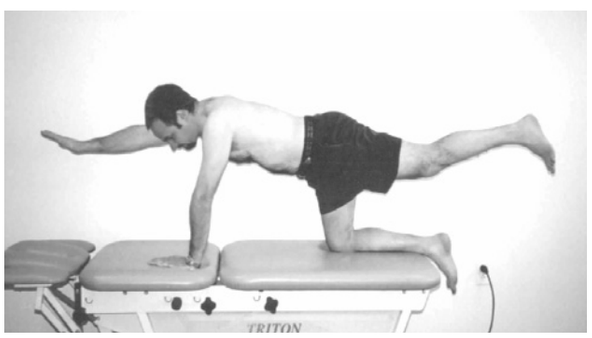

FIGURE 3. Unilateral hip extension and shoulder flexion exercise performed from the quadruped position.

Subjects in the stabilization exercise group received exercise instruction at all 5 therapy sessions. Exercises included a low-stress aerobic activity, such as treadmill walking or stationary cycling. The aerobic exercise component was performed at a subject-selected pace with an initial goal of 10 minutes. Subjects also performed 10 repetitions of a ROM exercise consisting of rocking the pelvis forward and backward while in a quadruped position. Stabilization exercises were performed at each session. Six different exercises were used based on evidence in the literature showing the exercises were either part of a program that resulted in improved clinical outcomes, or were able to produce high levels of force output in muscle groups believed to play an important role in spine stabilization without producing high levels of shear or compression forces.[34,35]

The first 3 exercises used the abdominal "drawing-in" procedure, as described by Richardson and colleagues.[42,43] Once the subject was able to perform the drawing-in procedure properly 10 times, holding each repetition for 10 seconds, subjects were instructed to perform the drawing-in maneuver while standing and performing wall slides, and while performing bilateral hip extension from a hook-lying position (Figure 2). The next 2 exercises were performed with the subject in a quadruped position. The subject was first instructed to perform the drawing-in maneuver, then extend 1 hip without allowing the spine to move. Once this exercise could be

FIGURE 4. Side-bridge exercise performed with the knees extended.

performed properly 20 times with each leg, the second quadruped exercise (hip extension with contralateral shoulder flexion) was added (Figure 3). The final stabilization exercise was the isometric side bridge.[28,35] This exercise was performed with the subject sidelying and the upper body propped up on 1 elbow. The subject was instructed to lift the pelvis high enough to be in line with the upper body. Once 10 lifts per side could be properly performed with knees bent, the exercise was progressed by performing the exercise with the knees extended (Figure 4).

Outcome Measurements

Prior to randomization, all subjects completed various self-report measures and underwent a standardized physical examination performed by a physical therapist who was masked to the subject's intervention group. All measures were repeated after 1 week (prior to the third treatment session) and after 4 weeks (at the completion of the study period). Self-report measures included the Fear-Avoidance Beliefs Questionnaire work subscale (FABQ-W). The FABQ-W was used to quantify the patient's fear of pain and beliefs about avoiding physical activity.[49] The FABQ-W contains 7 items, each scored from 0 to 6, with higher numbers indicating that the subject has greater levels of fear of physical activity and a perception that activity should be avoided. High levels of fear-avoidance beliefs have been shown to adversely impact outcomes of individuals with acute and chronic LBP.[31,49] Disability related to LBP was assessed with the Modified OSW.[15] The OSW contains 10 items, each scored from 0 to 5. The results are expressed as a percentage, with higher numbers indicating greater self-reported disability due to LBP. The version of the OSW used in this study has been found to be reliable and responsive to change in patients receiving physical therapy for LBP.[15]

Data Analysis

Therapist experience and training surveys were analyzed based on 3 therapist-related factors: years of experience, years of experience using manual therapy procedures, and specialty certification. This process was performed by an examiner blinded to patient outcome. Years of experience was based on the number of years since graduation from a first professional physical therapy program. Experience using manual therapy was based on the self-reported number of years the therapist had been using manual therapy procedures on patients during clinical care. We recorded the number of years for each variable and also categorized the therapists as less experienced (less than 3 years clinical experience) or more experienced (3 or more years of clinical experience). Therapists were also categorized as novice manual therapists (less than 1 year of self-reported experience) or experienced manual therapists (more than 1 year of self-reported experience). Finally, therapists with either OCS certification from the APTA or fellowship status from the AAOMPT (FAAOMPT) were considered to have specialty certification. All other therapists were categorized as not having specialty certification.

We first examined the effect of the therapist-related factors on clinical outcomes within each intervention group by performing 3 separate 2-way analyses of covariance (ANCOVAs) with repeated measures procedures for each group. Each ANCOVA used the mean OSW as the dependent variable. The between-subjects factors were the categorization of years of experience (less than 3 versus 3 or more years), experience with manual therapy (novice or experienced), and specialty certification status (yes or no). The baseline FABQ-W and the duration of the subject's symptoms were used as covariates because these variables have been shown to influence the prognosis of individuals with LBP.[14,16,46,50] For subjects in the manipulation group, the within-subjects factor was time with 2 levels (baseline and 1 week). The 1-week period was selected because subjects received only the manipulation intervention within the first week (first 2 sessions), and research has demonstrated that substantial improvement in disability can occur quickly in patients successfully treated with manipulation.[9,10,13] For the stabilization exercise group, the 2 levels of the within-subjects factor of time were baseline and 4 weeks. We used the 4-week OSW score because previous research demonstrating successful outcomes for patients treated with lumbar stabilization programs typically utilized programs over longer treatment durations.[38] A significance level of $P < .05$ was used for all analyses.

We sought to further examine the relative effect of therapist-related factors and intervention group on clinical outcomes using hierarchical linear regression models. The dependent variable for each model was change in Oswestry score between baseline and 1 week of treatment. The following variables were entered in the first step of the model: age, gender, duration of symptoms, and baseline Oswestry and

FABQ-W scores. The purpose of the first step was to control for the effects of these variables on change in Oswestry scores. In the second step, a stepwise entry procedure was used with 3 variables considered for entry: years of experience, intervention group (manipulation or stabilization), and the interaction between years of experience and treatment group. The purpose of the second step was to determine which factor(s) would contribute most to the explanation of variability in 1-week changes in Oswestry score. A significance level of $P<.05$ was used for stepwise entry into the model and $P>.15$ was the criterion for removal. Separate regression models were created to examine years of experience with manual therapy and specialty certification. These regression models used the same steps and variables except that years of experience with manual therapy or specialty certification status was substituted for years of experience.

RESULTS

Thirteen therapists participated in the study (Table 2). The mean age was 32.8 years (SD, 7.1) and 2 (15.4%) were female. The number of subjects treated by each therapist ranged from 1 to 32, with a mean of 10.1 (SD, 9.7). The average years of clinical experience among the therapists was 6.0 years (SD, 4.0), and the average years of experience with manual therapy was 3.1 years (SD, 1.4). Four therapists (30.8%) had specialty certification, and these therapists treated 77 subjects (58.8%).

TABLE 2. Characteristics of participating therapists. The mean age was 32.8 years (SD, 7.1).

Therapist Characteristics (n = 13)	Number (%)
Gender	
Female	2 (15.4)
Years experience	
<3 y	3 (23.1)
≥3 y	10 (76.9)
Over 75% of time currently spent in clinical practice	12 (92.3)
Highest physical therapy degree	
Baccalaureate	3 (23.1)
Entry-level master's	8 (61.5)
Postprofessional master's	2 (15.4)
Specialty certification	
OCS	4 (30.8)
FAAOMPT	2 (15.4)
Either OCS or FAAOMPT	4 (30.8)
None	9 (69.2)
Residency or fellowship training	0 (0)
Years of experience in manual therapy	
≤1 y	3 (23.1)
>1 y	10 (76.9)

Abbreviations: OCS, orthopaedic clinical specialist; FAAOMPT, fellow of the American Academy of Orthopaedic and Manual Physical Therapists.

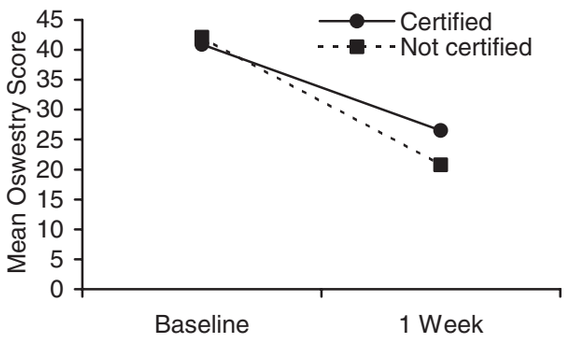

FIGURE 5. Change in Oswestry scores between baseline and 1 week for subjects in the manipulation group, based on certification status. A significant interaction (P = .04) was found between time and certification status.

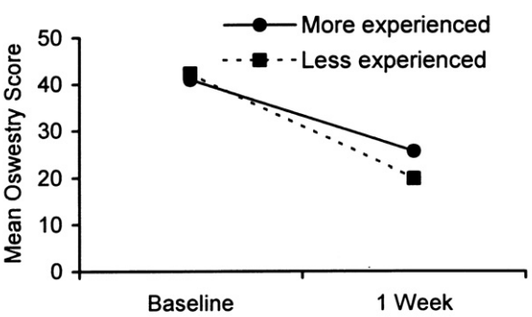

FIGURE 6. Change in Oswestry scores between baseline and 1 week for subjects in the manipulation group based on therapists' years of experience (more experienced, ≥3 years; less experienced, <3 years). The significance of the interaction effect was P = .05.

The ANCOVA procedures performed using subjects in the manipulation group (Table 3) yielded a significant interaction between time and specialty certification (P = .04). The nature of the interaction is pictured in Figure 5, indicating that subjects treated by therapists without certification demonstrated greater change in disability over the 1-week period than those subjects treated by therapists with certification (mean difference, 6.9 points; 95% confidence interval [CI]: 3.6, 14.0). The interaction between time and total clinical experience category was at the significance level (P = .05). The nature of this interaction is depicted in Figure 6, indicating a tendency towards greater improvement in disability among those subjects treated by therapists with less experience (mean difference, 7.0 points; 95% CI: –0.67, 14.7). The interaction between time and experience with manual therapy was not significant (mean difference, 0.94 points; 95% CI: –4.2, 6.1).

The ANCOVA procedures performed with subjects in the stabilization group did not yield any significant interaction effects, indicating that changes in disability among subjects treated with stabilization were not dependent on any of the therapist-related characteristics studied. The mean difference in OSW change was

TABLE 3. Baseline and follow-up Oswestry disability scores for subjects in both intervention groups. Numbers represent mean (standard deviation).

	Manipulation Group		Stabilization Group	
Therapist Group	Baseline Oswestry	1-Week Oswestry	Baseline Oswestry	4-Week Oswestry
<3 y experience	41.0 (10.2) n = 48	25.6 (15.0) n = 48	41.2 (11.1) n = 47	25.2 (17.4) n = 47
≥3 y experience	42.3 (10.1) n = 22	19.8 (11.6) n = 22	39.9 (10.0) n = 14	28.7 (18.4) n = 14
Experience with manual therapy	41.5 (10.3) n = 52	24.1 (12.1) n = 52	41.6 (11.5) n = 50	26.8 (16.9) n = 50
Novice with manual therapy	41.3 (9.9) n = 18	23.7 (15.0) n = 18	37.7 (5.8) n = 11	32.2 (14.7) n = 11
Specialty certified	40.9 (10.6) n = 37	26.5 (15.8) n = 37	40.9 (11.5) n = 38	25.6 (16.3) n = 38
Not specialty certified	42.1 (9.7) n = 33	20.8 (11.6) n = 33	40.8 (9.7) n = 23	26.8 (19.8) n = 23

TABLE 4. Hierarchical linear regression analysis examining the relationship between years of experience, treatment group, and change in Oswestry score, after 1 week of treatment, controlling for age, gender, symptom duration, initial Oswestry score, and fear-avoidance beliefs about work (FABQ-W).

Variables Entered	Adjusted R^2	Significance of R^2 Change	Standardized Beta Coefficient (Final Model)	Significance of Beta
Step 1	0.16	<0.001		
Age			–0.008	0.92
Gender			0.10	0.22
Symptom duration			–0.054	0.66
Initial Oswestry score			0.40	<0.001
Initial FABQ-W score			–0.005	0.95
Step 2	0.24	<0.001		
Treatment Group			–0.29	<0.001

Variables Excluded	Standardized Beta Coefficient if Entered	Significance of Beta
Years of experience	0.006	0.94
Interaction between years of experience and treatment group	0.044	0.62

–0.98 points (95% CI: –7.5, 5.6) based on total years of experience, –1.3 points (95% CI: –8.5, 5.9) for manual therapy experience, and –0.72 points (95% CI: –6.3, 4.9) based on specialty certification (note that negative values indicate greater change for therapist with greater experience or specialty certification). As expected, a significant main effect for time was found in all comparisons.

The regression models developed found that the variables entered in step 1 accounted for 16% of the variability in 1-week Oswestry scores changes (Table 4). The only variable entered in step 2 was the intervention group, which explained an additional 8% of the variability ($P<.001$). As shown in table 4, years of experience and the interaction between years of experience and intervention group were excluded from the model ($P = .94$ for years of experience, $P = .62$ for the interaction). The final regression models substituting years of experience with manual therapy or specialty certification status produced the same final model, with only intervention group being entered in step 2. The significance levels for the excluded variables in the model developed for years of experience with manual therapy were $P = .91$ for manual therapy experience and $P = .54$ for the interaction. The significance levels for the model developed with specialty certification status were $P = .16$ for specialty certification status and $P = .37$ for the interaction.

DISCUSSION

The majority of studies investigating the qualities of expert therapists have focused on qualitative factors, such as communication style, aspects of the clinical decision-making process, reputation of the therapist, levels of advanced training or specialty certification,

etc.[24,25] Many researchers agree that studies of expertise should also prospectively investigate whether any of these previously identified traits or characteristics associated with expert therapists actually translate into improved clinical outcomes or resource utilization.[16,40] In this study, specialty certification and higher levels of therapist experience did not result in better outcomes of care for patients with LBP treated with a standardized manipulation or a stabilization intervention, suggesting that experience and specialty may not be adequate markers of expertise when expertise is determined based on the outcomes of clinical care.

One of the primary ways that therapists have traditionally been identified as expert is based on the number of total years of experience. For example, therapists are often selected to participate in clinical research studies based on having more years of clinical experience or greater experience with manual physical therapy, without any further attempt to insure that the chosen therapists actually achieve better outcomes when caring for patients.[1,20,22,36,38] This is done based on the assumption that increased years of experience marks an expert therapist, and that these individuals will, consequently, deliver superior patient care. Our results did not support this premise. We found that subjects receiving the standardized manipulation intervention, treated by therapists with less than 3 years of experience, showed a tendency toward better outcomes (P = .05) when assessed with the OSW at 1 week, as compared to subjects treated by more experienced therapists. Furthermore, increased years of experience, specifically with manual physical therapy, did not improve outcomes for patients receiving the manipulation, and neither parameter of clinical experience (increased total years of clinical experience or increased years of experience with manual physical therapy) appeared to impact outcomes for patients treated with the stabilization intervention. These findings corroborate those of Resnik and Hart,[40] who found that therapists whose patients demonstrated a large improvement in risk-adjusted health-related quality of life (HRQL) did not differ from the therapists whose patients achieved an average outcome with respect to years of clinical experience.

A second therapist-related quality often utilized to identify expert therapists and presumed to impact clinical outcomes is specialty certification. We examined the influence of 2 specialty certifications: OCS certification through the American Board of Physical Therapy Specialties (ABPTS) and fellowship status in the American Academy of Orthopaedic and Manual Physical Therapy (FAAOMPT). Two previous studies have investigated whether holding these specialty certifications actually impacts clinical outcomes. In a retrospective analysis, Hart and Dobrzykowski[18] evaluated the relationship between OCS certification and both patient outcomes and resource utilization. These investigators found that therapists with OCS certification were more efficient than non-OCS therapists (fewer visits and less estimated cost over the same treatment duration); yet actual clinical outcomes were similar between the groups. In a more recent report, Resnik and Hart[41] examined the influence of therapist OCS certification status, manual therapy certification (MTC) status, and completion of an approved manual therapy residency program (FAAOMPT) on clinical outcomes. Their findings demonstrated a positive influence of MTC on patient outcomes, but not for FAAOMPT residency or OCS certification status. Interestingly, therapists with AAOMPT-approved residency training saw patients for more visits over a longer treatment duration as compared to therapists without this training. In our study, the number of treatment sessions and duration of treatment was held constant, yet all therapists, with and without specialty certification (either OCS or FAAOMPT), achieved similar outcomes with the standardized stabilization intervention. Interestingly, specialty certification status did impact outcomes achieved with the standardized manipulation intervention—patients treated by therapists without certification demonstrated, both clinically and statistically, greater change in disability over the 1-week period than those patients treated by therapists with certification.

A critical aspect of this analysis relates to the fact that clinical decision making was removed from the treatment of patients in this study. All therapists were instructed in standardized examination and intervention procedures. Both the manipulation and stabilization interventions were practiced and therapists were specifically instructed in progression of the exercise programs. Because therapists were not allowed to choose what intervention they would employ or how they would progress the patient, we can only draw conclusions about the therapists' skill in performing a standardized intervention program. Our results suggest that less-experienced and noncertified therapists were at least as capable, if not more capable, of learning and effectively performing the intervention techniques used in this study as the therapists with more experience or specialty certification. The results of the linear regression models support this conclusion. After controlling for numerous factors, it was the intervention that the patient received, and not any therapist-related characteristics, that helped to explain the differences in outcomes. Given that the interventions used in this study are evidence based and shown to be effective in the management of individuals with LBP, it is important to demonstrate that therapists can learn and become effective in the administration of these techniques, without a requisite number of years of clinical experience or requirement to attain specialty certification.

Based on the nature of our study design, several additional issues mandate caution when drawing conclusions from our analysis. Thirteen different therapists in 8 geographically diverse sites were included, and although we believe these therapists are representative of therapists working in orthopedic practices, they were not selected randomly. Only 3 therapists had less than 3 years of experience, limiting the generalizability of the results. In addition, because this was a secondary analysis, we did not randomly assign patients to therapists to insure a balanced design, and the number of patients treated by each therapist was variable. These factors may limit the overall generalizability of our results. Further studies in this area using alternative designs are needed.

Manipulation continues to be an underutilized intervention in physical therapist practice.[26,27] One reason that therapists may be reluctant to utilize manipulation for patients with LBP is the impression that it is an advanced technique that requires a high level of skill to perform. A recent survey by Boissonnault et al[3] of physical therapist educators in the United States demonstrated that many therapists perceive spinal manipulation as an advanced skill to be acquired through postprofessional, as opposed to first-professional, education.[12] The most frequently cited reason offered by educators for not including manipulation in their curricula was the belief that it is not an entry-level skill (45%).[3] There are little data to support the view that lumbar spine manipulation should be considered an advanced skill. Studies have shown that, with practice of a task, newly trained practitioners are able to apply similar levels of force compared to skilled practitioners[30,33] and that increased practice will improve performance regardless of experience, which reinforces the understanding that spinal manipulation is a motor skill that can be learned with repetition regardless of years of clinical experience.[6] Furthermore, reviews of the literature suggest that the safety and effectiveness of lumbar spine manipulation is not dependent on the type of practitioner, technique used, or years of experience.[2,44] Our findings support these ideas. The therapists in this study had only 1 manipulation technique to learn, practice, and perform. There is evidence supporting the effectiveness of this technique and novice therapists actually achieved superior outcomes with this intervention when compared to the more experienced therapists. Novice therapists can clearly learn and effectively employ a high-velocity thrust technique. Although the decision of which patients with LBP were appropriate for the manipulation technique was not made by the therapist within this design, evidence now exists to assist therapists in selecting the patients with LBP most likely to benefit from the technique.[13] Given the evidence supporting the use of manipulation for patients with LBP,[48] combined with evidence that inexperienced therapists can learn to deliver a manipulation effectively and can be instructed in the evidence available to assist in appropriate patient selection, there is no reason that all first-professional physical therapy educational programs should not include instruction in basic manipulation techniques in their curricula. In addition, clinical instructors working with these first-professional students should expect and encourage the utilization of these skills when caring for patients.

Few researchers have sought to specifically address this question of what factors actually set apart therapists who achieve superior outcomes with their patients; instead, they focus on exploring the therapist-related factors that describe clinicians deemed to be experts, based on factors other than patient outcomes. Although these other factors are likely important and perhaps part of what truly defines expertise, we believe that the definition of an expert physical therapist should also include utilization of the current best evidence in patient care and achievement of superior outcomes (patient-related outcomes and better cost utilization) when compared to other therapists and medical practitioners. The identification of factors that define expertise based on improved outcomes should have the potential to more directly influence the patients we serve and the students that we educate. Our findings further challenge the premise that years of experience or specialty certification status is a significant factor in achieving superior outcomes. More research is needed to examine the characteristics of therapists who achieve the best clinical outcomes for their patients.

CONCLUSION

It has been theorized that more years of clinical experience or holding advanced or specialty certification are therapist-related factors that assist in identifying expertise, and would, therefore, contribute to improved patient outcomes. With the standardized protocols utilized in this study, it appears that the therapist-related factors of increased experience and specialty certification status do not improve patient outcomes. These results have immediate implications on the incorporation of manipulation techniques into first-professional education. Future research is needed to further explore the potential relationship between experience and/or specialty certification and clinical outcomes with a design that allows clinicians to make decisions regarding intervention selection and patient progression.

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Invited Commentary

While many have hypothesized that therapist-related factors, such as years of experience and advanced certification, are related to expert practice, only a few studies have examined the association of these factors with patient outcomes.[2-5] The study by Drs Whitman, Fritz, and Childs explores an interesting and highly specific question: ie, is therapist experience and/or specialty certification associated with better outcomes for patients receiving a standardized evaluation and intervention protocol? The key implication of their research is that inexperienced therapists, and those who are not specialists, can quickly learn and become effective in delivering a high-velocity thrust technique. Their findings support the feasibility of teaching these types of manual therapy techniques within entry-level physical therapy programs.

Data for their study was drawn from a randomized clinical trial (RCT) examining a clinical prediction rule and employed both experienced and inexperienced therapists who had varying amounts of manual therapy training. Because prior studies testing the effectiveness of manual therapy techniques utilized experienced practitioners, often requiring 3 to 5 years minimum experience, Whitman et al wanted to know if therapist training and experience influenced the results of the RCT.

While theirs is a reasonable question to ask, I suspect that the original investigators of the RCT did not anticipate that there would be differential performance of the thrust technique due to the presence of specialty training or experience. If they had expected this to be a problem, it would have been logical for them to have made specialty certification and/or experience a prerequisite for therapist participation. This was not done. Instead, a training and quality-control mechanism was used to insure proper delivery of the protocol. In effect, this research serves to quantify the success of the training and quality-control mechanisms used in the RCT. One could argue that if the authors had found a difference between patient outcomes that was associated with therapist factors, then the intervention protocol of the RCT was not carried out in a uniform fashion as intended.

Therefore, I do not agree with the authors' unqualified statement that their findings "further challenge the premise that years of experience or specialty certification status is a significant factor in achieving superior outcomes." Although prior re-

search suggests that years of experience and specialty certification status are not a prerequisite for expert practice,[3-5] Whitman et al's research design cannot test this more general hypothesis or support this premise, because their therapists were not allowed to use their own clinical reasoning skills or adapt the intervention protocol based upon patient need or preference. Instead, therapists delivered standardized evaluation and treatment protocols. Because of these constraints, their findings cannot build upon previous theoretical models of expertise or add to the body of knowledge about therapist factors associated with clinical outcomes in the real world conditions of the clinic, where therapists freely make choices about the care that they deliver.

I agree with the authors that the generalizability of findings derived from previous studies of therapist factors and patient outcomes is limited by retrospective, nonexperimental designs, as well as by the small, nonrepresentative samples of therapists with advanced certification.[2-5] However, it is critical to point out that their study shares in these very same design limitations. This study is not an RCT, but, as the authors point out, a secondary analysis (or observational study) that uses data collected during an RCT. It also presents with additional concerns that may threaten its internal validity.

Publication of this paper presents an opportunity to educate *JOSPT* readers about some of the analytic challenges posed by observational research designs. While observational studies are popular in epidemiologic research, they are still relatively uncommon in physical therapy literature. Therefore, the choice of methods, presentation, and interpretation of findings from this study merit further discussion.

In an observational design, data are not collected to test specific hypothesis and, as such, there is no design mechanism put in place to evenly distribute patients' characteristics. In the original study, the RCT, the patients were randomized to treatment groups (manipulation plus exercise or lumbar stabilization exercises only). In the retrospective study, patients were not randomized to therapists based on the therapist factors under study.

Because outcomes of care can vary by patient characteristics, an unequal case mix can confound data analysis, leading to potentially faulty conclusions. RCTs are the gold standard of research designs, because the randomization process, if successful, creates comparability of patient characteristics between the intervention and control groups during the design phase of study. In an observational design, the researcher attempts to establish group comparability through control of confounders during the data analytic phase.[1] However, the researcher can only control for potential confounders that have been measured. Unmeasured confounders can still bias the results.

The authors used 2 analytic techniques to test their hypotheses, which resulted in somewhat different and conflicting findings. The first analysis was a repeated-measures analysis of covariance (ANCOVA), which used the subjects' baseline FABQ-W and duration of symptoms as covariates, and tested for the interaction between therapist experience/specialty certification and intervention group. The second analysis was a stepwise regression which controlled for age, gender, symptom duration, baseline Oswestry, and FABQ-W. While results of the ANCOVA indicated an interaction between therapist factors (certification, clinical experience) and manipulation group, the regression model showed no interaction effect.

Why were the results of the 2 analyses different? Because this was an observational study and patients were not randomized by therapist experience or specialty level; there was no method to insure that therapists classified as having different characteristics (experienced/not experienced, experienced with manual therapy/not experienced with manual therapy, specialist/not a specialist) had comparable patients. Thus, it is likely that patients treated by therapists with the various classifications differed in key areas that were related to their outcomes. This presents a major threat to internal validity.[6]

The conflicting results from these 2 analyses highlight the importance of employing adequate statistical methods for analytical control of confounding in an observational study. The ANCOVA didn't control for confounding because it did not include baseline Oswestry, age, gender, or symptom duration; whereas the regression adjusted for more of the baseline patient characteristics and, therefore, the results were less likely to be confounded (at least by measured confounders). Thus, the regression results have more internal validity. The presentation of the ANCOVA results and comments referring to findings from the relatively crude ANCOVAs, without additional discussion of contradictory findings from the regression and the limitations of the research design and analytic methods, may have left the reader somewhat confused.

There may be additional threats to internal validity in the way that therapists were categorized. The first relates to classification of therapists as specialists or not specialists. The authors grouped together 2 therapists who had fellowship with the FAAOMPT only, and 2 therapists who had OCS certification and fellowship with the FAAOMPT as "specialty certified." No doubt this collapsing of subcategories was done because a sample of 2 therapists would have been too small to analyze. However, it is not clear from the data if this grouping was justified. Were the outcomes of these 2 subgroups equivalent? Because no data were presented on the breakdown of outcomes by therapists within these 2 subcategories, the reader has

no way of knowing whether or not this larger grouping made sense.

Another potential problem is the classification scheme of therapists as experienced, or not experienced, with manual therapy procedures. Although a therapist may have been doing manual therapy for many years, it does not mean that they are familiar with, or have ever used, the particular manual therapy technique tested in this study. Thus, a therapist who was experienced in manual therapy, but had never used the particular procedure, may have been misclassified as experienced in manual therapy, but in actuality was a novice in using this particular thrust technique. This type of misclassification would have biased the results towards the null.

Despite the study's limitations and concerns, I applaud the authors for their interest in examining the association between therapist training and experience and patient outcomes. These types of studies are logistically difficult to conduct, and secondary analysis of data from an RCT was clearly an economical and innovative approach. Undoubtedly, the best design for future studies to definitively answer our questions about the influence of therapist training and experience on patient outcomes would be an RCT, where patients are randomized to therapists based upon therapist training and/or experience. Until then, our best sources of information will come from well-designed observational studies, which employ the best analytic techniques for control of confounders. A close examination of Whitman et al's study offers much food for thought about the methodology that can and should be used to explore these important questions.

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Authors' Response

As pointed out by Dr Resnik, and emphasized in our manuscript, the influence of experience on the practice of physical therapy is multifaceted, and can be researched from a variety of perspectives. It is the cumulative evidence provided by these varying perspectives that will ultimately lead to a better understanding of exactly how factors, such as clinical experience and specialty certification, influence the outcomes of physical therapy care. This paper represents one such perspective, which examined the influence of experience and specialty certification on the performance of specific interventions on patients with low back pain. The results did not support the hypothesis that increased experience or holding specialty certification would result in better outcomes and, therefore, it is entirely appropriate to acknowledge that these results, along with the results of other studies,[2,5] "further challenge the premise that years of experience or specialty certification status is a significant factor in achieving superior outcomes." No single study can examine all aspects of the relationship between experience, specialty certification, and outcomes; however, the preponderance of the evidence to date certainly challenges the prevailing assumptions regarding this relationship.

Dr Resnik expresses a concern that the ANCOVA and logistic regression analyses produced "somewhat different and conflicting findings." As noted above, the results of both analyses were consistent in their failure to support the hypothesis that increased experience or having specialty certification would result in superior patient outcomes. We believe that the ANCOVA differed somewhat from the logistic regression, because the treatment group was considered as an independent variable in the regression models; but not in the ANCOVA analyses, which were performed separately for the manipulation and stabilization exercise groups. These 2 analyses had somewhat different purposes: the ANCOVA permitted an examination of the influence of therapist-related factors in each treatment group separately, while the logistic regression models permitted an examination of the

relative importance of therapist-related factors and the treatment received. We believe these 2 analyses permit a more robust exploration of the data than would occur with only 1 analysis. The results of both analyses reject the hypothesis that more experience or holding specialty certification would result in better patient outcomes.

As is true of any research study, the design of the present study influences the interpretation of the results. The outcomes of clinical care are influenced by numerous factors, some of which are present in this design and others of which are not. Most notably, clinical decision making was not present, which permitted an evaluation of the influence of experience and specialty certification status on the actual performance of the interventions studied, but obviously did not permit conclusions regarding the influence of experience and specialty certification on the decision to perform the interventions. Contrary to the opinion of Dr Resnik, examining the influence of experience and specialty certification on the performance of interventions, particularly manipulation interventions, certainly helps to build on previous theoretical models and add to the body of knowledge that ultimately influences the practice of the physical therapy. There has been considerable debate regarding the appropriateness of instruction in manipulation techniques at the entry level, with the ability of new therapists to perform the techniques commonly expressed as a reason for concern.[1] It is likely that this concern arises from theoretical models of manual therapy that have traditionally emphasized the necessity of years of experience as a prerequisite for achieving expertise.[4] The results of this study advocate that individuals with little experience can be instructed in basic skills of manipulation, and can achieve favorable outcomes when applying the techniques to patients, thereby building on prevailing theoretical models. Further research examining the influence of clinical decision making will further inform and challenge these models, and inform clinical practice.

Another important aspect of the present study, in contrast to previous studies examining the influence of experience on outcomes, is its prospective design. Prospective research is characterized by an a priori definition of the patient sample to be studied and the variables to be assessed.[3] By contrast, in retrospective designs, the researchers define the sample and the variables to be studied after the outcomes have occurred, creating a greater likelihood of bias due to incomplete or unstandardized data collection.[6] The prospective design of the present study is not reversed by the fact that this manuscript was based on a secondary analysis of the data. Therefore, while it is important not to characterize the present analysis as a randomized trial, it is accurate to consider the design to be prospective in nature.

We agree with Dr Resnik's comments regarding the possibility of classifying therapists using alternative operational definitions. The quantity of experience required to consider a therapist as experienced is inevitably a somewhat arbitrary decision. We encourage further research using alternative classifications and research designs to further add to the important discussion of exactly what constitutes an expert physical therapist.

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