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The Need for Multidimensional Stratification of Chronic Low Back Pain (LBP)

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ABSTRACT

Study design: Cross-sectional study of Canadian LBP patients seeking primary care.

Objective: Determine which existing primary care LBP stratification schema is associated with distinct sub-populations as characterized by easily identifiable primary epidemiological factors.

Summary of Background Data: Low back pain (LBP) is among the most frequent reasons for visits to primary care physicians and a leading cause of years lived with disability. In an effort to improve treatment response/outcomes in LBP primary care, different classification systems have been proposed in an effort to provide more tailored treatment with the intent of improving outcomes. Group-specific risk factors and underlying etiology might suggest a need for, or inform, changes to treatment approaches to optimize LBP outcomes.

Methods: Stratification by: dominant mechanical pain patterns; chronicity risk; disability severity. Multinomial logistic regression was used to identify the system showing greatest variability in associations with age, sex, obesity, and comorbidity. Once identified, the remaining schemas were incorporated into the model.

Results: N=970; mean age: 50 years (range: 18-93); 56% female. Stratification by pain pattern revealed greater variability. Adjusted analysis: Increasing age was associated with greater odds of intermittent, extension-based back- or leg-dominant pain (Odds Ratio (OR): 1.02 and 1.06; $p<0.01$); being male with leg-dominant pain (ORs>2; $p<0.01$). Overweight/obesity was associated with extension-based leg-dominant pain (OR=2.6; $p<0.02$) and increasing comorbidity with extension-based back-dominant pain (OR=1.3; $p<0.01$). Severe disability was associated only with constant leg pain (OR=3.9; $p<0.01$), and high chronicity risk with extension-based leg-dominant pain (OR=0.4; $p=0.03$).

Conclusion: Dominant mechanical symptom stratification resulted in further discrimination of an epidemiologically distinct and large sub-group of LBP patients not identified by disability or chronicity risk stratification alone. Findings suggest a need for primary care initiated multidimensional stratification in chronic LBP.

Key Words:low back pain; primary health care; risk assessment; severity of illness index; epidemiology; health status; non-surgical intervention; pain pattern; cross-sectional study; osteoarthritis

Level of Evidence:3

1. INTRODUCTION

Low back pain (LBP) is currently ranked as the single leading cause of years lived with disability worldwide.[1,2]Despite extensive study and numerous clinical practice guidelines, treatment costs for LBP continue to increase without improvement in functional outcomes.[3,4]In the US, the annual expenditure related to LBP ($86 billion) has reached levels comparable to the care of diabetes ($98 billion), cancer ($89 billion) and non-spine arthritis ($80 billion).[4]

Although many acute episodes of LBP resolve,[3] substantial numbers of patients suffer repeated relapses requiring treatment.[5,6]A recent review reported that 75% of patients experiencing an episode of LBP continue to report pain at 6 weeks (sub-acute phase), and 66% continue to report pain at 3-months (chronic phase).[7] Up to 25% of LBP persists in a constant, chronic state and incurs the largest costs (approximately 75%) in terms of healthcare utilization and loss of productivity.[8,9]

At the primary care level, most current clinical practice guidelines dichotomize LBP patients to those with specific LBP (a small group with easily identifiable pain source, e.g. infection) or with implied mechanical or 'non-specific' LBP (a large group, >80%).[3]Patients with non-specific LBP are heterogeneous in terms of clinical characteristics and prognosis, and thus are more likely to respond favourably to specific treatment, rather than the current "one-size-fits-all" approach.[8,10,11] Evidence warranting moderate to low confidence suggests that a more specific approach to management leads to tailored treatments (i.e. stratified management) and improved outcomes.[10-13]Using a classification system based on mechanical patterns of symptom dominance and stratified management, Hall et al [10] found improved clinical outcomes compared to non-specific management in an observational study. Results of a randomized control trial conducted in the UK suggests that stratified management based on psychosocial factors, using the KeeleSTarT Back Screening Tool that separates LBP patients into low, moderate, and high risk groups for persistent disabling back pain, is cost-effective compared to usual care.[11] Recently a National Institutes of Health Pain

Consortium charged a Research Task Force to draft standards for research on chronic LBP.[12] Their recommendations were for stratification by severity of pain and disability.

To enable stratified management, easily identifiable group-specific factors, with potentially unique underlying etiology, may inform pragmatic changes to assessment, clinical diagnosis and treatment approaches for LBP patients in primary care.[14] For example, classifications systems associated with easy to identify patient epidemiologic factors such as age, sex, body mass index and concurrent medical and/or psychological conditions may enable or enhance sub-classification of LBP patients. The primary objective of this cross-sectional study was to assess which existing simple primary care LBP stratification schema is associated with distinct sub-populations as characterized by these easily identifiable primary epidemiological factors. With a schema identified, we further investigated whether the alternative stratification systems contributed independently to grouping in this schema.

2. MATERIALS AND METHODS

2.1 Patients

Data derived from patients who sought care from their primary care provider for persistent, recurrent chronic or subacute LBP and were referred to the Inter-professional Spine Assessment and Education Clinics (ISAEC: www.isaec.org).

The purpose of ISAEC is to identify patients reporting persistent, recurrent chronic or subacute LBP to their primary care provider (PCP) and to use an interdisciplinary shared-care model to provide diagnosis and stratified education and self-management recommendations. Based out of three cities in Ontario, Canada (Toronto, Hamilton and Thunder Bay), 220 PCPs participated in the program and referred patients to one of 21 ISAEC networked providers. Referred patients are evaluated by geographically linked community-based inter-professionally trained advanced practice clinicians (Chiropractors and Physiotherapists) who are linked

to networked specialists. Eligible patients: Aged 18+ years of age and experiencing persistent LBP-related symptoms lasting from 6 weeks to 12 months or recurrent LBP. These lower and upper limits for persistent painwere established to exclude incident acute LBP episodes and chronic long-term pain disorders, respectively. Patients with a work-based insurance claim, pain related to a motor vehicle accident, established narcotic dependency, involved in active litigation, pregnant or post-partum (<1 year), emergent spinal presentations, or an established pain disorder were excluded.

Patients were recruited from November 2012 to February 2014 and completed a health questionnaireand were given a standardized physical assessment at their initial ISAEC visit. The study was approved by the University Health Network Research Ethics Board (12-5477-BE/; 14-7776-BE).

2.2 ISAEC Stratification Schema (performed prior to diagnostic imaging)

LBP pattern

Grounded in the work of Wilson et al. and Hall et al.,[10,15] patients with mechanical 'non-specific' LBP symptoms were stratified into 1 of 4 clinical pain pattern subgroups. The essential elements of this system are determined by the location of the dominant symptoms and by the particular movements or postures that exacerbate or alleviate the pain, relying on patient history and physical examination. The four groups are back dominant pain aggravated by flexion (BD-F; i.e. worse with sitting or bending forward and better with standing or extending the lumbar spine), back dominant pain aggravated by extension (BD-E; i.e. worse with standing/walking and better with sitting or flexion of the lumbar spine), constant leg dominant pain (C-LD; i.e. lumbar radiculopathy), and intermittent leg dominant pain (I-LD; i.e. neurogenic intermittent claudication). Using 59 therapist examiners and 204 subjects, Wilson et al.[15] reported that this system demonstrated a kappa coefficient (κ) of 0.61 ($p<0.001$) and an overall agreement of 78.9%. Therapist experience level did not significantly affect reliability measures. Among experienced therapists, $\kappa=0.61$ ($p<0.001$) with 80.2% agreement. For the novice group, $\kappa=0.60$ ($p<0.001$) with 76.9% agreement. BD-F was chosen as the referent group for analytical modeling. From an etiologic aspect, ISAEC has operationalized

these patterns to the most likely source of the dominant symptoms: BD-F = discogenic LBP, BD-E = facetogenic LBP, C-LD = radiculopathy due to disc herniation and I-LD = neurogenic claudication due to spinal stenosis.

Severity of Disability (health questionnaire)

The Oswestry Disability Index (ODI) was used to assess level of back-related disability. It is a widely used and validated disability measure in LBP.[16-19] ODI asks respondents to select 1 of 6 descriptors indicating the level of difficulty, interference, or intensity with ten items: pain intensity, personal care, lifting, walking, sitting, standing, sleeping, employment, homemaking, social life, and travelling. Each is scored on a 0-5 scale, and the sum of the ten scores reported as a percentage of the total possible score. Cutoffs have been established to stratify according to severity: 0%-20% deemed 'minimal', 20%-40% deemed 'moderate', and 40% or greater deemed 'severe or greater' disability;[16]'minimal' was chosen as the referent group.

Risk of Chronicity

The Keele Start Back Screening Tool (SBST) [11,20](https://www.keele.ac.uk/sbst/startbacktool/)is a 9-item tool designed to measure severity in 9 domains: leg pain and shoulder/neck (each scaled from 0-'not at all' to 4-'extremely'), dressing, walking, fear, worry, catastrophizing and mood (each scaled from 0-'completely disagree' to 10-'strongly agree') and bothersomeness (scaled from 0-'not at all' to 4-'extremely'). The tool can be used to group patients into three categories of risk of poor outcome (i.e. persistent disabling symptoms) - low, medium, and high risk. For analytical purposes; 'low' was designated the referent group.

2.3 Additional study measures

In addition, the health questionnaire elicited age, sex, and height and weight, from which body mass index was calculated (BMI, kg/m^2). For analysis, BMI was categorized as overweight/obese (BMI≥25) versus normal (BMI<25).

Patients were presented with a list of 14 medical conditions to which they indicated yes/no to whether they had the condition. These were summed and a count of chronic conditions was generated.

An 11-point numerical pain rating scale was used to elicit each of back and leg pain both at rest and with activity. Patients were asked to rate their average pain on a 0-10 scale. The scale was anchored with 'No pain' (at '0') and 'Worst possible pain' (at '10'). One score for each of back and leg pain was derived based on the maximum response among the two respective items.

2.4 Statistical analyses

Descriptive statistics are presented for each study measure, overall and by clinical pain pattern subgroup (owing to subsequent findings). Statistical comparisons across pain pattern subgroups were made by way of analysis of variance or chi-square test.

Initially, multinomial logistic regression was used to investigate the association between age, sex, overweight/obese, and comorbidity count (patient factors) with each of the classification systems (model outcomes); three separate models, one for each system. The system with the greatest variability by virtue of associations with patient factors was retained for subsequent multinomial regression modeling. In this instance, the remaining two systems were additionally entered into the model as potential correlates, along with back and leg pain intensity scores.

3. RESULTS

3.1. Overall sample characteristics

The sample included 970 patients. By dominant pain pattern, 42% were classified as BD-F, 31% BD-E, 17% CL-D and 10% I-LD (Table 1). By chronicity risk, 24% were deemed 'high', 31% 'medium' and 45% 'low'

risk. Finally, by severity of disability, 39% were deemed 'severe', 40% 'moderate', and 21% 'minimal'. The overall mean age of the sample was 50 years, ranging from 18-93.

3.2. Differentiation between stratification schema

Table 2 presents the results from multinomial regression analyses. The greatest variability in associations was found for the dominant pain pattern subgroups where age, sex, BMI and comorbidity count each were significantly associated with the subgrouping. In contrast, only BMI and comorbidity count were associated with the subgroups when considering classification by either chronicity risk or severity of disability. Given this, dominant pain pattern was retained as the schema outcome of interest for the final multinomial logistic model.

3.3 Sample characteristics by pain pattern subgroupings

The I-LD and BD-E groups had higher mean ages, 63 and 52 years, respectively, than the BD-F and C-LD groups at 46 and 47 years, respectively (Table 3). The proportion of females was highest in the BD-E and BD-F groups at 61% and 59% versus 46% in the C-LD and I-LD groups.

In the I-LD group, 76% were categorized as overweight/obese, compared to 67% in the C-LD group, 59% in the BD-E group and 53% in the BD-F group. The I-LD and BD-E groups had higher mean comorbidity count, 1.9 and 1.4, respectively, compared to the BD-F and C-LD groups at a mean of 1.0.

A similar proportion of patients deemed to have severe disability was found for the BD-F and BD-E groups, ranging from 33% to 35%, compared to 42% in the I-LD and 58% in the C-LD groups. As expected, mean back pain intensity scores were higher (i.e. worse) in the back dominant pain groups, and mean leg pain intensity scores were higher (i.e. worse) in the leg dominant pain groups.

Finally, similar proportions within the BD-F, BD-E, and I-LD groups were deemed high risk for chronicity, ranging from 21-23%, compared to 35% in the C-LD group.

3.4 Examination of pain pattern subgroupings with multivariable adjusted analyses

From the adjusted model (Table 4), increasing age was significantly associated with a greater odds of being in the BD-E and I-LD groups (Odds ratios (OR): 1.02 and 1.06; $p<0.01$) compared to the BD-F group. Men had odds more than twice that of women for being in the C-LD and I-LD groups ($p<0.01$).

Being overweight/obese, compared to normal, was associated with a 2.5 times greater odds of being in the I-LD group ($p<0.02$) compared the BD-F group. Every unit increase in comorbidity count was associated with a 27% increased odds of being in the BD-E group ($p<0.01$) compared to being in BD-F.

As expected, higher (worse) back pain intensity scores were associated with decreased odds of being in the leg dominant groups compared to the BD-F group, and higher (worse) leg pain scores were associated with increased odds of being in the leg dominant groups compared to BD-F.

Severe disability was only associated with an increased odds of being in the C-LD group relative to the BD-F group (OR 3.9, $p<0.01$), while high chronicity risk was associated with a decreased odds of being in the I-LD group relative to BD-F (OR: 0.36; $p=0.03$). The multiple degree of freedom test for the overall effect of chronicity risk was not found to be significant ($p>0.30$).

4. DISCUSSION

Our results demonstrate significant heterogeneity in a primary care population with persistent LBP. Stratification by dominant pain pattern revealed the greatest variability in associations with common epidemiological factors. From adjusted analysis, increasing age was associated with greater odds of having back dominant extension (BD-E) and intermittent leg dominant (I-LD) symptoms and is consistent with the

most likely etiology being facetogenic LBP and spinal stenosis causing neurogenic claudication, respectively. Being male was associated with greater odds of having C-LD or I-LD, being overweight/obese with greater odds of I-LD, and increasing comorbidity count with greater odds of B-DE-based symptoms. Finally, severe disability was associated with having C-LD symptoms and high chronicity risk with decreased odds of I-LD symptoms. Disability and chronicity risk did not otherwise variably impact odds across the clinical LBP patterns. These results provide a rationale for combined use of these stratification tools in LBP models of care in that they each look at different dimensions of LBP (i.e. mechanical pain pattern, degree of disability and psychosocial well-being) and they in-turn also serve to direct a different dimension of treatment.[10-14] With each having their own merit, [12,13] the lack of highly unique subpopulations associated with any one stratification approach is consistent with the findings of Fairbanks et al.[13] They assessed the role of classification systems of chronic LBP that generally fell into the descriptive diagnostic systems, prognostic, or those that direct treatment, and concluded that no one classification system be adopted for all purposes.

Stratifying patients at the primary care level provides an opportunity for the development and delivery of more effective and patient-centered care to improve treatment response and where possible reduce chronicity. In addition to improving response through tailored treatment, identifying distinct 'at-risk' subgroups can suggest different etiologies/disease trajectories. For example, in the current study the mechanical stratification of LBP proposed by Hall et al [10] provided the most distinct clinical subgroups, particularly for those presenting with back dominant or intermittent leg dominant symptoms which are typically brought on by extension activity, representing older, obese patients with greater comorbidities, but less chronicity risk from a psychosocial aspect. Although the approach from Hall et al. is not designed to make specific inference to a patho-anatomical source of pain, these patients present with extension dominant LBP and/or neurogenic claudication and essentially represent symptomatic facet osteoarthritis (OA).[10,21-24]This group represents a growing demographic and accounted for 41% of this cohort.

Facet OA or lumbar spinal stenosis (LSS) and associated symptoms represent a significant source of healthcare and socioeconomic burden that warrants a significant increase in basic and clinical research.[25] It is estimated that facet OA with spinal stenosis causing neurogenic claudication affects about 20% of people over 65 and about half of that group suffer serious restrictions in their daily routines.[26]Battie et al demonstrated that the associated health burden of LSS on health related quality of life was significant and is about the same or greater than diabetes, heart disease, arthritis, or stroke.[26] Clinically, our current understanding of OA necessitates the consideration of spinal OA within the broader context of the impact of OA.[27-29]Consequently, recommendation of typical LBP interventions (including psychologically based interventions [11]) without consideration of the unique underlying medical comorbidity (including multisite OA) in this large subgroup of LBP patients may be inadequate. A recent review demonstrated limited and short-lived benefits of non-operative treatment for these patients.[30]In addition, data from the SPORT studies have demonstrated good comparative-effectiveness of surgical treatment for patients with LSS and in particular those with degenerative spondylolisthesis that is sustainable out to 4 years.[31]Consequently, multidimensional management in this subgroup should include a focus on multi-comorbidity management, and in those failing conservative management, earlier specialist referral.

Due to the successful results demonstrated by the Start Back trial,[11] there has been significant interest and implementation of the Start Back stratification tool by many groups.[32,33]In the current study we have demonstrated similar findings regarding the proportion of primary care patients presenting with a high risk of chronicity (21-34%).[11]However, our study uniquely demonstrates that the proportion of high risk patients is relatively similar across the different dominant clinical pain presentations. This suggests that the use of the Start Back stratification tool alone, although a valid prognostic tool that enables identification of patients requiring cognitive behavioral therapy (CBT) or those who are likely to succeed with simple education and self-management, would not enable further patient specific treatment regarding mechanical patterns of pain and more targeted initial medical management.[10] We demonstrated an almost identical finding regarding stratification based on severity of disability. Deyo et al[12] recently recommended the stratification of chronic

LBP by its impact (e.g. severity of disability) as a standard going forward for future research. Based on the present findings, this recommendation may be problematic from an epidemiologic perspective in that it would only serve to identify one aspect of LBP and as demonstrated not provide a useful means for identification of distinct subgroups beyond the degree of impact. As recommended by Fairbanks et al, we believe that a multidimensional combination of stratification tools is required to more holistically represent the complexities of chronic LBP.[13]

4.2 Study considerations and limitations

This was a cross-sectional study and therefore does not provide longitudinal prognostic data regarding the effectiveness of a multidimensional stratification approach that included mechanical patterns of pain. As well, further study with a more comprehensive consideration of patient and societal factors are required to explore the distinctness of the potential subgroups we have identified. Though uncommon, in instances where a patient's pain pattern was potentially mixed, symptom questions were phrased in alternative ways to establish which symptom or factor was most limiting, and this determined the dominant pattern. The occurrence of this situation was not recorded, and thus potential confounding is possible. Finally, the presence of comorbidities was considered in the study as a count of conditions. The limitation of this is that some may be under treatment, while others may not, and the severities of the condition(s) were not considered. Data in this regard were not available for study.

4.3 CONCLUSION

LBP patients are very heterogeneous and require primary care initiated stratification beyond the impact of symptoms and psychosocial risk factors. In particular, thedominant mechanical patterns of pain at presentation appear to have distinct and easily identifiable epidemiological profiles that may enhance current stratification approaches and enable more targeted interventions. Interestingly, differences were identified with a backdrop of little variability in disability severity and chronicity risk across pain pattern groups,

suggesting initial stratification based on the former factors may not result in distinct LBP subgroups and thus limit clinical and epidemiological research.

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Table 1. Description of study sample (n=970).

	Mean (±SD)
Age	49.8 (±15.7)
Number of medical comorbidities (range)	1.2 (±1.5) (0-11)
Oswestry Disability Index score	35.8 (±18.2)
Back pain intensity	6.9 (±2.4)
Leg pain intensity	5.7 (±3.3)
	Proportions (%)
Female	56.4
Body Mass Index	
Normal	40.0
Overweight/Obese	60.0
Chronicity Risk	
High	23.9
Medium	31.4
Low	44.6
Oswestry Disability Index	
Severe	39.0
Moderate	40.0
Minimal	21.0
Dominant Pain Pattern	
back pain with flexion	41.8
back pain with extension	31.0
constant leg pain	16.9
intermittent leg pain	10.3

Table 2. Multinomial logistic regression; outcomes: classifications based on three systems

Predictor variables	Outcome	Odds Ratio	Lower 95% CL	Upper 95% CL	p-value
	Outcome: Pain pattern*				
Age	BD-E vs. BD-F	1.02	1.01	1.03	0.0015
	C-LD vs. BD-F	1.00	0.99	1.02	0.5672
	I-LD vs. BD-F	1.06	1.04	1.08	<.0001
Sex: Male vs. Female	BD-E vs. BD-F	0.92	0.65	1.29	0.6272
	C-LD vs. BD-F	1.64	1.10	2.44	0.0161
	I-LD vs. BD-F	1.91	1.15	3.19	0.0133
Overweight/obese vs Normal	BD-E vs. BD-F	1.11	0.79	1.57	0.5316
	C-LD vs. BD-F	1.70	1.11	2.61	0.0139
	I-LD vs. BD-F	1.98	1.11	3.54	0.0213
Medical comorbidity count	BD-E vs. BD-F	1.15	1.01	1.30	0.0338
	C-LD vs. BD-F	0.93	0.79	1.11	0.4171
	I-LD vs. BD-F	1.13	0.96	1.34	0.1514
	Outcome: Chronicity Risk				
Age	High vs. Low	0.98	0.97	1.00	0.0549
	Medium vs. Low	1.00	0.99	1.01	0.4781
Sex: Male vs. Female	High vs. Low	1.29	0.90	1.85	0.1687
	Medium vs. Low	0.86	0.62	1.19	0.3562
Overweight/obese vs Normal	High vs. Low	1.57	1.07	2.29	0.0206
	Medium vs. Low	1.37	0.98	1.90	0.0658
Medical comorbidity count	High vs. Low	1.35	1.18	1.55	<.0001
	Medium vs. Low	1.21	1.07	1.38	0.0033
	Outcome: Disability Severity				
Age	Severe vs. Minimal	1.00	0.98	1.01	0.6436
	Moderate vs. Minimal	1.00	0.99	1.01	0.7651
Sex: Male vs. Female	Severe vs. Minimal	0.74	0.50	1.09	0.1308
	Moderate vs.	0.73	0.50	1.08	0.1129

	Minimal				
Overweight/obese vs Normal	Severe vs. Minimal	2.10	1.41	3.13	0.0003
	Moderate vs. Minimal	1.61	1.09	2.37	0.0168
Medical comorbidity count	Severe vs. Minimal	1.39	1.17	1.64	0.0001
	Moderate vs. Minimal	1.16	0.97	1.37	0.0979

* BD-F: back pain with flexion; BD-E: back pain with extension; C-LD: constant leg pain; I-LD: intermittent leg pain.

Table 3. Description of study sample by clinical pattern of LBP

	Clinical Low Back Pain Pattern Subgroup*				
	BD-F	BD-E	C-LD	I-LD	P-value
	Mean (±SD)				
Age	46.2 (±14.4)	51.6 (±16.6)	47.4 (±13.3)	62.9 (±14.1)	<0.0001
Number of medical comorbidities (range)	1.0 (±1.3) (0-11)	1.4 (±1.5) (0-10)	1.0 (±1.3) (0-5)	1.9 (±1.8) (0-7)	<0.0001
Back pain intensity	6.9 (±2.2)	7.1 (±2.1)	6.5 (±3.0)	6.4 (±3.3)	0.0129
Leg pain intensity	4.6 (±3.3)	5.1 (±3.4)	7.7 (2.1)	7.7 (±2.2)	<0.0001
	Proportion (%)				
Female	59.3	61.5	46.3	46.0	0.0014
Body Mass Index					
Normal	46.6	40.5	32.4	23.5	0.0002
Overweight/Obese	53.4	59.5	67.6	76.5	
Chronicity Risk					
High	21.0	22.9	34.8	21.0	
Medium	31.1	28.9	32.9	38.0	0.0030
Low	47.9	48.2	32.3	41.0	
Oswestry Disability Index					
Severe	32.9	35.5	58.5	42.1	
Moderate	40.9	41.0	33.3	44.2	
Minimal	26.2	23.5	8.2	13.7	

* BD-F: back pain with flexion; BD-E: back pain with extension; C-LD: constant leg pain; I-LD: intermittent leg pain.

Table 4. Multinomial logistic regression; outcome: pain pattern subgroup.

Predictor variables	Pain pattern subgroup *	Odds Ratio	Lower 95% CL	Upper 95% CL	p-value
Age	BD-E vs. BD-F	1.02	1.01	1.03	0.0056
	C-LD vs. BD-F	0.99	0.97	1.01	0.34
	I-LD vs. BD-F	1.06	1.03	1.08	<.0001
Sex: Male vs. Female	BD-E vs. BD-F	1.01	0.69	1.50	0.9444
	C-LD vs. BD-F	2.23	1.36	3.65	0.0015
	I-LD vs. BD-F	2.36	1.28	4.37	0.0063
BMI: overweight/obese vs normal	BD-E vs. BD-F	0.94	0.64	1.39	0.7612
	C-LD vs. BD-F	1.55	0.92	2.62	0.1019
	I-LD vs. BD-F	2.55	1.21	5.36	0.0136
Number of medical comorbidities	BD-E vs. BD-F	1.27	1.09	1.47	0.0017
	C-LD vs. BD-F	0.96	0.78	1.18	0.7155
	I-LD vs. BD-F	1.20	0.96	1.48	0.1057
Back pain intensity	BD-E vs. BD-F	1.05	0.95	1.16	0.3385
	C-LD vs. BD-F	0.69	0.61	0.78	<.0001
	I-LD vs. BD-F	0.73	0.64	0.84	<.0001
Leg pain intensity	BD-E vs. BD-F	1.03	0.97	1.10	0.3138
	C-LD vs. BD-F	1.62	1.43	1.84	<.0001
	I-LD vs. BD-F	1.76	1.48	2.08	<.0001
Oswestry Disability Index					
Severe vs Minimal	BD-E vs. BD-F	0.93	0.51	1.72	0.8246
	C-LD vs. BD-F	3.87	1.58	9.49	0.0031
	I-LD vs. BD-F	1.72	0.61	4.90	0.3078
Moderate vs Minimal	BD-E vs. BD-F	1.06	0.64	1.77	0.812
	C-LD vs. BD-F	1.93	0.82	4.53	0.1306
	I-LD vs. BD-F	2.33	0.89	6.09	0.084
Chronicity risk					
High vs Low	BD-E vs. BD-F	0.98	0.54	1.75	0.9357
	C-LD vs. BD-F	1.16	0.56	2.40	0.6974
	I-LD vs. BD-F	0.36	0.14	0.91	0.0316
Medium vs Low	BD-E vs. BD-F	0.83	0.52	1.35	0.4546
	C-LD vs. BD-F	0.88	0.46	1.68	0.702
	I-LD vs. BD-F	0.58	0.27	1.22	0.1491

* BD-F: back pain with flexion; BD-E: back pain with extension; C-LD: constant leg pain; I-LD: intermittent leg pain.