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## Original Research Article

# The relationship between pain catastrophizing, kinesiophobia and subjective knee function during rehabilitation following anterior cruciate ligament reconstruction and meniscectomy: A pilot study

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### ABSTRACT

**Background and objective:** Psychological responses to the initial injury and rehabilitation might be an important additional determinant of functional level outcomes after knee surgery. The objectives of this study were (1) to measure pain catastrophizing and kinesiophobia levels and (2) determine their association with self-reported subjective knee function during rehabilitation, following anterior cruciate ligament reconstruction (ACLR) and meniscectomy.

**Materials and methods:** The study involved 41 participants. The levels of catastrophizing (Pain Catastrophizing Scale [PCS]), kinesiophobia (Tampa Scale of Kinesiophobia [TSK-11]), pain (Numeric Pain Rating Scale [NRS]), and subjective knee function (the Knee Injury and Osteoarthritis Outcome Score [KOOS]) were assessed before and after completion of 14-session rehabilitation program.

**Results:** The mean level of catastrophizing changed from 5.8 (SD, 0.9) to 4.2 (SD, 0.5) during rehabilitation ( $P < 0.05$ ). The mean level of kinesiophobia changed from 22.7 (SD, 0.7) to 18.4 (SD, 0.6) ( $P < 0.05$ ). There was a moderate negative correlation between the PCS and the KOOS pain, function in daily living, knee-related quality of life subscales before and after rehabilitation ( $P < 0.05$ ). There was a moderate negative correlation between the TSK-11 score and the KOOS function in daily living subscale before and after rehabilitation ( $P < 0.05$ ).

**Conclusions:** Pain catastrophizing and kinesiophobia decreased during rehabilitation. A higher pain catastrophizing level correlated with a greater level of knee pain during activities, more difficulties experienced during daily activities before and after rehabilitation.

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A high level of kinesiophobia correlated with more difficulties experienced in daily activities and poorer knee-related quality of life before and after rehabilitation.

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## 1. Introduction

The most frequently injured ligament of the knee is the anterior cruciate ligament [1,2]. The incidence of anterior cruciate ligament reconstruction (ACLR) in the United States increased between 1994 and 2006, reaching rates as high as 35/100,000 people per year, particularly in females as well as those younger than 20 years and those 40 years or older [3]. These figures are consistent with estimates from both New Zealand (2000–2005) and Scandinavia (2004–2007), which have reported ACL injury rates of 32–37/100,000 [4] and 38/100,000 [5] people per year. In Australia (2003–2008), ACL injury rates have been reported to be as high as 52/100,000 people per year [6]. Meniscal injuries are the second most common injury of the knee, with an incidence of 12%–14% and a prevalence of 61 cases per 100,000 persons [7]. A high incidence of meniscal tears occurs with an injury to the anterior cruciate ligament, ranging from 22% to 86% [8,9]. In these cases, the surgery is performed to stabilize the knee joint to prevent further injuries and to allow the patient to return to previous level of activity. After surgery, rehabilitation helps to restore range of motion, strength, movement control, and knee function [10]. During rehabilitation, not only physical but also psychological factors could be an indicator of rehabilitation success.

In recent years, the integration of the biopsychosocial model in rehabilitation has been receiving attention in clinical research. Implementing psychological factors assessment and management in rehabilitation for patients with musculoskeletal injuries/pain can aid in the decision making process and improve outcomes. Therefore, it is important to know which psychological factors are related to the rehabilitation process and can contribute to a good recovery. The psychological influences such as self-efficacy, confidence in function, pain catastrophizing, kinesiophobia or re-injury may modulate individual perception and response to the illness, and may influence functional level after musculoskeletal injury [11–16].

Kinesiophobia causes patients to avoid behaviors that may potentially elicit pain or re-injury. The injury can create feelings of uncertainty and fear of how far the injury will affect future function [17]. This causes the individual's negative attitudes toward the body and participating in daily activities and sports. Pain catastrophizing and fear of pain is a major cause of delayed recovery and discharge after musculoskeletal injury and surgery [18,19]. Pain catastrophizing reflects an exaggerated negative cognitive and affective reaction to an expected or actual pain experience [20]. It is characterized by magnification of the potential negative aspects of pain, an inability to disengage from thoughts about pain, and feeling of helplessness in coping with pain [21,22]. These misinterpretations and pain-related fear often cause avoidance, escape and guarding behaviors [19]. Kinesiophobia is described as an

excessive, irrational and debilitating fear of physical movement and activity resulting from a feeling of vulnerability and susceptibility to painful injury or re-injury [23]. Kinesiophobia is one potential underlying reason why many people do not return to sports after ACL reconstruction [11,12,24].

Examining psychological factors before and after rehabilitation and understanding which psychological impairments contribute most significantly to function following knee surgery will assist in establishing appropriate rehabilitation programs in this patient population. The objectives of this study were (1) to measure pain catastrophizing and kinesiophobia levels and (2) determine their association with self-reported subjective knee function during rehabilitation following anterior cruciate ligament reconstruction and meniscectomy.

## 2. Materials and methods

### 2.1. Sample

This study included 41 participants, 22 following anterior cruciate ligament reconstruction and 19 meniscectomy, who were receiving rehabilitation in the Department of Rehabilitation, Hospital of Lithuanian University of Health Sciences. Rehabilitation was not controlled in this study. Pain catastrophizing and kinesiophobia were not formally addressed during rehabilitation. This was done in order to observe changes in pain catastrophizing and kinesiophobia beliefs during rehabilitation without specific treatment focused on modifying these fear-avoidance beliefs.

The inclusion criteria were as follows: (1) age between 25 and 50 years, (2) unilateral anterior cruciate ligament rupture combined with or without associated meniscus injury, and isolated meniscus injury, (3) asymptomatic contralateral knee, (4) completion of a rehabilitation program, (5) completed pre- and post-assessment. The exclusion criteria were (1) previous anterior cruciate ligament and meniscus injury and/or surgery, (2) bilateral knee injury, (3) collateral ligament and posterior cruciate ligament injuries, (4) participation in other studies.

### 2.2. Measures

Demographic and clinical information were collected. These variables included age (years), sex, time between injury and surgery (months), time between surgery and rehabilitation (days), previous knee injuries or surgeries, concomitant injuries, physical activity level before injury (well-trained and frequently sporting, sporting sometimes, non-sporting).

Knee pain intensity was measured with an 11-point Numeric Pain Rating Scale (NRS) [25]. Pain intensity ratings range from 0 as “no pain” and 10 as “the worst imaginable pain.” A higher score indicates greater pain intensity. The

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