

In this thesis, we set out to uncover to what extent the patient mindset influences patient-reported outcomes in patients with thumb base osteoarthritis (OA). Patients with low expectations, a negative perception of their illness, or patients who catastrophize their pain might not achieve a successful outcome. It could also imply that interventions on the patient mindset result in better outcomes.

To do so, this thesis was structured in three parts: 1) the introduction to the prevalence of thumb base OA, the patient cohort used in this thesis, and innovation in data collection, 2) psychosocial effects in patients who receive nonsurgical treatment for thumb base OA, and 3) psychosocial and occupation effects in patients who receive surgical treatment for thumb base OA.

### **Part 1 - the introduction to the cohort and innovation in data collection**

While the radiographic prevalence is widely reported, there is no consensus on the exact prevalence of thumb base OA. Therefore, in **Chapter 2**, we conducted a meta-analysis on the age and sex-specific prevalence of radiographic thumb base OA. We found that females and older participants had significantly more radiographic thumb base OA. The prevalence of radiographic OA for the 50-year-old male and female participants was 5.8% and 7.3%, respectively, while the respective prevalence for 80-year-old male and female participants was 33.1% and 39.0%.

Chapter 3 describes how we created and implemented a routine outcome measurement cohort of patients with hand and wrist conditions and how these data are used to improve the quality of care and facilitate scientific research. Implementing such a system was feasible using a highly automated data collection infrastructure tightly linked to the patient journey and the workflow of healthcare professionals. The system serves as a tool to improve care and as a basis for scientific research.

**Chapter 4** describes how these routine outcome measurements are used in daily clinical care to optimize care and strive for better outcomes. For instance, extreme value detection helps identify patients that report extreme pain postoperatively and historical outcome data help surgeons choose the best available treatment and facilitate shared decision making.

Shorter patient-reported outcome questionnaires are preferred because they lead to compliance.

**Chapters 5 and 6** describe a machine-learning method to shorten the Boston Carpal Tunnel Questionnaire (BCTQ) and Patient Rated Wrist Evaluation (PRWE). We could reduce both questionnaires from 15 to six questions in the case of the PRWE and from 19 to six in case of the BCTQ, while retaining excellent agreement with the original questionnaire.

Since 2017, psychosocial questionnaires are part of routine outcome measurements. In **Chapter 7**, we were specifically interested in how patients perceive their illness. We found that patients with

thumb base OA and carpal tunnel syndrome perceive their illness to be more negative than patients with trigger finger syndrome or Dupuytren's disease.

## **Part 2 - Psychosocial effects in patients who receive nonsurgical treatment for thumb base osteoarthritis**

Previous research indicated that psychosocial factors influence outcomes of musculoskeletal diseases. We set out to study the influence of the patients' mindset on outcomes at different time points during the nonsurgical treatment of thumb base OA. In **Chapter 8**, we studied the extent to which the patients' mindset could explain baseline pain. We found that the patients' mindset explains 41% of the variance in pain before the start of nonsurgical treatment while the presence of scaphotrapeziotrapezoid OA only explained 1%.

**Chapter 9** aimed to find if the patients' mindset at baseline is associated with nonsurgical treatment outcomes for thumb base OA. We found that more positive outcome expectations and better illness understanding were associated with less pain and more hand function three months after treatment. The finding that more positive (higher) outcome expectations are associated with less pain contradicts most surgeons' beliefs. In **Chapter 10**, we tested the popular hypothesis that patients with higher expectations will most likely be less satisfied. We found the reverse effect; patients with higher expectations of the outcome of nonsurgical treatment are more likely to be satisfied. This effect can partially be attributed to the findings that higher expectations are associated with less pain, described in Chapter 9.

These prior studies suggest that changing the patients' mindset could improve the outcomes of nonsurgical treatment of thumb base OA. In **Chapter 11**, we studied whether the patients' mindset changes during standard nonsurgical treatment and the extent to which this change is associated with the change in pain during the first three months of treatment. We found that an increase in outcome expectations and gaining a more positive perception of the illness was associated with more pain reduction. Our findings emphasize the need for randomized intervention studies to assess if actively changing the patients' mindset, for example by optimizing their outcome expectations, can cause an additional decrease in pain.

## **Part 3 - Psychosocial and occupation effects in patients who receive surgical treatment for thumb base osteoarthritis**

While the previous part shows that the patients' mindset is important for patients who received nonsurgical treatment, we do not know if this was the same for patients who receive surgical treatment. In **Chapter 12**, we compared patients at the start of surgical or nonsurgical treatment for thumb base OA. We compared them on patient characteristics, baseline pain and hand function, and mindset. We found that patients scheduled to undergo surgery for thumb base OA have a more

negative mindset than those scheduled for nonsurgical treatment. More specifically, they are more prone to depression and anxiety and tend to catastrophize their pain more.

In **Chapter 13**, we studied the extent to which the patients' mindset was associated with pain and hand function in patients scheduled for surgical treatment for thumb base OA. We found that the patients' mindset could explain 31% of baseline pain, while this was only 12% for hand function. This 31% was less than their nonsurgical counterparts, described in Chapter 8.

**Chapter 14** aimed to find which factors are associated with postoperative pain after surgical treatment for thumb base OA. We found that female sex, opioid usage, higher preoperative satisfaction with hand, and higher self-reported consequences and coherence were associated with more postoperative pain. Future studies could investigate sex-based approaches and patient education for reducing acute postoperative pain.

We hypothesized that the patients' mindset would also be associated with outcomes of surgical treatments. Therefore, in **Chapter 15**, we studied the extent to which patients' mindset was associated with pain and hand function one year after surgical treatment for thumb base OA. We found that more psychological distress, longer expected duration and greater concern were associated with more pain one year after surgery. Furthermore, more concern was associated with less hand function. These findings indicate that surgeons could anticipate psychological distress and greater concern about the illness as opportunities for improved comfort and capability, develop care strategies to address them.

Many patients will ask surgeons the same question: "doctor, when can I work again?". For surgical treatment for thumb base OA, this answer was always based on experience from the surgeon. In **Chapter 16**, we evaluated how long it takes patients to return to work and which factors are associated with return to work. The median time to return to work was 12 weeks; this costs the employer €11.175 on average. However, the type of work greatly influenced this. Patients who had an office job return to work after 8 weeks, patients who had a moderate physical job (e.g., work in a shop) returned after 14 weeks, and patients who performed heavy physical labor (e.g., carpenter) returned to work after 20 weeks.

Finally, in **Chapter 17**, we studied how the experience with the treatment influences outcomes. We found that the information provision, communication skills of the physician, and postoperative care had the strongest association with outcomes. The results highlight the potential importance of positive experience with the treatment process to improve treatment outcomes in patients undergoing surgery for thumb base OA.

Chapter 18 discusses these findings, their limitations and their implications in more detail.