Research Report

The Low Back Activity Confidence Scale (LoBACS): Preliminary Validity and Reliability

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Background. Low back pain affects a substantial number of adults each year and is persistent or recurrent for many. Self-efficacy is an important predictor of functional recovery.

Objective. The purpose of this investigation was to assess the preliminary reliability and validity of the Low Back Activity Confidence Scale (LoBACS) for individuals with histories of low back pain or lumbar surgery.

Design. Two overlapping samples of patients who had undergone a microdiskectomy participated: a test-retest sample of 21 individuals and a validity sample of 53 individuals.

Methods. Low Back Activity Confidence Scale items pertaining to self-efficacy for functional activities (FnSE subscale), self-regulation of back health (Self-RegSE subscale), and regular exercise (ExSE subscale) were generated from existing literature and clinical observations. The test-retest sample completed the LoBACS twice, approximately 10 days apart. The validity sample completed the LoBACS and measures of functional performance, self-reported leisure and occupational physical activity, pain, fear beliefs, disability, and quality of life.

Results. The FnSE, Self-RegSE, and ExSE subscale scores and LoBACS total score had excellent to acceptable test-retest reliability (intraclass correlation coefficients of .924, .634, .710, and .850, respectively) and internal consistency (Cronbach α coefficients of .924, .804, .941, and .911, respectively). The LoBACS subscales were correlated in expected directions with physical performance, physical activity, pain, fear beliefs, disability, and quality of life, providing initial evidence of concurrent validity.

Conclusions. The findings provide preliminary content and concurrent validity and interrater and internal consistency reliability for the LoBACS measure of self-efficacy for individuals with histories of low back pain and lumbar microdiskectomy.

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[Yamada KA, Lewthwaite R, Popovich JM Jr, et al; for the Physical Therapy Clinical Research Network (PTClinResNet). The Low Back Activity Confidence Scale (LoBACS): preliminary validity and reliability. *Phys Ther.* 2011;91:1592–1603.]

Published Ahead of Print: August 18, 2011
Accepted: June 19, 2011
Submitted: April 18, 2010

Low back pain (LBP) is a highly prevalent[1] and often persistent[2] and recurrent[3] health condition, with high costs to individuals and to society.[4] A recent systematic review by Dagenais and colleagues[4] showed that patients with back pain spent 61% more on total medical costs than individuals without back pain ($3,498 versus $2,178). Hestbaek and colleagues[2] estimated a higher point prevalence of back pain in people with one or more previous episodes of LBP (averaging 56%) than people who reported no previous LBP (averaging 22%). Furthermore, 62% of those reporting prior episodes of LBP still experienced pain 12 months later. Low back pain has remained the focus of research because of its exceedingly high prevalence and growing impact on health care spending.[4]

A variety of conservative and surgical means have been applied to mitigate LBP.[5,6] A number of studies have shown surgical success rates above 80% by various standards, including pain relief, patient satisfaction, and return to unrestricted military duty.[6–8] After 2 to 10 years, this effectiveness reduces somewhat.[9,10] The present study drew upon the structure and sample of a randomized clinical trial conducted to evaluate the impact of intense and progressive exercise- and education-oriented physical therapy interventions following single-level lumbar microdiskectomy for individuals who had experienced chronic LBP.[11,12] Despite the availability of procedures with relatively high initial effectiveness, recurrence of pain and disability remains a concern. In addition to surgical and other clinical interventions for LBP that may influence the sustainability of outcomes, patient beliefs and behaviors may contribute to the recurrence of LBP and disability.[13–17]

The Self-efficacy Construct

Self-efficacy has been identified across varied clinical conditions as an important psychological factor in health outcomes. Self-efficacy is a situation-specific sense of self-confidence that an individual can marshal needed actions to achieve desirable, or avoid undesirable, outcomes.[18–20] Individuals who lack confidence in their own capacities to carry out key behaviors not surprisingly tend to avoid those activities or reduce their effort and persistence when engaged, sometimes affecting performance and health.[18,20] Self-efficacy has been found to prospectively predict health and functional outcomes across the disease, injury, and disability spectrum,[21–24] including musculoskeletal conditions.[13–15,25–29] Self-efficacy also has accounted for disability more so than pain intensity in patients with chronic pain.[13,21] Additionally, with appropriate insight and assessment, self-efficacy can be enhanced,[30,31] perhaps more effectively or conveniently than other unmodifiable (eg, demographic characteristics) or less easily modifiable factors such as fear beliefs and catastrophic thinking.[32]

Measuring Unique Aspects of Self-efficacy

As self-efficacy represents a situation-specific and not a general or personality-related construct, confidence in performing one type of activity may differ substantially from confidence in performing other actions, all of which may contribute to a common outcome. Optimally, self-efficacy measures are customized to assess individuals' confidence in demonstrating key behaviors related to recovery from or mitigation of their particular health condition or circumstance. Self-efficacy scales thus involve measuring an individual's confidence for each unique behavior or set of behaviors.[24,27] For example, participants in the development of the Arthritis Self-Efficacy Scale[26] reasoned that behaviors associated with more successful outcomes for individuals with arthritis would include continuing engagement in ordinary functional tasks, as well as active management of pain and other common symptoms of arthritis. Confidence in demonstrating those behaviors thus became the basis of that scale, which comprises 3 subscales to assess self-efficacy for physical function, self-efficacy for pain management, and self-efficacy for the management of other symptoms.

The kinds of self-efficacy expectations relevant to the choice or execution of these patient behaviors are themselves an empirical issue, but factors that are not assessed will not be uncovered. The purpose of this study was to develop and evaluate the preliminary validity and reliability of a self-efficacy measure designed to address confidence for instrumental activities and behaviors that may be related to sustained low back health and function following clinical intervention. Continuing key behaviors of professional intervention (eg, exercise) after therapy has stopped will likely be more beneficial than reverting to low activity or no activity. In the case of individuals with a history of LBP, patient education on self-management for back health may include instruction on recommended body positioning, medications, or devices to prevent reinjury; staying active on an everyday basis following professional intervention; and performing back-specific or general exercise regularly.

Although several instruments that assess self-efficacy have been developed in the context of LBP,[14,15,28,29] they did not address the functional and self-regulatory behaviors of interest in our postintervention clinical population. These measures addressed work-specific function-

ing,[14,15] pain management behavior for individuals currently experiencing significant pain,[28] or lower-level movements rather than functional activities.[29] Thus, we constructed the Low Back Activity Confidence Scale (LoBACS) to assess several forms of self-efficacy potentially relevant to LBP. These forms include self-efficacy for generic, non–work-specific, but back-relevant functional activities such as standing, carrying, and pushing; self-efficacy for self-regulation[33,34] or exercising self-control to manage one's thoughts, emotions, and behaviors in order to perform or avoid activities that can contribute to back health; and self-efficacy for exercising regularly, which is a core activity in a number of therapeutic interventions for LBP[12,35] (Appendix). These are behaviors that we expected to have a bearing on function and on rehabilitation and optimal recovery following back surgery and exercise-related physical therapy intervention.

Validating the LoBACS

Evidence of the validity of this multidimensional scale of patient-rated back-related self-efficacy would come in the form of observed relationships between the measure's subscales and other constructs to which they should (or should not) be theoretically or conceptually related. Self-efficacy theory[18,19] and empirical evidence[13–15,22,25,27] suggest that self-efficacy will: (1) be related to sources of information that can influence self-perceptions of capability, such as actual performance accomplishments (eg, quantitatively assessed physical performance) and pain with performance (as a physiological indicator of limits to capability) and (2) act as a co-effect, mediator, or cause of relationships between other contributors and functional and health outcomes.

In this study, we examined relationships between self-efficacy and quantitatively assessed physical performance on functional tests, as well as measures of physical activity, pain, disability, and quality of life to examine the construct validity of our multidimensional self-efficacy measure. We expected that self-efficacy for functional activities involving the back would relate in positive directions to quantitative assessments of physical performance, to self-reported levels of physical activity, and to quality of life and in negative directions to measures of pain with performance, to reported fear and catastrophizing about the back, and to levels of disability. We expected that self-efficacy for regulating back health through deliberate actions, as well as self-efficacy for performing exercise regularly (a subset of self-regulatory activity), would be similarly related to the aforementioned variables but to lesser degrees.

Method

Scale Development

The LoBACS was developed from existing self-efficacy and LBP literature and from the reports of physical therapy clinicians and patient participants in the randomized clinical trial of which this study was a part. Information was gathered from face-to-face and telephone interviews with patients with a history of chronic LBP. Open-ended questions were used such as "What do you believe caused/causes the change in your symptoms?" and "Are your activities the same as before you had back symptoms?" followed by "Describe how they are different." Clinicians and patient participants independently reported problems with sleeping, standing, sitting, doing household chores, carrying items, and so on, which are characteristic of LBP conditions.

From the literature and the aforementioned clinical observations several items were generated. Items that assessed similar types of actions or that assessed similar types of behavioral or exercise barriers were considered overlapping and, therefore, were consolidated. A scale with 15 items was developed and organized into 3 subscales based upon theoretical, rational distinctions and content. The functional self-efficacy[13–15] (FnSE) subscale contained 7 items regarding self-confidence for commonly mentioned, challenging functional activities for individuals with LBP (ie, carrying, lifting, pushing, sitting, standing, walking, and stair climbing). The self-regulatory self-efficacy[33,34] (Self-RegSE) subscale contained 3 items regarding confidence in caring for, controlling, and dealing with a back problem. The exercise self-efficacy[24,36] (ExSE) subscale contained 5 items regarding maintaining regular exercise for back health in different barrier situations. Strength of self-efficacy was assessed on an 11-point scale ranging from 0% (no confidence) to 100% (complete confidence), marked in 10% increments. We also evaluated the value of a summary score that represented the average score of all LoBACS items (TotalSE).

Participants

Participants were a subset sample of convenience from a randomized clinical trial, the MUSSEL study[11,12] of the Physical Therapy Clinical Research Network (PTClinResNet), a clinical research network to evaluate the efficacy of physical therapist practice. The study included individuals from 18 to 60 years of age who had recently undergone a single-level lumbar microdiskectomy for the first time. Further inclusion and exclusion criteria are reported in the publication of the MUSSEL clinical trial's protocol by Selkowitz and colleagues.[11] Following microdiskectomy, participants received an investigational regimen of back-related exercises and education about caring

Table 1.
Demographic, Pain, and Surgical Histories for Participants in Sample 1 (n=21) and Sample 2 (n=53)

Variable	Sample 1 (Reliability)	Sample 2 (Validity)
Age (y), $\bar{X}$ (SD)	36 (10.5)	40 (10.6)
Sex, female (% of sample)	11 (52.4%)	29 (54.7%)
Level of microdiskectomy	L4–L5: 9 participants L5–S1: 12 participants	L4–L5: 28 participants L5–S1: 25 participants
Mode of onset of back pain	19% lifting 4.8% bending 4.8% prolonged sitting 9.5% falling down 61.9% other	20.8% lifting 7.5% bending 7.5% prolonged sitting 9.4% falling down 58.5% other
Average time between initial pain onset and surgery, $\bar{X}$ (SD)	10.19 (9.3) y	15.58 (24.1) y
Average time between recent pain onset and surgery, $\bar{X}$ (SD)	5.12 (5.4) mo	5.47 (8.0) mo
Average time between recent pain onset and test, $\bar{X}$ (SD)	6.23 (5.4) mo	11.73 (10.2) mo
Average time between surgery and test, $\bar{X}$ (SD)	4.53 (1.3) wk	6.19 (5.7) mo
Best relieving factor prior to surgery	4.8% sitting 0.0% standing 19.0% walking 61.9% lying down 9.5% medications 4.8% indeterminate	3.8% sitting 5.7% standing 18.9% walking 62.3% lying down 5.7% medications 3.8% indeterminate
Worst aggravating factor prior to surgery	71.4% sitting 23.8% standing 4.8% walking 0% lying down 0% medications 0% indeterminate	56.6% sitting 17.0% standing 13.2% walking 9.4% lying down 0% medications 3.8% indeterminate
Average pain intensity after sitting for 10 min (visual analog scale)	2.23	1.57[a]
Average pain intensity after walking for 5 min (visual analog scale)	1.73	1.20[a]

[a] Missing data for 3 participants.

for their back, usual postsurgical physical therapy care, or education about caring for their back only.[12] Instructions or activities regarding postintervention behavior such as continuation or adaptation of intervention exercise or other self-regulatory behaviors were not formally included in the clinical trial protocol.

Our analysis was performed only on participants who had complete concurrent assessments for the independent and dependent variables used in our analyses at the time of the evaluation. Two sample sets were used for our analyses. A test-retest reliability sample of 21 participants (sample 1) completed the LoBACS twice, 4 to 6 weeks following single-level lumbar microdiskectomy and before randomization into 1 of the 3 investigational groups from the original study (3–28 days between administrations, with an average of 10 days). The remaining validity and reliability assessments were made with an additional 32 participants, for a total of 53 participants (sample 2). In this sample of 53 participants, 28 were assessed 4 to 6 weeks following single-level lumbar microdiskectomy and before randomization into 1 of the 3 investigational groups from the original study, 5 were assessed after intervention (3 received usual physical therapy care, 1 was in the investigational exercise and education group, and 1 was in the education only group), and 20 were 1 year postsurgery (5 received usual physical therapy care, 12 were in the investigational exercise and education group, and 3 were in the education only group). Demographic, pain, and surgical history characteristics of the 2 samples are presented in Table 1.

Additional Outcome Measures

In order to investigate construct validity, we examined the relationships of the self-efficacy subscales to measures of other constructs, including functional performance, physical activity, pain, fear beliefs, disability, and quality of life. The participants concurrently completed the following standardized questionnaires and performed the following quantitative tests as part of the outcome measures set of the MUSSEL study. All

Table 2.
Characteristics of the Validity Sample (n=53)[a]

Measure	Mean (SD), Range
Functional	
Five-Minute Walk Test (ft)	1,538.55 (288.6), 794–2,372
50-Foot Walk Test (s)[b]	8.84 (2.2), 5–19
Repeated sit-to-stand test (s)[b]	15.5 (6.0), 7–41
Physical Activity Scale (METS)	40.65 (9.8), 26–81
Quality of life and disability	
Modified Oswestry Disability Index (%)[b]	23.96 (17.5), 0–66
Roland-Morris Disability Questionnaire (%)[b]	28.62 (22.0), 0–83
Subjective Quality of Life Scale	5.26 (1.3), 2.0–7.0
SF-36 (version 2)	66.11 (19.7), 19–99
Physical function	64.87 (25.7), 14–100
Role–physical	54.09 (36.3), 0–100
Bodily pain	54.25 (26.4), 21–100
General health	71.42 (18.9), 30–100
Vitality	57.90 (20.0), 0–100
Social function	65.09 (29.9), 0–100
Role–emotional	84.43 (24.9), 0–100
Mental health	76.79 (15.1), 40–100
Physical health component	60.50 (21.5), 16–99
Mental health component	71.13 (17.0), 22–99
Fear-related beliefs	
FABQ physical activity subscale (total: 24 points)[b]	12.89 (6.2), 0–24
FABQ work subscale (total: 42 points)[b]	14.36 (10.8), 0–40
Self-reported pain	
VAS score after 10 min of sitting[b]	1.70 (2.3), 0–8
VAS score after 5-min walk[b]	1.33 (2.1), 0–7
LoBACS	
Functional self-efficacy	61.0 (30.7), 0–100
Self-regulatory self-efficacy	82.1 (20.3), 0–100
Exercise self-efficacy	84.9 (19.0), 44–100
Total LoBACS self-efficacy (average of all LoBACS items)	73.2 (20.0), 31–100

[a] METS=metabolic equivalents, FABQ=Fear-Avoidance Beliefs Questionnaire, VAS=visual analog scale, LoBACS=Low Back Activity Confidence Scale.
[b] Higher scores in these measures indicate lower function, higher disability, or more pain.

functional tests were administered by licensed physical therapists and were standardized according to the PTClinResNet MUSSEL study procedures. Participant responses and performance scores are summarized in Table 2.

Functional Assessments

Five-Minute Walk Test.[37] Participants were asked to walk at a comfortable pace for 5 minutes. The distance walked was recorded in feet. Excellent test-retest reliability has been established (intraclass correlation coefficient [ICC]=.99) for this test.[37]

50-Foot Walk Test.[37] Participants were asked to walk 50 ft (15.24 m) at their fastest comfortable pace. The time to complete this task was recorded in seconds. Excellent test-retest reliability has been established (ICC=.99) for this test.[37]

Repeated sit-to-stand test.[37] Participants were asked to complete 5 consecutive sit-to-stand actions as fast as tolerable. Time needed for completion of this task was recorded in seconds. Excellent test-retest reliability has been established (ICC=.89) for this measure.[37]

Physical Activity Scale.[38] This self-report instrument asks respondents to indicate how much time during a typical day they spend in each of 9 intensity-based (metabolic equivalents based) categories of work, leisure, and other physical activity. The total number of minutes and hours are to add up to 24 hours for an average day and night. This scale has been found to be a valid alternative to using a physical activity diary.[39]

Disability and Quality-of-Life Assessments

Modified Oswestry Disability Index (MODI).[40] The Oswestry Disability Index has been used extensively to assess the perceived difficulty of various activities. The modified version of this questionnaire was utilized in which participants were asked about the perceived difficulty of employment and homemaking activity instead of sexual activity. The MODI yields a total score that represents the experienced percentage of disability. A score of 100% indicates the highest level of disability.

Roland-Morris Disability Questionnaire.[41] This questionnaire was used to assess the functional limitations a participant relates to his or her LBP. A percentage of disability

Table 3.
Test-Retest Data for Low Back Activity Confidence Scale (LoBACS) Total and Subscale Scores[a]

Measure	$\bar{X}$	SD	ICC	95% CI	SEM
Total LoBACS self-efficacy (average of all LoBACS items)	0.67	0.18	.850	0.667–0.936	0.07
Functional self-efficacy	0.46	0.29	.924	0.825–0.968	0.08
Self-regulatory self-efficacy	0.80	0.21	.634	0.296–0.832	0.13
Exercise self-efficacy	0.89	0.14	.710	0.418–0.870	0.07

[a] ICC=intraclass correlation coefficient, 95% CI=95% confidence interval, SEM=standard error of the measurement.

was calculated from the 24-item questionnaire. Higher scores indicate greater disability. This questionnaire has been found to be a sensitive outcome measure following lumbar diskectomy.[42]

Subjective Quality of Life Scale.[43] This is a one-item scale used to obtain the participants' general assessment of their quality of life. Participants rated their "overall quality of life" on a 7-point scale in which 1 means "life is very distressing; it's hard to imagine how it could get much worse" and 7 means "life is great; it's really hard to imagine how it could get much better." This measure has been used for assessing quality of life in people with various disabilities.

SF-36 Health Survey (version 2).[44] This questionnaire also was used to assess the participants' general health-related quality of life. Eight subscales include items addressing: physical function, role–physical, bodily pain, general health, vitality, social function, role–emotional, and mental health. Two component scores capture physical health and mental health dimensions, respectively, and are calculated from a combination of the item scores. A total SF-36 score based on the average of all of the item scores also was calculated. A higher score indicates higher perceived health-related quality of life. The SF-36 instrument also has been found to be a sensitive outcome measure in patients after lumbar surgery.[42]

Fear-Avoidance Beliefs Assessment

Participants' fear-avoidance beliefs were assessed with the Fear-Avoidance Belief Questionnaire (FABQ).[16] This questionnaire evaluates individuals' beliefs about the effects of physical activity and work on LBP. Eleven items of this questionnaire are used to calculate a physical activity subscale score and a work subscale score. The highest score possible is 24 points for the physical activity subscale and 42 points for the work subscale, with scores on both subscales indicating greater levels of fear-related activity avoidance.

Pain Assessment

Pain was assessed using a visual analog scale. Participants were asked to rate their pain on a 10-cm line anchored by "no pain" and "worst pain possible" immediately after sitting for 10 minutes while completing the survey questionnaires and after walking for the Five-Minute Walk Test.

Data Analysis

We used SPSS version 15.0 (SPSS Inc, Chicago, Illinois) for all statistical analyses. Descriptive statistics were used to describe both the reliability sample and the validity sample. To determine test-retest reliability, ICCs (2,1) for 2-way random single measure of reliability were used according to Shrout and Fleiss,[45] and 95% confidence intervals (CIs) were reported. The standard error of the measurement (SEM) was calculated using the formula: *standard deviation* $\times \sqrt{(1-ICC)}$. The Cronbach α coefficient was used to estimate the internal consistency of each subscale and the total scale. Visual inspection of histograms and calculation of skewness and kurtosis values for LoBACS total and subscale scores and additional outcome measures were used to test data normality. The data were determined to be nonparametrically distributed. Therefore, Spearman rho correlation coefficients were used to confirm internal consistency within the questionnaire, based on the intercorrelation between the subscale and total scores of the LoBACS. Inter-item and item-total correlations were used to estimate homogeneity within the subscales. To assess the validity of the LoBACS, Spearman rho correlation coefficients were used to examine the strength of relationship between the LoBACS subscales and the other aforementioned constructs.

Role of the Funding Source

The PTClinResNet was funded by a grant from the Foundation for Physical Therapy (American Physical Therapy Association) to Carolee Winstein, PT, PhD, FAPTA, and James Gordon, PT, EdD, FAPTA.

Results

Scale Reliability and Validity Assessments

Test-retest reliability. We calculated ICC (2,1), 95% CI, SEM, and mean values for each subscale of the LoBACS to assess the consistency of the measure from one time to

Table 4.
Spearman Intercorrelations of Low Back Activity Confidence Scale (LoBACS) Subscale and Total Scores (n=53)[a]

Measure	FnSE	Self-RegSE	ExSE	TotalSE
FnSE		.479**	.294*	.918**
Self-RegSE			.745**	.707**
ExSE				.591**
TotalSE				

[a] FnSE=functional self-efficacy subscale, Self-RegSE=self-regulatory self-efficacy subscale, ExSE=exercise self-efficacy subscale, TotalSE=total LoBACS self-efficacy (average of all LoBACS items). *$P<.05$, **$P<.01$.

Table 5.
Spearman Rho Correlations of Low Back Activity Confidence Scale (LoBACS) Subscale and Total Scores With Measures of Other Constructs[a]

Measure	FnSE	Self-RegSE	ExSE	TotalSE
Physical performance and physical activity				
Five-Minute Walk Test	.625**	.239	.161	.567**
50-Foot Walk Test[b]	−.583**	−.253	−.277*	−.595**
Repeated sit-to-stand test[b]	−.644**	−.282*	−.219	−.614**
Physical Activity Scale	.663**	.254	.089	.586**
Disability and quality of life				
Modified Oswestry Disability Index[b]	−.860**	−.484**	−.224	−.802**
Roland-Morris Disability Questionnaire[b]	−.767**	−.417**	−.157	−.686**
Subjective Quality of Life Scale	.567**	.518**	.298*	.594**
SF-36 (version 2)	.710**	.434**	.248	.693**
Physical function	.819**	.480**	.257	.788**
Role–physical	.711**	.285*	.111	.622**
Bodily pain	.663**	.416**	.214	.636**
General health	.401**	.455**	.383**	.487**
Vitality	.484**	.366**	.327*	.550**
Social function	.602**	.394**	.186	.567**
Role–emotional	.348*	.246	.133	.369**
Mental health	.313*	.265	.225	.343*
Physical health component	.766**	.456**	.266	.745**
Mental health component	.577**	.405**	.272*	.592**
Fear-related beliefs				
FABQ physical activity subscale (total: 24 points)[b]	−.469**	−.169	−.077	−.426**
FABQ work subscale (total: 42 points)[b]	−.576**	−.244	−.130	−.492**
Pain				
VAS after 10 min of sitting[b]	−.579**	−.370**	−.120	−.503**
VAS after 5-min walk[b]	−.206	−.234	−.065	−.219

[a] FnSE=functional self-efficacy subscale, Self-RegSE=self-regulatory self-efficacy subscale, ExSE=exercise self-efficacy subscale, TotalSE=total LoBACS self-efficacy (average of all LoBACS items), FABQ=Fear-Avoidance Beliefs Questionnaire, VAS=visual analog scale. *$P<.05$, **$P<.01$.
[b] Higher scores in these measures indicate lower function, higher disability, or more pain therefore negative correlations were expected when related to self-efficacy.

another (Tab. 3). According to Fleiss,[46] ICC values of .40 to .75 are considered "fair" and values greater than .75 are "excellent." In general, the FnSE subscale (ICC=.924) and the TotalSE (ICC=.850) had excellent test-retest reliability, and the Self-RegSE (ICC=.634) and ExSE (ICC=.710) subscales had fair test-retest reliability.

Internal consistency reliability. Internal consistency reliability was excellent within each subscale. According to Nunnally,[47] Cronbach α values greater than .700 are considered acceptable. The FnSE, Self-RegSE, and ExSE subscales had Cronbach α coefficients of .924 (95% CI=.880–.951, SEM=.018), .804 (95% CI=.625–.920, SEM=.077), and .941 (95% CI=.837–.974, SEM=.038), respectively. The TotalSE had a Cronbach α coefficient of .911 (95% CI=.854–.942, SEM=.023). All subscales were correlated with each other and with the TotalSE score (Tab. 4). Inter-item correlation coefficients within each subscale were all positive and ranged from .453 to .919. Item-to-total correlations also were generally high, ranging from .613 to .909.

Construct validity. Correlations among all 3 subscale scores and the total LoBACS score were related to measures of other constructs to evaluate scale validity. Results of these correlations are shown in Table 5 and provide evidence that subscales and overall self-efficacy measures are generally associated, as anticipated.

As expected, the FnSE subscale correlated moderately and positively with measures of physical performance and self-reported physical activity levels, and moderately and negatively with indexes of pain after sitting and fear about injury. Confidence in abilities to perform everyday functional activities correlated negatively and strongly with mea-

sures of disability, as well as generally and positively with patient-reported and health-related quality of life, and physical aspects of health-related quality of life in particular. Thus, individuals with low self-efficacy for functional activities had poorer physical performance, lower levels of physical activity and quality of life, and higher levels of pain, fear beliefs, and disability.

Like the FnSE subscale, but generally more weakly, the Self-RegSE subscale was related in expected directions to disability, quality of life, and pain. Confidence in the capacity to affirmatively control one's thoughts and actions to remain active and prevent back dysfunction (self-regulatory self-efficacy) was associated positively with quality of life and negatively with disability and pain. Thus, individuals in this sample with lower self-regulatory self-efficacy had poorer quality of life and higher levels of perceived disability and pain. Distinct from the FnSE subscale, the Self-RegSE subscale scores did not correlate significantly with scores on physical performance measures or with scores on fear-avoidance belief measures.

The ExSE subscale addresses individuals' perceptions of their ability to overcome common barriers to performing exercise on a regular basis. As shown in Table 5, this measure was unrelated to physical activity, as well as pain and fear beliefs. Confidence in one's ability to self-regulate, specifically in the area of exercise maintenance, was related in positive directions to patient-reported quality of life. The SF-36 general health, vitality, and mental health subscales were significantly and more moderately related to the LoBACS ExSE scale, respectively.

The total (average) score on the 15 items of the LoBACS was moderately to strongly related to the set of relevant measures used to evaluate construct validity in this preliminary study. Individuals with higher levels of back-related self-efficacy had better physical performance in terms of walking and sit-to-stand capacity. These individuals also reported higher levels of leisure and occupational physical activity and higher patient-reported and health-related quality of life. Higher TotalSE scores also were associated with lower levels of pain and less fear about back-related injury and its consequences. As shown in Table 4, FnSE and TotalSE scores were strongly correlated (r=.918, P<.01), as reflected in similar patterns and strengths of correlations with other constructs. The addition of self-regulatory and exercise self-efficacy items beyond the functional self-efficacy set appeared to create generally stronger relationships between total self-efficacy and general health and vitality aspects of health-related quality of life, as shown in Table 5.

Discussion

The purpose of this study was to develop and provide preliminary test-retest and internal consistency reliability and construct validity evidence for a self-efficacy instrument relevant to individuals with histories of LBP and surgery. Within the limits of this preliminary study with a sample of convenience, evidence of reliability and construct (concurrent) validity was found, particularly for the FnSE subscale and the TotalSE. Fair to excellent test-retest reliability and excellent internal consistency for each subscale and the total LoBACS scale were found. All subscales demonstrated content validity with their respective self-efficacy constructs, as reflected in conceptual and item similarity with other functional,[13,14] self-regulatory,[33,34] and exercise[24,36] self-efficacy scales reported in the literature. Self-efficacy scales were examined with respect to a set of standardized measures of distinct constructs that included several indicators of quantitatively assessed physical performance (walking speed and endurance and sit-to-stand capability), self-perceived disability (MODI and Roland-Morris Disability Questionnaire), and patient-reported and health-related quality of life (SF-36 version 2). Where multiple indicators of the same construct (eg, physical performance measures or disability instruments) were available, specific self-efficacy measures were observed to relate similarly to them in direction and magnitude of relationships, lending support to the consistency of the observed relationships. Preliminary evidence for the construct validity of LoBACS FnSE and Self-RegSE subscale and TotalSE scores was provided through correlations with concurrently assessed measures of variables that may constitute sources of self-efficacy information such as physical performance and pain, consistent with theoretical expectations for self-efficacy measures.[18] Other outcomes, for which self-efficacy may act as a co-effect, mediator, or cause—including fear,[17,48] disability, quality of life, and physical activity—were associated in expected directions with the LoBACS instrument. The LoBACS subscale that assessed self-efficacy to maintain regular exercise despite barriers had only weak relationships with patient-reported quality of life and some health-related quality-of-life measures, and further study is warranted on larger and diverse populations.

The LoBACS addresses 3 theoretically relevant and clinically important aspects of recovery for patients with histories of LBP and surgical interventions. The present validity sample completed study instruments approximately 6 months on average after microdiskectomy surgery at a time when they had relatively low levels of pain. Other samples of indi-

viduals with acute or chronic pain or at different times following surgical or other intervention for LBP might have different challenges as reflected in the patterns of their self-efficacy scores.

Other self-efficacy scales reported in the LBP literature have utilized work-related functional self-efficacy,[14,15] self-efficacy for pain management,[28] and self-efficacy for more basic motions[29] rather than functional activities or the psychological skills relevant to coping and adherence. The Self-RegSE and ExSE subscales of the LoBACS may be of greater value relative to assessment of the effects of interventions with formal expectations of patient self-management and exercise progression, as well as clinically in predicting those individuals at risk for nonadherence to an ongoing exercise regimen.[24,49]

As a construct, self-efficacy reflects a task-, situation-, or context-specific assessment of confidence that is dynamic and expected to fluctuate as conditions or recent histories of accomplishment change. The familiar statements of currently successful athletes or coaches (eg, "We're playing with a lot of confidence right now.") are testament to this property. Self-efficacy is not a personality characteristic, as we all from time to time have low levels of confidence for one thing or another, nor perhaps does it lead as readily to potential negative labeling of patients in distress, as concepts such as fear beliefs and catastrophizing might do. Assessment of self-efficacy has the potential to identify potential problems of a patient's mind-set and future behavior that may be addressed through insightful practice, as well as to present patients with a patient-centered perspective that may signify respect for their thoughts and challenges.

Limitations

There are limitations to this study based on the sample size and characteristics, as well as lack of opportunity in this convenience sample to examine other potential correlates of the 2 self-regulatory subscales of the LoBACS. The limited size of the validity sample precluded multivariate analyses that might reveal the relative importance of self-efficacy and related constructs. The participants in this study would be categorized as having relatively mild pain and moderate disability (average pain scores were less than 2 on a 10-point scale, and MODI scores were 33.2% and 24% for the reliability and validity samples, respectively). Results may be different for populations with more or less pain or pain histories or minimal or severe disability scores. Results also may differ for people with acute back pain, as the participants in this study had a longer history of back pain. The sample used in this study had a low pain report per visual analog scale, although it can be assumed that their presurgical pain levels were sufficiently significant to warrant surgical intervention.

Future Research

Further prospective studies with a larger sample size from the general population with LBP would allow for extended analyses and definition of the subscale structure. They also would allow for subgroup self-efficacy analyses with regard to sex, age, activity level, socioeconomic and educational background, timing after surgery or injury, and other characteristics. The LoBACS also could be examined as a predictor of recovery or recurrence in longitudinal data sets or applied at different stages of recovery, and may be helpful in observing moderators of outcomes from conservative or surgical treatment for LBP. Other psychometric properties of the LoBACS, including its responsiveness and sensitivity to change, as well as its factor structure, are warranted. Multivariate analyses on a larger sample to compare competing psychosocial constructs including fear and catastrophizing also are necessary. The LoBACS shows promise in its application in rehabilitation programs that address self-efficacy issues. Interventions targeting self-efficacy have been successful in improving long-term exercise adherence and physical activity in patients with musculoskeletal conditions,[30,31] diabetes,[23] coronary disease,[24,50] and obesity.[51]

Clinical Importance

Assessment of self-efficacy and design of interventions that target physical therapy–related self-efficacy hold promise for rehabilitation and recovery, based on the validation findings of this study and the growing empirical support for self-efficacy mediation in increasing activity and participation outcomes for individuals with LBP or dysfunction. Improving self-efficacy may be important in all phases of rehabilitation and recovery, including goal setting and outcome assessment.[52]

All authors provided concept/idea/research design and consultation (including review of manuscript before submission). Dr Yamada, Dr Lewthwaite, and Dr Popovich provided writing and data analysis. Dr Yamada, Dr Popovich, and Dr Beneck provided data collection. Dr Yamada and Dr Kulig provided project management. Dr Kulig provided fund procurement. Dr Beneck provided facilities/equipment. Dr Yamada provided clerical support.

The authors acknowledge the Physical Therapy Clinical Research Network (PTClinResNet). The principal investigator was Carolee J. Winstein, PhD, PT, FAPTA, and the co-principal investigator was James Gordon, EdD, PT, FAPTA (both at University of Southern California, Los Angeles, California). Project principal and co-principal investigators were: David A. Brown, PT, PhD, (Northwestern University, Chicago, Illinois); Sara J. Mulroy, PT, PhD, and Bryan Kemp, PhD (Rancho Los Amigos National Rehabilitation Center, Downey, California); Loretta M. Knutson, PT, PhD, PCS (Missouri State University, Spring-

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This research was approved by the Institutional Review Board of the University of Southern California.

This research was presented at the Combined Sections Meeting of the American Physical Therapy Association; February 14–18, 2007; Boston, Massachusetts.

The PTClinResNet was funded by a grant from the Foundation for Physical Therapy (American Physical Therapy Association) to Carolee J. Winstein, PT, PhD, FAPTA, and James Gordon, PT, EdD, FAPTA.

DOI: 10.2522/ptj.20100135

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Appendix.

The Low Back Activity Confidence Scale (LoBACS)

Name _____

Date _____

LOW BACK ACTIVITY CONFIDENCE SCALE

The following items are designed to determine what types of activities you can do easily, which are more difficult, and which you cannot do successfully. **Please indicate your level of confidence, at the present time, in doing the activity in question by circling the appropriate number.** Select the response that most closely matches your own, remembering that there are no right or wrong answers.

For example, in item 1, if you have almost complete confidence that you could carry a box that weighs 25 lb from a car into your home, you might **circle 90%.** If, however, you had no confidence that you could carry a box that weighs 25 lb from a car into your home, you would **circle 0%**.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

NO CONFIDENCE **MODERATE CONFIDENCE** **COMPLETE CONFIDENCE**

I believe that I can . . .											
	%	%	%	%	%	%	%	%	%	%	%
1. Carry a box that weighs 25 lb from a car into my home	0	10	20	30	40	50	60	70	80	90	100
2. Move a heavy phone book from an overhead cabinet to a low shelf	0	10	20	30	40	50	60	70	80	90	100
3. Push a sofa 10 ft into a new location across carpet	0	10	20	30	40	50	60	70	80	90	100
4. Sit for a 6-hour plane trip	0	10	20	30	40	50	60	70	80	90	100
5. Climb 3 flights of stairs	0	10	20	30	40	50	60	70	80	90	100
6. Walk 1 mile (10 city blocks) nonstop	0	10	20	30	40	50	60	70	80	90	100
7. Stand in a slow-moving line for 3 hours	0	10	20	30	40	50	60	70	80	90	100
8. Do what I have to do to take care of my back	0	10	20	30	40	50	60	70	80	90	100
9. Control my low back problem in such a way that I can do the things I enjoy	0	10	20	30	40	50	60	70	80	90	100
10. Find strength within myself to deal with the frustration of low back pain	0	10	20	30	40	50	60	70	80	90	100
11. Continue to do my exercise program even when I have pain or discomfort	0	10	20	30	40	50	60	70	80	90	100
12. Continue to do my exercise program even if I have no current symptoms of my low back problem	0	10	20	30	40	50	60	70	80	90	100
13. Exercise regularly even if I was bored by the program or activity	0	10	20	30	40	50	60	70	80	90	100
14. Exercise when there is no one around to offer encouragement	0	10	20	30	40	50	60	70	80	90	100
15. Exercise when I need to start up with the program again after lapsing	0	10	20	30	40	50	60	70	80	90	100

Scoring: Average of Items 1–7: ___ Average of Items 8–10: ___ Average of Items 11–15: ___ Average of Items 1–15: ___