Physical Therapy and Rehabilitation
ISSN 2055-2386 | Volume 6 | Article 9

HOAJ
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Original Research Open Access

# Risk Factors for the Elevation of Psychosocial Barriers in the Recovery of Lumbar Pathology

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## Abstract

**Background/Purpose**: The prevalence of low back pain (LBP) continues to rise and an appreciation for a biopsychosocial approach, which takes in multiple facets of a patient presentation, may significantly impact this increase. To the best our knowledge, there are no studies evaluating the relationship between the STarTBack Screening Tool (SBT) and the access point the patient enters the health system. Our hypothesis is that patients that access care through the medical model will exhibit greater psychosocial risk.

**Methods**: A retrospective analysis of 1404 cases of LBP utilizing past medical history, demographic information, and SBT data. A linear regression model to identify potential predictors was utilized followed by analyses using cumulative logistic regression model with potential predictors.

**Results**: Referral source had a positive impact on the SBT score and higher probability of high risk classification. Compared to direct access, accessing care through a primary care physician had an odds ratio of 2.802 and specialist an odds ratio of 3.195.

**Conclusion**: This study provides evidence to the impact that access may have on the psychosocial status of patients with LBP. The approach taken by the healthcare provider may impact long term pain and functional outcomes and costs.

**Keywords**: Low Back Pain, Direct Access, Health Systems

## Introduction

The prevalence of low back pain (LBP) continues to rise, despite the increasing technological advancement in the medical field [1-3]. Following the natural course and history, episodes of LBP increase healthcare utilization and lead more patients into chronic stages [4,5]. A clear association was demonstrated between length of disability and healthcare cost, with 86% of episodes less than one month yielding only 11% of all costs [6]. This reveals the importance of preventing and reducing the frequency of patients who transition from acute to chronic stages [5,7]. A biomedical, pathoanatomical model negatively influence the patient's overall status and those dealing with chronic low back pain [8,9]. A recent systematic review demonstrates that a multidisciplinary biopsychosocial rehabilitation approach is an effective treatment strategy for low back pain [10]. A biopsychosocial approach takes in multiple facets of a patient presentation. A general outline involves assessing for patients pain, somatic, medical, cognitive, emotional, behavioral, social factors, and motivation for a complete clinical picture of a condition [11].

Most patients will not have a meaningful pathoanatomical diagnosis as imaging findings may be considered abnormal despite being asymptomatic, and the likelihood of abnormalities increase with age [12]. Trends demonstrate earlier medi-

doi: 10.7243/2055-2386-6-9

cal imaging led to greater probability towards surgery and healthcare spending [1]. Structural change on imaging in an asymptomatic population continues to support the notion that other factors such as emotion, behavior, cognitive beliefs may contribute to patient's pain perception. Patients' access care differently depending on their cognitive belief system, and will enter a persistent state or recovery influenced by their beliefs [13].

The Start Back Screening Tool (SBT) stratifies patients accordingly to low, medium, high risk for biobehavioral influences on pain, demonstrating good reliability [14-21]. Those classified as high risk may benefit from increased education regarding their condition [2,22-25]. A Cochrane review lends support to the use of a biopsychosocial approach for treatment of subacute LBP, compared to usual care [26]. Emerging evidence continues to support use of the biopsychosocial framework, despite low quality in nature [27]. Findings also suggest that this approach may be comparable to other forms other PT interventions, for a chronic population [28,29].

To the best of our knowledge, there are no studies evaluating the relationship of the score on the SBT to the access point the patient enters the health system. Our hypothesis is that patients that access care through the traditional medical model (primary care or specialist) will exhibit greater psychosocial risk. This would be the first study to look at the factors that may elevate psychosocial risk in achieving an outcome to reduce to the likelihood of developing chronic LBP.

## Methods

Retrospective analysis of 1404 cases of LBP from September 2015-December 2016 utilizing FOTO (Focus on Therapeutic Outcomes) and Clinicient (electronic medical records system) to gather data from 13 outpatient physical therapy clinics in the Philadelphia, PA area. All patients evaluated during this time, with complete intake information, were included in the study. Patient information was exported from FOTO and integrated with referral source information gathered from the EMR during the intake process at the outpatient clinical sites. Classification of the referral source into primary care, specialist, or direct access was completed by a research assistant with the help from a marketing representative as needed. Utilizing past medical history, demographic information, referral source, and SBT data we performed a linear regression model to identify potential predictors that impact the SBT score. The SBT risk level was analyzed using cumulative logistic regression model with potential predictors.

## Results

In 1404 patients, 366 (26.1%) patients were classified as high risk per the SBT (**Table 1**). Linear regression model revealed a number of significant factors to elevate the SBT score (**Table 2**). A cumulative logistic regression model with these potential predictors identified the odds ratio to determine how impactful these factors were on probability of risk elevation. Our analysis found previous surgery (OR 4.073), higher BMI (OR 1.017), OA (mean 0.286), COPD (mean 0.994), HTN (mean 0.307), HA (mean 0.676), major vision disease (mean 0.581), previous accident (mean 0.676), anxiety (mean 0.554), depression (mean 0.545), sleep dysfunction (mean 0.547), and referral source had a positive impact on the SBT score and probability to have high-risk classification. Osteoporosis (mean -0.492), myocardial infarction (mean -0.690), and previous episode of cancer (mean 0.500) had a negative impact on SBT score and lower probability of high-risk classification. Referral source was positive as predicted to increase the SBT risk level. Compared to direct access, accessing care through a primary care physician had

**Table 1. STarT Back Screening Tool distribution results.**

| Risk Level | Value | Percent | 95% CI |
|---|---|---|---|
| Low | 455 | 32.4% | (30.0%, 34.9%) |
| Medium | 583 | 41.5% | (38.9%, 44.1%) |
| High | 366 | 26.1% | (23.8%, 28.4%) |

**Table 2. Linear regression model results.**

| Factor | Mean Difference (SBT raw score) | 95% CI | P-Value |
|---|---|---|---|
| Previous Surgery | 1.442 | (0.464, 2.42) | .004* |
| BMI | 0.013 | (.003, .023) | .009* |
| Osteoarthritis | 0.286 | (.013, .560) | .040* |
| COPD | 0.994 | (.150, 1.837) | .021* |
| HTN | 0.307 | (0.030, 0.583) | .030* |
| Headaches | 0.676 | (0.350, 1.003) | <.001* |
| Major Vision | 0.581 | (0.083, 1.079) | .022* |
| Previous MVA | 0.676 | (0.289, 1.062) | <.001* |
| Anxiety | 0.554 | (0.171, 0.937) | .005* |
| Depression | 0.545 | (0.143, 0.947) | .008* |
| Sleep Dysfunction | 0.547 | (0.119, 0.895) | .002* |
| Referral (PCP vs DA) | 1.122 | (0.435, 1.808) | .001* |
| Referral (Specialist vs DA) | 1.265 | (0.600, 1.930) | <.001* |
| Osteoporosis | -0.492 | (-0.990, 0.006) | .053 |
| Myocardial Infarction | -0.690 | (-1.544, 0.164) | .113 |
| Cancer | -0.500 | (-1.007, 0.007) | .053 |

**Table 3. Cumulative logistic regression model results.**

| Factor | Odds Ratio | 95% CI |
|---|---|---|
| Age | 0.984 | (0.977, 0.990) |
| Surgery | 4.073 | (1.706, 10.504) |
| BMI | 1.017 | (1.003, 1.032) |
| Referral (PCP vs DA) | 2.802 | (1.521, 5.326) |
| Referral (Specialist vs DA) | 3.195 | (1.763, 5.982) |
| Positive PMHx | 1.437 | (1.336, 1.547) |

doi: 10.7243/2055-2386-6-9

an odds ratio of 2.802 and specialist an odds ratio of 3.195 to present with high risk as measured by the SBT.

## Discussion

### Positive Predictors

#### *Previous Surgery*

Multiple explanations can be used to rationalize prior surgery as a potential predictor of a high SBT score. When assessing the long term outcomes of lumbar surgical intervention, many procedures in current practice have limited outcomes [30,31]. This has especially been noted with surgeries such as the lumbar fusion and discectomy [32-34]. Across the spectrum of 4 year, 7 year, and 20 year follow up, outcomes are similar and not superior to physical therapy and cognitive behavioral therapy. It may be implied from the previous studies that continued disability, along with use of unsuccessful surgical intervention may continue to lead a patient to a lack of understanding regarding the complex nature of lumbar pathology.

#### *Higher BMI*

The association between LBP and BMI is conflicting [35]. The heterogeneity of the patient population in this study may result in its modest odds ratio. While chronic low back pain has support to have no relationship, radicular symptoms have been found to be related to higher BMI [36,37]. Given these populations were not separated; it is possible to have a subpopulation that BMI is relevant in the development of increased risk. Non-specific LBP and radicular LBP may be managed differently from healthcare providers leading to this sub classification consideration in future studies.

#### *Osteoarthritis*

Level of pain and pain related fear have been shown to be significantly associated with functional limitations in patients with osteoarthritis (OA) [38,39]. Anxiety has also been shown to predict poorer function in people with OA [39,40]. Other studies in the OA population have shown that pain catastrophizing and pain related fear are significantly related to psychological disability and have been shown to explain pain and disability in the OA population [41]. Low levels in catastrophizing and pain related fear have been shown to be related to milder symptoms of knee osteoarthritis [39].

#### *COPD*

Chronic obstructive pulmonary disease (COPD) is a condition in which many emotional needs are seen in this population [42,43]. These needs are similar to the domains screened in the SBT (fear and anxiety) [42,43]. Patient understanding the effects of exercise, motivation, and ability to control the condition are all barriers as well contributing to the thoughts and beliefs that lead to avoidance behaviour [42-44]. One barrier to this is the ability of healthcare providers to make referral to pulmonary rehabilitation, know the influence of exercise on the condition, or overcome other barriers to attendance and completion to program [44]. These barriers correlate to the SBT assessment and suggest that these patients are at risk of a higher psychosocial stratification.

#### *Hypertension (HTN)*

Three main barriers exists to the self-management of HTN; medication use, diet, and exercise [45-47]. There are several barriers to this with some not being captured through our data collection (culture, education level, time constraint, financial status) [45,47]. Exercise limitations have been found to be due to BMI >30, female gender, low education level, being employed, psychosocial issues, and belief that MI is likely with current lifestyle [46]. The psychosocial variables found to be predictive of poor exercise adherence were stress, depression, self-worth, and lack of carefulness. These share a relationship with the SBT and therefore, would increase the likelihood of developing a high-risk profile. Identifying patients with poor adherence may subgroup patients to better identify people in need of psychologically informed management of LBP.

#### *Headache*

As in chronic pain conditions and low back pain, people who are suffering from recurrent headaches have been shown to display elevated pain related fear and avoidance of the behavior [48,49]. Anxiety sensitivity (AS) has also been shown to have a direct relationship to fear of pain in patients with recurrent headache [49]. As has been shown to be related to higher cognitive anxiety, fear of pain, and avoidance in chronic pain patients [50]. Other research has shown the in people dealing with headaches, higher scores on in fear/avoidance were related to lower pain pressure thresholds on the head [51]. Anxiety and depression have also been shown to be associated with both migraine and non-migrainous headaches [52].

#### *Major vision disease*

Major vision disease in a general term focused at capturing all patients with a variety of visual disease that affects their daily life. Little research has been done on the impact vision disease has on exercise and the barriers these individuals have regarding exercise. Haegele et al, have found that exercise does have a positive effect on self-efficacy, but this population is similar to other populations with a disability and are inactive individuals [53,54]. The barriers within this population is significant, but working with healthcare providers to overcome these barriers is important to reduce the likelihood of developing a high-risk profile with lumbar pathology.

#### *Previous accident (MVA)*

% of individuals who experience WAD will have persistent pain and disability and a variety of other symptoms including headaches and sleep disturbances among others [55]. The transition from acute to chronic issues in the WAD population has been shown to at least in part be due to cognitive and psychological factors including fear and catastrophizing as

doi: 10.7243/2055-2386-6-9

well as hyperalgesia and central sensitization [56-58]. People suffering from chronic WAD can also have symptoms of post-traumatic stress and this can be predictive of development of chronic issues when identified early [57,59].

### *Anxiety and Depression*

The link between anxiety and depression in people suffering with pain is vast in the literature. Depression rates have been shown to be more prevalent in those with pain and vice versa [60]. As pain severity worsens, so does depression [60]. Catastrophizing has also been linked to reports of depression [61]. Anxiety has been previously shown to be related to pain severity and behavior [62,63]. Anxiety can also produce hyperalgesia related to brain function in the hippocampal region [63]. A combination of anxiety and depression with chronic musculoskeletal pain was strongly related to increased pain intensity, an increased pain interference and worse health related quality of life [64].

### *Sleep Dysfunction*

Sleep dysfunction has been identified and is an area to be addressed in people with central sensitization and those suffering from chronic pain conditions and can lead to exacerbation of symptoms [1,65-67]. Individuals with both acute and persistent low back pain have already been shown to have decreased quality of sleep [68-70]. In addition, sleep disturbances are labeled as one of many pain sensitizing factors in individuals with low back pain [71].

### *Referral Source*

The results from this study support the notion that referral sources may have impact on the SBT. When comparing direct access physical therapy versus primary care physicians and specialists, there is an increase risk in SBT risk stratification implicating a change in psychosocial status. This may be due to frequent studies being performed, despite continued recommendation to avoid early imaging of the lumbar spine [72-74]. In addition, physician patient education may lead to an increase risk for patient's psychosocial status. Medical providers may rely heavily on a biomechanical framework for musculoskeletal disorders [34]. The biomechanical framework minimizes the patient's overall experience with the focus on body abnormalities [27,75,76]. Similar to diagnostic imaging, both rely on the belief that abnormalities correlate/associate to patient symptoms which in actuality is false [74,76-78].

## Negative Predictors

### *Osteoporosis*

Patients presenting with osteoporosis had an average difference of -0.492 (CI -0.990, 0.006). Several clinical practice guidelines exists to help guide healthcare providers in the management in osteoporosis [79]. While there is a variability in the description of exercise parameters, there is a support for exercise for those with this condition. Patients with osteoporosis education have stronger beliefs in the effectiveness and safety of exercise [80]. The reinforcement of the safe effectiveness of exercise may provide the patient with a stronger desire to move and exercise compared to those without this condition.

### *Myocardial Infarction (MI)*

In contrast to the predictors of cardiac events (Hypertension and BMI), patients who have experienced a myocardial infarction had a neutral or negative effect on risk stratification. The mean difference was -0.690 (CI-1.544, 0.0164) providing support for the effect physician encouragement of exercise has on patient belief and expectations regarding exercise. In both the European and American guidelines for coronary cardiovascular health, exercise and its effects on that condition are encouraged [81,82]. This education accompanied with a life-changing event may ensure a more adherent patient and retention of education on exercise.

### *Previous Cancer (CA)*

Cancer survivors had a mean difference of -0.500 (CI -1.007, 0.007). This demonstrates that having a past medical history of CA had either no effect or a negative effect on probability of elevated risk with an episode of lumbar pathology. This can be explained when assessing survivors' belief about expectations of exercise. CA survivors have favorable beliefs about exercise whether or not they believed in the long-term cancer effects [83]. Exercise is often prescribed for a number of comorbidities during oncological treatment [84,85]. This encouraging support for exercise and its effects may carry over into a patient's thoughts and beliefs in regards to lumbar pathology. These factors, as well as, the perspective that CA gives someone when compared to other injuries or conditions.

### *Clinical Message*

- Physician education and seeking behaviour may negatively impact patient psychosocial risk.
- Conditions that support exercising reduce high psychosocial risk.
- Access may have an impact beyond cost of current episode. The approach taken by healthcare providers may impact long term pain and functional perceptions.

**Competing interests**

The authors declare that they have no competing interests.

**Authors' contributions**

| Authors' contributions | CK | CH | JS | TZ |
|---|---|---|---|---|
| Research concept and design | ✓ | -- | ✓ | -- |
| Collection and/or assembly of data | ✓ | -- | ✓ | ✓ |
| Data analysis and interpretation | ✓ | ✓ | ✓ | ✓ |
| Writing the article | ✓ | ✓ | ✓ | -- |
| Critical revision of the article | ✓ | -- | -- | -- |
| Final approval of article | ✓ | ✓ | ✓ | ✓ |
| Statistical analysis | ✓ | -- | -- | ✓ |

doi: 10.7243/2055-2386-6-9

**Acknowledgments and Funding**
Thank you Megan Storey for your support in this project. The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by the Department of Physical Therapy at Thomas Jefferson University.

**Publication history**
Editor: Mohammad H. Hadadzadeh, Wheeling Jesuit University, USA.
Received: 08-May-2019 Final Revised: 07-Jun-2019
Accepted: 11-Jun-2019 Published: 20-Jun-2019

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**Citation:**
Keating C, Hui C, Smith G and Zhan T. **Risk Factors for the Elevation of Psychosocial Barriers in the Recovery of Lumbar Pathology**. *Phys Ther Rehabil*. 2019; **6**:9.
http://dx.doi.org/10.7243/2055-2386-6-9