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The influence of psychological factors on pre-operative levels of pain intensity, disability and health-related quality of life in lumbar spinal fusion surgery patients

Allan D. Abbott [a,b,*], Raija Tyni-Lenné [a], Rune Hedlund [c]

[a] *Department of Physical Therapy, Karolinska University Hospital, Stockholm, Sweden*
[b] *Department of Clinical Science, Intervention and Technology, Division of Orthopaedics, Karolinska Institute, Stockholm, Sweden*
[c] *Institute for Clinical Sciences, Department for Orthopaedics, Sahlgrenska University Hospital, Gothenburg, Sweden*

Abstract

Objectives To assess the extent to which perceived pain and psychological factors explain levels of disability and health-related quality of life (HRQOL) in patients scheduled for lumbar fusion surgery, and to test the hypothesis that relationships between pain intensity, mental health, fear of movement/(re)injury, disability and HRQOL are mediated by cognitive beliefs and appraisals.
Design Cross-sectional, correlation study.
Setting Orthopaedic outpatient setting in a tertiary hospital.
Participants One hundred and seven chronic back pain patients scheduled for lumbar fusion surgery.
Measures Visual analogue scale for pain intensity, Short Form 36 mental health subscale, Tampa Scale for Kinesiophobia, Back Beliefs Questionnaire, Self-efficacy Scale, Coping Strategy Questionnaire, Oswestry Disability Index and European Quality of Life Questionnaire.
Results The group effect of multiple mediators significantly influenced the relationships between pain intensity and mental health, fear of movement/(re)injury, functional disability and HRQOL. Pain catastrophising significantly mediated the relationship between pain intensity and mental health, control over pain significantly mediated the relationship between mental health and functional disability, self-efficacy and pain outcome expectancy significantly mediated the relationship between mental health and HRQOL, and self-efficacy also significantly mediated the relationship between pain intensity, fear of movement/(re)jury and functional disability. The model explained 28, 30, 52 and 42% of the variation in mental health, fear of movement/(re)injury, functional disability and HRQOL, respectively.
Conclusions This study highlights the strong influence and mediation roles of psychological factors on pain, mental health, fear of movement/(re)injury, disability and HRQOL in patients scheduled for lumber fusion. Future research should focus on screening as well as pre- and post-operative interventions based on these psychological factors for the potential improvement of lumber fusion surgery outcomes.

Keywords: Spinal fusion; Disability; Quality of life; Mental disorders; Fear avoidance; Mediation

Introduction

Since a biopsychosocial approach has been used in the development of a theoretical explanation for chronic pain and disability, psychosocial factors have been suggested to intermediate between neurophysiological mechanisms of pain and the experience of pain perception and disability [1].

Based on theories of operant and classical behavioural conditioning, early literature from Fordyce *et al.* [2–4] suggested that maladaptive pain-avoidance behaviours can be learned and persist independent of nocioceptive input. Turk *et al.* [5] argued the importance of individuals' beliefs, cognitions and coping skills in the development and maintenance of chronic pain and disability. The work of Lethem *et al.* [6], Phillips [7] and Waddell *et al.* [8] emphasised a reciprocal relationship between cognitive and behavioural factors. Moreover, Lethem *et al.* [6] suggested that confrontation of pain-related fears promotes recovery, while fear avoidance generates physical and psychosocial

* Corresponding author at: Department of Physical Therapy, Karolinska University Hospital, Huddinge, Stockholm 14186, Sweden.
Tel.: +46 8 585 819 55; fax: +46 8 585 821 90.
E-mail address: allan.abbott@karolinska.se (A.D. Abbott).

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consequences that contribute to chronic pain and disability.

Building upon earlier cognitive behavioural models, the fear-avoidance model of Vlaeyen *et al.* [9,10] included theories of kinesiophobia [11]. Apart from fear of pain *per se*, fear of movement/(re)injury was suggested to promote fear-avoidance behaviour through the effects of pain catastrophising. Catastrophising was viewed as a method of cognitive coping and is characterised by negative self-statements, overly negative thoughts and ideation [12]. Several studies have demonstrated that pain catastrophising and fear is predictive of disability [13–17], and that fearful chronic low back pain (CLBP) patients perform less well on behavioural performance tasks [18–23].

It has been recognised in large population studies that there is significant co-morbidity between chronic pain disorders and mental health disorders [24,25]. The occurrence of anxiety and depression disorders and, to an even greater extent, their co-occurrence has also been associated with greater pain-related disability and lower health-related quality of life (HRQOL) [24–26]. Furthermore, chronic pain patients' vulnerability to depression and anxiety has been suggest to be dependent upon predisposed sensitivity, selective attention to threat (hypervigilance) and expectations of further pain [27–30].

In addition to the role of pain catastrophising, several other cognitive factors have been suggested to mediate pain and disability in chronic pain patients. Such factors include outcome expectancy (the belief that a chosen behaviour will lead to the desired outcome), self-efficacy beliefs (the belief that one can execute a desired behaviour) and self-control beliefs (the belief that one has control over events that affect them) [31–33]. Self-efficacy with respect to pain management, pain coping and physical functioning has been demonstrated to mediate associations between pain intensity, pain-related fear, disability and depression in CLBP patients [34,35], as well as the effect of cognitive behavioural therapy for treating chronic pain [36]. Research investigating mediation roles of outcome expectancies and perceived pain control is lacking. Significant associations between outcome expectancies and physical functioning have, however, been demonstrated [16,37,38]. Similarly, perceived lack of control has been associated with psychological distress and depression in chronic pain patients [39,40].

The aims of this study were: (1) to assess the level to which perceived pain and psychological factors explain levels of disability and HRQOL in CLBP patients scheduled for lumbar fusion surgery; and (2) to test the hypothesis that the effects of pain outcome expectancy, functional self-efficacy, pain catastrophising, perceived pain control and ability to decrease pain mediate the influence of chronic pain on mental health and fear of movement/(re)injury, as well as their further influence on functional disability and HRQOL (Fig. 1).

Materials and methods

Study design and participants

This study is a baseline cross-sectional analysis of lumbar fusion surgery patients involved in a prospective randomised clinical trial comparing post-operative physiotherapeutic rehabilitation methods. Patients were selected for lumbar fusion at the Karolinska University Hospital, Huddinge, Sweden. The patients were recruited over a 2-year period between 2005 and 2007.

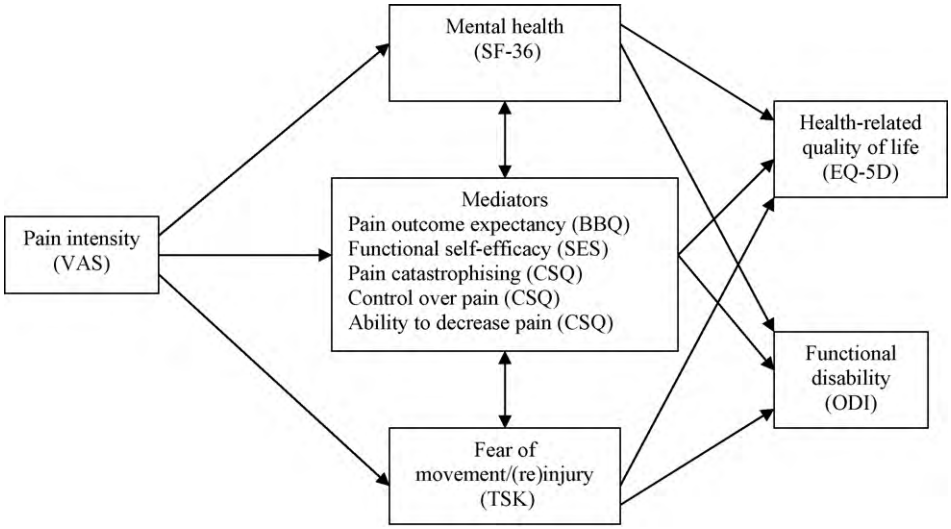

Fig. 1. Hypothesised multiple mediators of the influence of pain intensity on mental health and fear of movement/(re)injury, as well as their further influence on functional disability and health-related quality of life. VAS, visual analogue scale; SF-36, Short Form 36; TSK, Tampa Scale for Kinesiophobia; BBQ, Back Beliefs Questionnaire; SES, Self-efficacy Scale; CSQ, Coping Strategy Questionnaire; ODI, Oswestry Disability Index; EQ-5D, European Quality of Life Questionnaire.