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Psychology in orthopedics and traumatology: an instructional review

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- Mental health is important as a predictor of outcomes after orthopedic treatment.
- Psychological parameters (e.g. expectations, coping strategies, personality) are as important as biological and mechanical factors in the severity of musculoskeletal complaints and treatment results.
- Orthopedic surgeons should not only treat physical conditions but also address psychosocial factors. If necessary, they should refer to clinical psychologists.
- Multidisciplinary approach, patient-oriented treatment, (psycho)education, emotional support, and teaching coping strategies are elements of psychosocial attention within orthopedics and traumatology.

Keywords

- psychology
- quality of life
- orthopedics
- pain
- expectation
- anxiety
- depression

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Introduction

An orthopedic surgeon dealing with psychology may sound strange to many people, including doctors and patients. For most, the harsh world of bones and heavy metal prostheses cannot be reconciled with the soft world of thinking about feelings and their expression, reflection, and the psychologist's easy listening. Combining orthopedics and psychology may seem like a paradox. It is something that does not seem right, but in fact, it is right. Not being able to exercise due to knee or hip problems, not being able to walk further than the corner of the street due to back problems, or not being able to hold a grandchild due to problems of the wrist or shoulder is not life-threatening, such as other (chronic) diseases (e.g. cardiovascular diseases). Patients will not die from hip wear and tear, a sports injury to the knee or pain in the shoulder, but orthopedic problems will prevent patients from participating in a variety of daily activities, leading to a loss of quality of life (QOL).

The separation between the mind and mental health (psychological aspects), and the body and physical health (functional aspects) is very persistent in medicine, especially in orthopedics and trauma surgery. This separation is not as sharp as it is often considered. The concept of interaction between mind and body has been known for a long time. A clear burden of proof is beginning to emerge in the scientific field that shows that mental and social health may have as much influence on the intensity of the patient's symptoms and his or her ability to participate in society as the pathophysiology of the orthopedic or traumatic problem itself. However, the focus within orthopedics and trauma surgery often remains on biomedical and technical aspects and on the achieved function of a joint or the survival of a prosthesis, while a biopsychosocial approach addresses the needs of patients better and approaches them more holistically.

The purpose of this instructional review is to alert orthopedic (trauma) surgeons to the interplay between physical and mental health and discuss various psychological factors and mechanisms that are important to consider when treating patients with locomotor problems. Although the influence of social factors (e.g. demographic factors, housing situation, accessibility to health care) should also not be underestimated, it is not a topic of this review. Before the interplay is discussed, this review begins with a description of different outcome measures. This paper ends with a brief overview of suggestions about how to address psychological factors in an orthopedic setting.

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Functional status, health status, and quality of life

In orthopedics and trauma surgery, and in actuality in most fields of medicine, the impact of disease and outcome of treatment was traditionally determined by discussing the physical domain, such as healing of a fracture in correct alignment, survival of a prosthesis of a patient, or general and foremost objectively measured physical functioning using clinician-based measures such as the number of degrees of mobility of a shoulder, centimeters shortening of a leg, and millimeters of displacement in a fracture. This focus on functional status (FS) is nowadays augmented by patients' self-reported (i.e. subjective) measures about their health status (HS). The possibility of climbing stairs in case of knee or hip problems may be considered as a measure of HS because it is the opinion of the patient about their capability. HS does not only include patients' judgment of the physical domain, but it is also multidimensional in assessing at least three domains: physical, psychological, and social, parallel to the World Health Organization definition of health (1948) as 'a state of complete physical, mental and social well-being, and not merely the absence of disease') (1). Discussing mainly FS physicians thus ignores subjective mental and social well-being while treating musculoskeletal problems. The orthopedic world usually thus does not adhere to this definition of health. The ability to adapt and self-manage in the face of physical, emotional, and social challenges is therefore an important issue not only in measuring HS but also in measuring QOL. QOL can be health-related QOL (HRQOL) or generic QOL. Generic QOL is broader than HRQOL and includes the patient's assessment of their own functioning in various areas: physical health, psychological well-being, social relationships, and environment (2). HRQOL is primarily concerned with those factors that fall within the spheres of influence of healthcare providers and healthcare systems. Both HS and HRQOL are linked to health, while QOL is broader than health. QOL encompasses the patient's subjective evaluations of their own well-being. The important role of managing or adapting to the situation of lowered FS is also illustrated by the fact that not being able to manage or adapt to situations, in general, results in lower QOL, also in absence of disease (3).

At the same time, mental health will also affect QOL by itself and it can influence the severity of orthopedic and trauma problems and their outcome (4). For example, symptoms of musculoskeletal problems are more common in times of stress or other psychosocial problems. Why does one patient hardly suffer from a knee with a Kellgren–Lawrence grade 2 osteoarthritis while the other is significantly disabled? Why is one patient satisfied with the result after an artificial hip while the other experiences many complaints with an identical X-ray? It appears that there is a discrepancy between objective and subjective measures (5), as well as a discrepancy between physicians and patients concerning pain and disability perception, expectations (6), goals (7), and outcomes.

To measure QOL, patient-reported outcome measures (PROMs) are increasingly being used because they can measure how a patient feels he/she is doing in different ways. These subjective outcomes, indicated by the patient, provide other insights than the more clinical (i.e. objective) outcomes on FS or HS. Nowadays, both objective and subjective outcomes are important. Outcomes can be obtained through interviews, self-report questionnaires (paper and pencil or using apps and websites), and diaries. PROMs can be divided into generic, disease-specific, or condition-specific measures (8). Generic measures can be used to assess outcomes in healthy persons as well as patients with any disease or condition, while disease-specific measures describe the severity, symptoms, or functional limitations related to a specific disease (seen from the patients' perspective).

In order to be more broadly informed about the patient and their situation as an orthopedic surgeon, it is important to be aware of various psychological and social factors. These can be of great importance in experiencing complaints from the locomotor system and may be important predictive factors for the result following their treatment. An elderly patient who is physically active playing golf or tennis may experience a lower QOL if there is a tear of the shoulder tendons from wear and tear than a patient who is less active and, for example, has reading as a hobby. However, if this elderly patient can manage their disappointment in not being able to play tennis anymore, the situation changes again. It is a minor problem not being able to climb stairs if one lives on the ground floor unless one needs this ability to work. QOL can vary from person to person and depends on cultural, social, economic, and personal factors (9). It is even possible that two patients with an equal score on FS and/or HS can differ on (HR)QOL since the impact of their FS and HS may be different due to differences in personal and social circumstances. Management of the orthopedic problem should be colored by the inclusion of these factors.

Psychological factors

Prediction of postoperative pain is an important issue in orthopedic practice. Having a higher preoperative pain score and using morphine before total shoulder arthroplasty is predictive for acute postoperative pain, but also in the longer term the relation with complications and/or worse outcome is also reported for osteoarthritis of knees (10), hips (11), and the CMC1 joint (12). Also a variety of mental factors, such as anxiety (13),

depression (13), pain catastrophizing (14), personality (e.g. emotional stability/neuroticism) (15, 16, 17), coping mechanisms (18, 19, 20), resilience (21), expectations (22, 23, 24), self-efficacy (25), and illness perceptions (26), are mentioned to influence symptoms before and after surgery. Since these factors can overlap, coincide, oppose, or enhance each other, we choose the most mentioned in the literature to discuss in this paper and we do not claim to be complete in reviewing the existing literature. Using the 3P-disease model (predisposing, precipitating, or perpetuating factors) (27) factors such as personality have the predisposition to generate certain behavior (thoughts, coping mechanism, psychopathology) which can act as a precipitating and/or perpetuating factor in musculoskeletal problems.

Personality

Already in 1925, Wile (28) wrote in his paper called 'The relation between orthopedics and personality': 'Personality consists of an individual's collective attributes or qualities. It is the sum total of his traits and, at the same time, the main spring of his being and activities. It comprises his consciousness, his character and his will, and is manifest in his conduct and behavior' (p.1623). Today, personality is described as 'the set of psychological traits and mechanisms within the individual that are organized and relatively enduring and that influence his or her interactions with, and adaptations to, the environment (including the intrapsychic, physical, and social environment' (p. 12) (29). There are different taxonomies of personality, for instance, Eysenck's hierarchical model of personality or the Five-Factor model of Costa & McCrae (29). Although we will not discuss these models, we would like to discuss a trait (i.e. emotional stability) to show the importance of personality in the medical field. Emotional stability refers to how persons cope with life stressors, like disease or physical symptoms. On a continuum, persons who score high tend to be calm, relaxed, and stable, while persons who score low tend to be moody, anxious, and insecure (30). Persons who are instable (i.e. score high on neuroticism) report poor health behaviors (e.g. smoking) and poorer physical health (17). Personality and behavior are related to each other. They can affect function in hip or knee arthrosis and outcomes of arthroplasty, although mostly not independent of other factors such as comorbidity. The way people react to daily stressful events with negative affect may cause poor health compared to those reacting with positive affect (31). Personality influences the interaction between osteoarthritis of the hip and knee, function, and health perception (32). Following the 3P-disease model, neuroticism is best conceived of as a vulnerability factor; it lowers the threshold at which pain is perceived as threatening, and at which catastrophic thoughts about pain emerge (15). In contrast, it also has a perpetuating role when rehabilitating orthopedic surgery. One might say that certain personality characteristics predispose to generate certain behavior that can act as a protective or perpetuating factor. Although often mentioned, there is no such personality as the orthopedic patient personality (33).

Mood

Anxiety and depression are the two most mentioned factors that affect how people experience orthopedic problems and their outcomes of treatments. For example, the least improvement in pain was characterized by a combination of high levels of both anxiety and depressive symptoms, when studying the effect of time on pain, function, and stiffness between subgroups of hip and knee patients (34). Initial patient self-reported anxiety was negatively associated with patient-reported physical function at the final follow-up in a broad cohort of patients with lower extremity injuries undergoing surgery (35). Anxious and depressed patients also reported to have higher preoperative expectations of foot surgery. Although these patients had similar rates of fulfillment of expectations compared with non-depressive and -anxious patients, they had markedly lower outcome scores for domains of symptoms, activity, and QOL. They also perceived less improvement and were more often dissatisfied with their outcomes (13). Not only the result of treatment is influenced by the mental state of a patient but also the initial presentation is influenced by depression and pain catastrophizing (36). Complex associations exist between neuroticism, current depression, and tendencies toward catastrophic and anxiety-provoking appraisals of pain intricate relation is present between trait anxiety, depression, and catastrophizing of pain (16, 37).

Both anxiety and depression can also lead to decreased sleep, decreased appetite, decreased physical activity, and loss of stamina, which can affect recovery time after orthopedic surgery (38). In addition, anxiety can hinder a patient's ability to work and function in everyday life, which can affect the QOL. People with depression may experience more pain and fatigue and are less inclined to actively participate in their recovery which can affect the outcomes of an operation. For those with osteoarthritis of hip or knee being active, building stamina and stability is the conservative treatment modality. But not all patients are suited for this conservative treatment in which they actively participate and wish for surgical treatment instead (after which again active participation in rehabilitation is expected). The role of anxiety and depression, but also having negative, unhelpful, or maladaptive thoughts can be seen as precipitating or perpetuating psychological factors in the maintenance and treatment of musculoskeletal disorders (39).

Pain catastrophizing

Nowadays, it is thought that catastrophizing is a multidimensional construct that includes rumination ('I can't seem to keep it out of my mind'), magnification ('I keep thinking of other painful events'), and helplessness ('It's terrible and I think it is never going to any get better') (40, 41). Pain catastrophizing is a key concept in the theoretical fear-avoidance model (42), which focuses on explaining the development of chronic pain (43). This model contains two pathways: persons who after injury experience pain, catastrophize, develop a pain-related fear, avoid pain, and will disuse and become inactive. According to the model, this group of patients will be stuck in a negative cycle, while those who have no pain-related fear will confront pain and will recover. Pain catastrophizing has been studied in the past 20 years and it turned out to be a consistent predictor of pain (experience) (41) in various orthopedic populations. Pain catastrophizing is considered an important predictor of the result of total knee arthroplasty due to its perpetuating action on pain processing next to poor mental health in general (44, 45).

Resilience

When given a new diagnosis, some patients are only mildly distressed, while others react severely. Why some patients adapt more better than others may be explained by a concept, called resilience. Resilience can be viewed as a trait, process, or outcome (46). As a trait, resilience refers to a characteristic of personality, which is heritable and relatively stable across time (47). The American Psychological Association defines resilience as 'the process and outcome of successfully adapting to difficult or challenging life experiences, especially through mental, emotional, and behavioral flexibility and adjustment to external and internal demands' (48). Debate is still going on whether it is a personality trait and thus relatively untrainable or a skill that can be developed by specific training (49). Nevertheless, research shows that having a high level of resilience is beneficial, as it allows an individual to manage difficult circumstances and accept situations that cannot be changed (50). A person with a high degree of resilience can recover faster from injury or surgery and cope better with the limitations that result than someone with a lower degree of resilience. Patients with higher levels of resilience are less likely to use opioids before and after total joint arthroplasty (51). In orthopedic patients, the role of resilience is mostly affected by other psychologic variables, such as neuroticism, self-efficacy, anxiety, and depression (21). Having a high resilience may act as a moderating factor for personality progressing into maladaptive behavior. In the 3P-disease model, it can thus be classified as the fourth P, namely protective.

Coping mechanisms

A coping mechanism is any conscious or nonconscious adjustment or adaptation that decreases tension and anxiety in a stressful experience or situation (52). It is known that the way people deal with stress and pain affects their physical and mental health, including orthopedic complaints (53). There are different ways to categorize coping strategies: (i) avoidant or approach coping strategies or (ii) problem-focused or emotion-focused strategies (54).

When persons use avoidance-oriented coping, they attempt to push away thoughts and feelings that are linked to the stressor, they may downplay the seriousness of the stressor or deny its existence. In the orthopedic setting, this may result in a denial of physical problems and asking for medical advice in a late stage, when surgery is unavoidable or when secondary damage to a joint necessitates more extensive surgical procedures, resulting in a higher risk of complications and usually also a worse outcome. Patients may also use distraction in order not to think about their issues (55). Approach-oriented coping includes efforts to solve the problem or ask for (professional) help. In an orthopedic setting, patients address their problems and try to find solutions for them. Persons with this coping style may actively accept or find benefit in the stressful experience. Which coping strategy is successful also depends on the situation. In general, an avoidant coping style is believed to be an effective short-term strategy, though not an effective long-term, response to stress, while an approach-oriented coping style is effective, although distress will be present as well (54).

Persons who used a problem-focused coping style attempt to change the situation by doing something constructive about the challenging situation (e.g. ask an expert for advice), while persons who use an emotion-focused coping try to regulate their emotions that are associated with the stressor, by, for instance, keeping a diary or by reframing an injury in something positive (55).

Research in patients with a hand fracture has shown that pain coping strategies such as pain catastrophizing and anxiety for pain delayed recovery (56). Coaching of patients with a minimally displaced radial head fracture improved motion and countered the development of a stiff elbow (57). Positive reframing and reliance on others for emotional support are positive and negative predictors, respectively, of satisfaction after sports-related knee surgery. Preoperative optimism was not predictive of postoperative satisfaction (19). In addition, high scores on the Somatic PreOccupation and Coping questionnaire measured at 6 weeks were related to persistent pain, reduced HS, and larger pain interference at 1 year in fracture patients (18). Poor coping strategies can be classified as precipitating or perpetuating factors for musculoskeletal complaints.

Expectations

Expectations play an important role in hip replacement surgery. For instance, patients with low expectations might decline surgery (58), while patients with higher expectations who experience unmet expectations can be dissatisfied after surgery (59). In addition, the expectations of patients and orthopedic surgeons can differ, in which more disabled patients had higher expectations (60). Realistic expectations can help create a positive attitude and motivation in the patient, which can contribute to a faster recovery and a better QOL after surgery (61). On the other hand, unrealistic expectations can lead to disappointment, reduced motivation, and a reduced QOL. In a recent systematic review (62), fulfillment of expectations seems to be consistently associated with patient satisfaction with the outcome. It is therefore very important that the patient is well-informed about the expected results of the operation, the duration of recovery, and the possible complications (63). The patient can then get a realistic picture of what to expect after surgery, and these expectations can be used to motivate and support the patient during the recovery process. In addition, the attending physicians and physiotherapists can also play an important role in managing patient expectations by providing regular feedback on the patient's progress and adjusting treatment if necessary. The role of having realistic expectations can thus be seen as a prevention of developing maladaptive thoughts. Vice versa unfulfilled expectations may act as perpetuating factors on the road to an unsatisfactory result.

Other factors

Other psychological variables, such as self-efficacy and illness perceptions, may also be important to realize when treating orthopedic patients but are only described briefly in orthopedic and traumatological literature.

Self-efficacy reflects confidence in the ability to exert control over one's own motivation, behavior, and social environment (64). It can have both positive and negative influences on health. It is positive when this confidence is correct but a negative influence of self-efficacy is present when people avoid health information when they perceive that they lack control and coping resources (20).

Illness perception refers to the way how an individual experiences and mentally frames living with a disease (65). This may include both positive and negative illness beliefs that can influence the ability to cope with the disease and to perceive it as manageable or threatening (66). Illness perceptions are strongly associated with outcome expectations in patients treated for hand or wrist conditions (26).

Addressing psychosocial factors in orthopedic treatment

Orthopedic care should focus not only on treating physical conditions and the effectiveness of treatment but also addressing other domains than the biomedical, such as the psychological or the social domains that may affect the patient's QOL. Knowledge about the patient, the health problem, and its impact on the functioning and QOL is important. General practitioners have referred to this as context medicine for many years. This means that there is not really an average patient, but also not a standard outcome, at least not in terms of QOL, but possibly in terms of FS. There are several steps in which the importance of psychosocial factors in the treatment of an orthopedic patient can be shaped. First, to be aware of the impact of psychological factors on the presentation of symptoms and treatment outcomes in order to include psychological factors in clinical practice. Screening for prognostic factors using questionnaires can be of assistance when deciding on surgical treatment or referral to a psychologist (67, 68) or at least give an opportunity to have an open discussion (69) on this topic. Second, to include the patient's needs when treatment decisions are made. This can be done by implementing shared decision-making, in which the patient is involved in the decision, while the physician keeps in mind that the best treatments for that individual patient in that situation are offered. Third, to optimize and treat the identified psychological factors identified by screening. Providing patients information about their condition, treatment, and expected outcomes is the most obvious way. Adequate information provision can help manage expectations and reduce anxiety (70). Providing emotional support to the patient can help reduce stress and promote recovery by offering professional counseling or involving family and friends in the treatment. Teaching coping strategies (e.g. learning how to deal with stress) and cognitive behavioral therapy may help reduce stress and strengthen patient resilience (71). Therefore, developing resilience can be an important part of treating orthopedic conditions. In addition, there are also specific interventions such as cognitive behavioral therapy aimed at changing unhelpful or irrational thoughts that are common in patients with orthopedic conditions. The attending physicians and physiotherapists can also support their patients by educating them about the expectations of recovery, educating them on how to strengthen their resilience, and helping them develop a realistic recovery plan. It all starts, however, with the identification of patients being at risk for worse outcomes.

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