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RISK FACTORS FOR KINESIOPHOBIA AMONG ORTHOPAEDIC PATIENTS - A LITERATURE REVIEW

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ABSTRACT

Introduction: Kinesiophobia, defined as an excessive and unjustified fear of movement resulting from fear of pain or re-injury (Reneman et al., 2003), is a significant factor limiting the effectiveness of rehabilitation after orthopaedic surgery. A growing number of studies indicate that its development is multifactorial and goes beyond purely biomechanical postoperative conditions.

Aim of the study: The aim of this literature review was to identify and analyse the risk factors for kinesiophobia among orthopaedic patients.

Material and methods: A review of observational studies, systematic reviews and meta-analyses published between 2018 and 2025 in PubMed and Google Scholar databases was conducted in the following patient populations: total knee arthroplasty, ACL and MPFL reconstruction, limb fracture fixation, rotator cuff repair, lumbar spinal fusion and articular cartilage damage.

Results: The most commonly identified risk factors were: high postoperative pain intensity, the presence of anxiety and depressive symptoms, low self-efficacy and avoidance strategies for coping with stress. Sociodemographic factors such as older age, poor social support, and lower education level were also significant. High levels of kinesiophobia correlate with more limited range of motion and delayed return to function. Analyses indicate that in some patients, kinesiophobia persists over time, especially in the presence of multimorbidity. Pre-injury level of sports activity, prolonged injury-to-surgery time, gender and abnormal BMI may be additional predictors. A correlation was also found between the type of anesthesia used during surgery and the level of kinesiophobia in the early postoperative period.

Conclusions: Kinesiophobia affects a large group of orthopedic patients suffering from various conditions. It is a phenomenon with biopsychosocial causes. Early identification of patients with risk factors may enable implementation of targeted interventions and improve treatment outcomes.

KEYWORDS

Kinesiophobia, Risk Factors for Kinesiophobia, Fear of Movement, Phobic Movement Disorder, Motor Phobia

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Kinesiophobia is defined as an excessive, irrational fear of physical activity resulting from fear of pain or re-injury (Reneman et al., 2003). People with such predispositions perceive movement as a potential threat and consequently avoid physical activity, which can lead to secondary deterioration in functional efficiency.

This concept derives from the fear-avoidance model developed by Lethem (1983), according to which patients facing pain adopt either a strategy of confrontation or avoidance. The avoidance strategy leads to reduced activity, decreased muscle strength and intensified negative emotions such as anxiety and depression. This model was developed by Vlaeyen et al. (1995), who showed that it is not the intensity of pain itself, but its interpretation as a threat and fear of movement that largely determine functional limitations in patients with chronic low back pain. These results emphasised the importance of psychological factors in the process of perpetuating disability.

In the context of orthopaedics, the problem of kinesiophobia is particularly significant. Physical activity after surgery is a key element of rehabilitation, but preoperative occurrence of pain and fear of damaging the operated structure can contribute to catastrophisation of pain and lead to movement avoidance. Studies of patients after total knee arthroplasty (TKA) have shown that higher levels of kinesiophobia are associated with deterioration in functional outcomes, increase in pain intensity and limited range of motion (Brown et al., 2015; 2020; Filardo et al., 2016). More importantly, kinesiophobia may also affect the return to sports activity - in an analysis after high tibial osteotomy (HTO) surgery, it was the only significant predictor of a reduced return to sport rate, regardless of demographic and clinical factors (Lucidi et al., 2025). This indicates that psychological factors may be as important as biomechanical parameters or even surgical technique.

However, previous studies show that kinesiophobia is neither a homogeneous nor a random phenomenon. Numerous factors predisposing to its development have been identified in populations of patients with musculoskeletal disorders, articular cartilage damage, after total knee arthroplasty (TKA), anterior cruciate ligament (ACL) reconstruction, medial patellofemoral ligament (MPFL) reconstruction, rotator cuff repair, lumbar spinal fusion and limb fracture repair. The most commonly reported factors include high levels of postoperative pain, anxiety and depressive symptoms, low self-efficacy, and maladaptive, avoidance strategies for coping with stress. In studies of patients after ACL reconstruction, fear of re-injury and the level of physical activity before surgery play an essential role (Zheng et al., 2025). In older populations after limb fractures, a link between persistent kinesiophobia and multimorbidity has been found (Jiang et al., 2024), while in studies after rotator cuff repair, diabetes and osteoporosis were identified as one of the risk factors (Cao et al., 2025). Sociodemographic factors such as older age and lower education level were also analysed and in some studies were associated with a higher intensity of the fear of movement (He et al., 2023; Cai et al., 2024)

Despite the growing number of publications on kinesiophobia among patients with injuries and orthopaedic conditions, evidence regarding its risk factors remains fragmented and heterogeneous across different clinical populations. The systematic collection and analysis of these factors may be significant in the process of early identification of high-risk patients and the implementation of targeted therapeutic interventions (e.g., education, psychological support, modification of the rehabilitation plan) before avoidance behaviours, leading to secondary mobility limitations, become entrenched.

The aim of this study is to collect and discuss the risk factors for kinesiophobia among orthopaedic patients that are documented in the literature.

Methodology

A literature review was conducted based on data from PubMed and Google Scholar using the following keywords: kinesiophobia, orthopaedic patients, kinesiophobia risk, kinesiophobia prevalence, fear of movement, phobic movement disorder, motor phobia

Final Search String: ("kinesiophobia" OR "fear of movement" OR "phobic movement disorder" OR "motor phobia") AND ("risk factors" OR "post-surgery recovery" OR "functional outcomes").

The inclusion criteria were RCTs (Randomised Controlled Trials), systematic reviews, meta-analyses, and cross-sectional studies published between 2018 and 2025. The review is based on an analysis of risk factors for kinesiophobia in orthopaedic patients, with particular emphasis on patients undergoing total knee arthroplasty, anterior cruciate ligament reconstruction, rotator cuff repair, medial patellofemoral ligament reconstruction, articular cartilage damage, open reduction internal fixation of limb fractures, and patients with musculoskeletal disorders. Articles not available in English were rejected. The results were analysed and summarised to provide a comprehensive overview of the current state of knowledge.

1. Preoperative factors:

1.1 Self-efficacy

Self-efficacy is defined as an individual's belief in their own ability to successfully perform a specific task (Bandura, 1977), including coping with pain, functional limitations, and difficulties arising during treatment and rehabilitation. In the context of orthopaedic patients, it refers to a belief in the possibility of safely undertaking physical activity, gradually increasing the load, following therapeutic recommendations, returning to daily activities and, if it is possible, to the level of physical activity prior to the injury or the onset of the disease.

In a study of 160 patients on the prevalence of kinesiophobia after total knee arthroplasty by Cai et al. (2018), self-efficacy was assessed using the Chinese version of the Knee Self-Efficacy Scale (K-SES). This tool comprises 22 items related to functioning in daily activities, sports activities, performing functional tasks and anticipated future physical activity. Responses are given on an 11-point Likert scale (0–10), where a higher average score reflects more positive beliefs about one's own mobility. The authors showed that lower self-efficacy was significantly associated with a higher likelihood of kinesiophobia after surgery ($p < 0.001$, $OR = 0.76$).

This relationship was also confirmed in a meta-analysis that consisted of 11 studies of a population of patients after TKA (a total of 4,039 people), in which low self-efficacy was one of the significant factors associated with an increased risk of developing kinesiophobia (Du et al., 2025). These results indicate that patients' beliefs about their own functional abilities are an important psychological factor influencing the process of rehabilitation and postoperative adaptation.

1.2 Level of education

In the literature, the patient's level of education appears to be a significant risk factor for the development of kinesiophobia among orthopaedic patients. The mentioned earlier meta-analysis of studies on patients after total knee arthroplasty showed that a lower level of education was associated with a higher risk of kinesiophobia ($p < 0.01$, OR = 1.73), regardless of other clinical and psychosocial factors (Du et al., 2025). The study by Cai et al. (2018) involving patients after TKA also confirmed that patients with below-average education more often presented high scores on the Tampa Scale of Kinesiophobia ($p = 0.015$, OR = 2.31). Furthermore, observations in a population of patients after arthroscopic shoulder surgery (Cao et al., 2025) indicate that people with primary education or lower are more likely to belong to the group with severe fear of movement ($p = 0.08$, OR = 2.64), which may be a result of limited knowledge about the treatment and rehabilitation process.

1.3 Age

The patient's age is one of the most frequently analysed sociodemographic factors in studies on kinesiophobia. The current state of knowledge suggests that older age may be associated with higher levels of fear of movement in the postoperative period.

In a cross-sectional study by Cai et al. (2018), older patients after knee replacement surgery were more likely to obtain significantly higher scores on the Tampa Scale of Kinesiophobia (TSK). Advanced age remained a statistically significant factor in logistic regression analysis ($p = 0.011$, OR = 1.08).

Similar observations were reported by He et al. (2023), who also found a significant association between older age and higher levels of kinesiophobia among patients after knee arthroplasty. However, although age was significantly correlated with kinesiophobia in the initial analyses, this relationship did not remain statistically significant in the multivariate model. This finding suggests that the observed association may be partially explained by the coexistence of other clinical or psychosocial variables that exert a stronger influence on the level of kinesiophobia.

The authors interpret this tendency by indicating that older individuals may experience greater uncertainty regarding the stability of the operated joint, fear of falling or re-injury, and lower confidence in the rehabilitation process. Additionally, chronic conditions and reduced physical activity are more common in this age group, which may intensify the perception of movement as a potential threat. These observations are consistent with the biopsychosocial model of kinesiophobia, in which age may appear as a modifying factor influencing both pain perception and emotional responses during recovery. However, due to the observational design of the studies, these findings should not be interpreted as evidence of a causal relationship.

1.4 Coping styles

Research indicates that coping styles are important predictors of kinesiophobia after orthopaedic surgery. In the large cross-sectional study cited above, Cai et al. (2018) included the Simplified Coping Style Questionnaire (SCSQ) as one of the tools for assessing individual strategies for coping with pain, stress and rehabilitation after total knee arthroplasty. The results showed that negative coping styles - including passive, avoidant or maladaptive strategies developed to manage pain and difficulties - were significantly associated with a higher risk of postoperative kinesiophobia, regardless of other clinical variables such as age, level of education or pain intensity.

This finding is also confirmed by data from the latest meta-analysis of studies on kinesiophobia after TKA, in which negative coping strategies increased the incidence of kinesiophobia (OR = 1.34, 95% CI: 1.165-1.523), indicating their clinical significance in the recovery process (Du et al., 2025).

Coping style influences how patients interpret pain signals and rehabilitation difficulties - avoidance and passive strategies can intensify the perception of movement-related threats and reinforce avoidance behaviours consistent with the fear-avoidance model. This emphasises that the assessment of coping styles in orthopaedic patients should be a part of early screening for kinesiophobia risk, which would allow to implement targeted psychological or rehabilitation interventions as a prevention of this phenomenon.

1.5 Comorbidities

In a study by Jiang et al. (2024), involving 150 patients after surgical treatment of limb fractures, the number and presence of comorbidities were identified as a significant factor associated with the persistence of high levels of kinesiophobia during rehabilitation (OR = 1.89, $p = 0.003$, 95% CI: 1.24-2.87). Patients with a greater number of chronic conditions were more likely to belong to the group with a persistent high level of fear of movement. This relationship persisted even after taking into account other clinical and psychological variables.

The possible mechanisms for this phenomenon are multifactorial. Firstly, comorbidities such as cardiovascular disease, diabetes, osteoporosis or chronic pain syndromes can reduce overall physical performance and increase fatigue, which contributes to the perception of exercise as excessive or potentially dangerous (Fortin et al., 2006). Secondly, patients with multiple diseases are more likely to experience chronic pain, which can exacerbate the fear-avoidance mechanism by reinforcing the belief that movement leads to a deterioration in health (Vlaeyen, 2000). Thirdly, the presence of multiple conditions increases the overall feeling of frailty, which can exacerbate fears of falling, further injury or complications (Fried et al., 2001).

It is also important to note that multimorbidity is often associated with greater psychological burden, including higher levels of anxiety and depressive symptoms (Read et al., 2017), which, as shown in the same study, are independent predictors of kinesiophobia. As a result, comorbidities can have both a direct effect (by limiting physical activity) and an indirect effect (by modulating emotional state and perception of risk).

It is worth noting that the significance of comorbidities as a risk factor for kinesiophobia has also been confirmed in studies of patients after arthroscopic rotator cuff repair (Cao et al., 2025). In the analysis of this population (245 patients, mean age (58.08 ± 8.57) years), it was shown that the presence of selected chronic conditions, in particular diabetes and osteoporosis, was significantly associated with higher levels of kinesiophobia as assessed using the Tampa Scale of Kinesiophobia (OR = 2.18, $p = 0.019$, 95% CI: 1.14-4.17). Patients with diabetes may experience greater pain, slower tissue healing and fears of complications, which contributes to avoidance behaviours (Boulton et al., 2005; Jeffcoate et al., 2003). Osteoporosis, in turn, may increase fear of re-injury or damage to bone structures during rehabilitation (Giangregorio et al., 2014). These results indicate that not only the number of comorbidities, but also their nature (especially conditions affecting the healing process and the integrity of the musculoskeletal system) can significantly modulate the risk of developing kinesiophobia after orthopaedic surgery.

From a clinical point of view, these results indicate that patients with multiple comorbidities are a particular risk group for persistent kinesiophobia during orthopaedic rehabilitation. In this population, it seems reasonable to implement a more individualised rehabilitation approach, taking into account both somatic aspects and psychological support.

1.6 Gender

In the studies analysed in the review by Zheng et al. (2025), which included 16 publications with a total of 1,725 patients after anterior cruciate ligament (ACL) reconstruction, gender was a frequently analysed variable, although the results were not entirely clear. Some studies indicated higher levels of kinesiophobia in women after ACL reconstruction. Possible explanations include differences in pain perception, a greater tendency to catastrophise, and different strategies for coping with post-traumatic stress (Keogh et al., 2006). Others, on the other hand, show a higher prevalence of this phenomenon among men (Rips et al., 2024), suggesting that the influence of gender may be moderated by other factors, which may include, for example, the level of sporting activity or psychosocial support. Gender may be a factor that potentially modifies the risk of kinesiophobia, but its significance is not as clear-cut as in the case of pain or fear of re-injury.

1.7 Level of physical activity

The level of sporting activity prior to injury was identified in the above-mentioned review by Zheng et al. (2025) as an important factor associated with the development of kinesiophobia after ACL injury. Patients with a high level of sporting involvement (especially competitive athletes) were more likely to experience increased fear of re-injury, which resulted in higher Tampa Scale of Kinesiophobia scores and delayed return to sport. In this group, the consequences of re-injury may end a career or cause a decline in the level of competition, which increases the perception of risk. In contrast, individuals with lower levels of activity prior to injury may experience less pressure to fully return to physical performance, but at the same time it may lower their motivation for rehabilitation. This indicates that both high and low levels of preoperative activity can modulate the risk of kinesiophobia, despite the fact that the psychological mechanisms in both groups are different.

A relationship between the level of physical activity prior to surgery and the level of kinesiophobia was also observed among patients with articular cartilage damage (DiBartola et al., 2021). The authors analysed 210 patients treated with various surgical methods (56% chondroplasty, 36% microfracture, 22% autologous chondrocyte implantation). It was observed that lower levels of physical activity were significantly associated with poorer psychological health, including higher severity of depressive symptoms, greater pain catastrophising and higher levels of kinesiophobia. Patients who were less physically active scored higher on the Tampa Scale of Kinesiophobia, indicating a stronger fear of movement (OR = 1.90, 95% CI: 1.10-3.30, $p < 0.05$).

Importantly, this relationship was correlational - the study did not allow for a clear determination of causality. It is possible that both, low activity promotes increased fear of movement, and that established kinesiophobia leads to reduced physical activity. However, the authors emphasise that lower activity levels may be an indicator of a risk group for impaired psychological functioning prior to surgery.

1.8 Prolonged injury-to-surgery time

In a study by Theunissen et al. (2020) conducted in a population of patients after anterior cruciate ligament reconstruction (ACLR), the predictive values of several measurable variables before surgery were analysed in relation to the level of kinesiophobia three months after surgery. Potential predictors included age, gender, body mass index (BMI), injury-to-surgery time (ITST), preoperative pain level, and knee function assessments (KOOS and IKDC-2000). In the multivariate linear regression model, all four factors remained significantly associated with higher levels of kinesiophobia in the early postoperative period, but among them, the prolonged time between injury and ACL reconstruction was the strongest predictor - its regression coefficient indicated that each additional 30 days of delay was associated with a significant increase in the Tampa Scale of Kinesiophobia (TSK-17) score in the third month of rehabilitation ($p < 0.01$).

Similar results were obtained in a study by Lips et al. from 2024, which analysed 140 cases of patients after anterior cruciate ligament reconstruction 5.5 (± 1.25) years after surgery. It was observed that patients who developed kinesiophobia had a significantly longer injury-to-surgery time than patients without kinesiophobia ($p = 0.005$), with this relationship occurring only among women.

Although the mechanisms of this relationship are not yet fully understood, the authors suggest that patients who wait longer for surgery experience a longer period of knee instability and fears related to functional uncertainty and pain, which may contribute to the perpetuation of negative beliefs about movement and increased fear of movement, which is consistent with the fear-avoidance model.

1.9 Abnormal BMI

In a study by Huang et al. (2025) on kinesiophobia after lumbar spine surgery, BMI was analysed as one of the demographic variables associated with different profiles of fear of movement. The authors divided patients into three groups with varying levels of kinesiophobia (low, moderate and high) and compared clinical variables between them. It was shown that the patients with normal BMI were more likely to belong to the low level of fear of movement group, while the "abnormal BMI" was associated with a higher likelihood of belonging to the moderate level of kinesiophobia group. The study did not distinguish between underweight and overweight/obesity, but referred to values deviating from the normal range for adults. The results suggest that both too low and too high body mass index may contribute to the severity of movement anxiety. The mechanism of this relationship may be related to poorer physical activity, greater strain on the musculoskeletal system, or reduced functional confidence in people with abnormal body weight (Wearing et al., 2006). However, it should be emphasised that this relationship was observational and requires further study to determine its causal direction.

Although further evidence of the relationship between BMI and kinesiophobia after orthopaedic surgery is limited, there are clinical studies indicating that abnormal body weight (especially overweight and obesity) is associated with higher levels of fear of movement in populations with musculoskeletal disorders. In a multicentre study of 424 patients, higher BMI values were independently associated with a greater risk of kinesiophobia (OR = 3.98; 95% CI: 2.17–7.29), alongside factors such as pain, physical inactivity and anxiety symptoms (Mekonnen et al., 2025).

Furthermore, an analysis of changes in kinesiophobia intensity over time among patients after TKA showed that the level of the fear of movement in patients with normal body weight decreased faster than in patients with above-normal BMI, suggesting that body weight may modulate the course of postoperative anxiety (Yan et al., 2023).

2. Perioperative factors – the role of sedation type

An important, though rarely analysed, perioperative factor that may influence the development of kinesiophobia is the type of used intraoperative sedation. Degirmenci et al. (2020) conducted a randomised study involving 60 patients undergoing total knee arthroplasty (TKA), in which regional anaesthesia combined with deep sedation (loss of consciousness) was compared with regional anaesthesia and light sedation (consciousness maintained during surgery). The authors showed that in the group of patients who remained conscious during surgery, the incidence of kinesiophobia in the early postoperative period was significantly higher (66.7%) compared to the preoperative period (30%; $p = 0.003$). No significant increase in the incidence of kinesiophobia was observed in the group with deep sedation. In addition, patients with higher scores on the Tampa Scale of Kinesiophobia ($TSK \geq 40$) performed worse on functional tests (2-minute walk test, Timed Up and Go), had a smaller range of motion in the knee joint and higher pain intensity on the VAS scale. The authors suggest that preserved intraoperative awareness, associated with the perception of auditory and vibratory stimuli and the surgical context, may intensify anxiety reactions and promote the development of movement avoidance mechanisms in accordance with the fear-avoidance model. However, it should be emphasised that the study involved a small group of patients and concerned only the early postoperative period, which limits the possibility of generalising the results to the long-term effects of treatment.

3. Postoperative factors

3.1 Pain

In a study by Lei et al. (2023) involving patients after total knee arthroplasty, the intensity of postoperative pain (assessed using the VAS/NRS scale) was significantly higher in patients with kinesiophobia (OR = 1.29, 95% CI: 1.16-1.44, $p < 0.001$). Postoperative pain intensity was an independent risk factor for the development of kinesiophobia in patients after TKA, and higher VAS values increased the likelihood of avoidance behaviours. More severe pain after surgery can lead to a negative interpretation of movement as a threat. Patients start to avoid activity in order not to provoke pain. An avoidance mechanism, consistent with the **fear-avoidance** model, becomes established.

Similar results were obtained in the previously cited studies on patients after anterior cruciate ligament reconstruction ($p < 0.05$; Zheng et al., 2025), surgical treatment of limb fractures (OR = 1.41, 95% CI: 1.18-1.69, $p < 0.001$; Jiang et al., 2024) and arthroscopic rotator cuff repair (OR = 1.34, 95% CI: 1.12-1.60, $p = 0.01$; Cao et al., 2025). The severity of postoperative pain is proved to be the most consistent and strongly documented predictor of kinesiophobia among all risk factors analysed in this study.

3.2 Joint function

A review by Zheng et al. (2025) showed that higher levels of kinesiophobia after anterior cruciate ligament reconstruction were significantly associated with lower scores on functional scales such as IKDC, KOOS and Lysholm. These scales include the assessment of subjectively reported symptoms (including stiffness, swelling, limited range of motion, limping, feeling of joint instability, pain, joint locking), level of performance in activities of daily living (climbing stairs, squatting, sitting with bent knees) and sports activities, and quality of life related to knee joint dysfunction. This means that patients with poorer functional scores, reflecting more severe symptoms and mobility limitations, also presented a higher level of fear of movement as measured by the TSK scale. However, it should be emphasised that this relationship refers to the global assessment of function and symptoms included in these tools, rather than to individual, objectively measured clinical parameters.

The relationship between the severity of kinesiophobia and poorer functional outcomes is also confirmed by studies conducted in a population of patients after medial patellofemoral ligament (MPFL) reconstruction (Ayas et al., 2024). Clinical analyses have shown a significant negative correlation between scores on the Tampa Scale of Kinesiophobia (TSK) and results obtained in tools assessing knee joint function, such as the Kujala or Lysholm scales. Patients with higher levels of fear of movement achieved lower functional scores and performed worse in single-leg test and balance tests.

However, this relationship may be bidirectional: reduced function of joint may contribute to increased fear of movement, but established kinesiophobia may also lead to avoidance of activity and secondary deterioration of function.

3.3 Social support

Social support is an important element of the biopsychosocial model of recovery after total knee arthroplasty, increasing the sense of security, motivation for rehabilitation and willingness to engage in activity despite pain (Cai et al., 2018). The available literature indicates that a low level of social support may predestinate to the development of kinesiophobia in the postoperative period. In a cross-sectional study by Cai et al. (2018), the level of social support was assessed using the Social Support Rating Scale (SSRS) (Xiao, 1999). The authors showed that lower levels of support - both objective (actual help from family and friends) and subjective (perceived emotional support) - were significantly associated with higher levels of kinesiophobia as measured by the TSK scale. This relationship was confirmed in a meta-analysis of 4,039 patients after TKA, where low levels of social support were one of the significant factors associated with an increased risk of the fear of movement (OR = 1.681, 95% CI: 1.000-2.361) (Du et al., 2025).

More recent publications, which also analysed orthopaedic conditions other than TKA, confirmed that patients with limited support from their family and environment are more likely to exhibit increased avoidance behaviours. This relationship can also be observed, among others, in patients after surgical fixation of limb fractures (Jiang et al., 2024) and hip fractures (Xu et al., 2025).

From the perspective of psychological mechanisms, social support can modulate the anxiety response by reducing stress, strengthening self-efficacy and providing feedback that normalises the experience of postoperative pain (Li et al., 2023). This mechanism fits into the fear-avoidance model proposed by Lethem (1983), developed later by Vlaeyen et al. (1995), according to which the interpretation of pain as a threat is a key element leading to movement avoidance. Lack of support may contribute to catastrophising pain and intensifying the perception of threat, which increases the likelihood of activating the avoidance mechanism and perpetuating kinesiophobia.

However, it should be emphasised that most studies analysing the role of social support are observational, which limits the possibility of establishing a clear cause-and-effect relationship. Nevertheless, the consistency of the results indicates that low levels of social support may be a significant, modifiable risk factor.

3.4 Severity of anxiety and depression

In a study by Xu and Chen (2025) analysing 269 patients who underwent surgical repair of hip fractures, anxiety and depressive symptoms were identified as significant factors associated with the occurrence of kinesiophobia. Emotional state was assessed using standardised psychometric tools (Hospital Anxiety and Depression Scale, HADS), and higher scores indicating severe psychological symptoms correlated significantly with higher Tampa Scale of Kinesiophobia (TSK) scores. In the multivariate analysis, the presence of anxiety symptoms (OR = 1.52, 95% CI: 1.29-1.80, $p < 0.001$) and depressive symptoms (OR = 1.47, 95% CI: 1.23-1.75, $p < 0.001$) remained an independent predictor of kinesiophobia, even after taking into account other clinical variables such as pain intensity and joint function. The authors emphasise that anxiety can intensify the interpretation of movement as potentially dangerous, increasing vigilance to pain signals and promoting avoidance behaviours. In turn, depressive symptoms may reduce motivation to actively participate in rehabilitation and decrease self-efficacy, which in turn perpetuates physical activity limitations. This mechanism is consistent with the fear-avoidance model, in which negative beliefs and emotional reactions to pain lead to avoidance of movement and, consequently, to functional deterioration. These results suggest that early identification and treatment of mood disorders in the postoperative period may be an important element in the prevention of kinesiophobia in orthopaedic patients.

Limitations

Most of the studies included were observational, mainly cross-sectional, which makes it impossible to clearly determine the cause-and-effect relationship between the analysed factors and the development of kinesiophobia. In many cases, a bidirectional relationship is possible.

The studies differed in terms of population (TKA, ACLR, MPFLR, limb fractures, rotator cuff repair, articular cartilage damage, lumbar spinal fusion), timing of postoperative assessment, and psychometric tools used. Although the Tampa Scale of Kinesiophobia (TSK) was most commonly used, different scales were also used to assess pain, self-efficacy, coping styles and social support, which limits the full comparability of the results.

Another limitation is methodological heterogeneity - different inclusion criteria, varying sample sizes and different statistical analysis models may affect the strength of the reported relationships. Some studies included ethnically and culturally homogeneous populations, which limits the possibility of generalising the results to other patient groups.

In addition, many publications lacked long-term follow-up, making it difficult to assess the persistence of kinesiophobia and its impact on long-term functional outcomes. Another limitation is that some factors, such as coping style and level of education, were assessed using self-report questionnaires, which may be associated with a risk of response bias.

Conclusions

Based on the literature review, it can be concluded that kinesiophobia is a common and clinically significant phenomenon among orthopaedic patients, with particular emphasis on patients after orthopaedic procedures such as total knee arthroplasty, anterior cruciate ligament reconstruction, medial patellofemoral ligament reconstruction, limb fracture fixation, lumbar spinal fusion, articular cartilage damage repair or rotator cuff repair. Its development is multifactorial and fits into a biopsychosocial model in which somatic, psychological, and sociodemographic factors interact with each other. The most strongly documented risk factors are: high postoperative pain intensity, presence of anxiety and depressive symptoms, low self-efficacy, and maladaptive, avoidant styles of coping with stress. Other significant factors include older age, lower level of education, the level of sporting activity prior to surgery/injury and the presence of comorbidities, including diabetes and osteoporosis.

Available studies also indicate that kinesiophobia is associated with poorer functional outcomes, such as limited range of motion, delayed return to activity, and persistent performance deficits. In some patients, fear of movement may become entrenched over time, highlighting the importance of early identification. Therefore, the assessment of kinesiophobia risk factors should be a part of comprehensive post-operative care. Early implementation of targeted interventions, including optimisation of pain management, psychological support, and modification of maladaptive coping strategies, may contribute to improved rehabilitation effectiveness and better orthopaedic treatment outcomes.

Disclosures

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