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Ostéoarthrose trapézo-métacarpienne symptomatique : modalités de gestion et facteurs biopsychosociaux

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Ostéoarthrose trapézo-métacarpienne symptomatique :

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Résumé

Introduction. L'ostéoarthrose trapézo-métacarpienne (OTM) est l'une des ostéoarthroses (OA) de la main la plus prévalente, la plus douloureuse et la plus handicapante. Bien qu'une approche biopsychosociale soit préconisée dans la gestion de douleur chronique, la majorité des études sur l'OTM ne documentent que ses composantes physiques. La gestion de cette pathologie est souvent jugée sous-optimale, probablement due à une méconnaissance de la maladie et à l'absence de guide de pratique clinique. Ce travail doctoral a visé à (1) documenter l'efficacité des interventions non-chirurgicales et chirurgicales et (2) investiguer les impacts de l'OTM dans diverses sphères de la vie, (3) examiner les facteurs biopsychosociaux qui influencent la sévérité de la douleur et des incapacités fonctionnelles, et (4) documenter l'utilisation des ressources en santé que font les personnes atteintes d'OTM.

Méthodologie. Le premier objectif a eu recours à deux revues systématiques en suivant la méthodologie de la *Cochrane Collaboration*. Pour les deuxième, troisième et quatrième objectifs, une étude descriptive a été menée auprès de 228 participants atteints d'OTM. Ils ont répondu à un questionnaire comprenant diverses échelles dûment validées. Des régressions linéaires multiples ont été utilisées afin d'identifier les facteurs de la sévérité de la douleur et des incapacités fonctionnelles.

Résultats. Les résultats des revues systématiques ont montré des preuves scientifiques de qualité faible à modérée qui appuient l'efficacité des interventions suivantes en termes de douleur, d'incapacités fonctionnelles, de satisfaction et/ou d'événements indésirables: (1) injections de solution saline (intra-/extra-articulaire); (2) orthèse thermoplastique du pouce; (3) mobilisation nerveuse; (4) combinaison des exercices/mobilisation nerveuse et articulaire; (5) trapézectomie par voie antérieure ou postérieure; (6) trapézectomie et reconstruction ligamentaire avec ½ flexor carpi radialis (FCR) et tunnel métacarpien; (7) trapézectomie et reconstruction ligamentaire et interposition tendineuse en utilisant ½FCR et tunnel métacarpien; et (8) arthroplastie par distraction d'hématome.

Pour ce qui est des résultats de l'étude descriptive, les participants étaient âgés de 63 ans en moyenne et plus de 80% d'entre eux rapportaient de la douleur d'intensité modérée à sévère (≥ 4/10). Leur score moyen au QuickDASH (incapacités fonctionnelles) était modéré (46,1/100). Leur score moyen de qualité de vie physique (SF-12v2*)* était inférieur à la moyenne de la population générale (41,0 vs 50,0). Près de 30% des participants présentaient des signes cliniquement significatifs d'anxiété et/ou de dépression. La fréquence de la douleur et le niveau d'incapacités fonctionnelles expliquaient 59,0 % de la variance dans la sévérité de la douleur tandis que le sexe, l'intensité de la douleur, la dépression et

l'éducation expliquaient 60,1 % de la variance dans les scores d'incapacités fonctionnelles. Acétaminophène, anti-inflammatoires non stéroïdiens oraux, injections intra-articulaires de cortisone, orthèses, massage/exercices et application de chaleur/froid étaient fréquemment employées, tandis que les principes ergonomiques, des aides techniques, de la mobilisation nerveuse et des interventions psychosociales l'étaient beaucoup moins.

Conclusions. L'OTM peut engendrer une douleur sévère, affectant divers aspects de la vie quotidienne. Les connaissances générées par cette thèse permettront de bonifier les recommandations des guides de pratique pour l'OTM, ainsi que de faciliter la gestion personnalisée de cette pathologie dans une perspective biopsychosociale.

Mots-clés : ostéoarthrose trapézo-métacarpienne, rhizarthrose, revue systématique, étude descriptive, approche biopsychosociale, douleur, incapacité fonctionnelle, bien-être psychologique, qualité de vie, utilisation des ressources en santé.

Abstract

Introduction. Trapeziometacarpal osteoarthritis (TMO) is one of the most prevalent, painful, and handicapping hand osteoarthritis (OA). Although a biopsychosocial approach is advocated in the management of chronic pain, the majority of studies on TMO document only its physical components. The non-surgical management of this pathology is often considered suboptimal, probably due to the poor understanding of the TMO and the absence of a clinical practice guide. This doctoral work thus aimed to (1) document the efficacy of non-surgical and surgical interventions and (2) investigate the impacts of TMO in various spheres of daily life, (3) examine the biopsychosocial factors that influence the severity of pain and functional disability, and (4) document the healthcare resources used by TMO patients.

Methods. To answer the first objective, two systematic reviews were conducted using the methodology of the *Cochrane Collaboration*. For the second, third and forth objectives, a descriptive study was carried out among 228 participants with TMO. They answered a questionnaire comprising various scales duly validated. Multiple linear regression analyses were used to identify factors of pain severity and functional disability.

Results. The results of the systematic reviews showed low to moderate quality evidence supporting the efficacy of the following interventions in terms of pain, physical function, satisfaction and/or adverse events: (1) saline injections (intra-/extra-articular); (2) custom-made thermoplastic thumb orthosis; (3) nerve mobilization; (4) combination of exercises/nerve and joint mobilization; (5) trapeziectomy by anterior or posterior approach; (6) trapeziectomy and ligament reconstruction with ½ flexor carpi radialis (FCR) and metacarpal tunnel; (7) trapeziectomy and ligament reconstruction and tendon interposition using ½FCR and metacarpal tunnel; and (8) distraction hematoma arthroplasty.

The descriptive study revealed that the participants were on average 63 years old and over 80% of them reported moderate to severe pain (≥ 4/10). Their mean QuickDASH score was moderate (46.1/100) for functional disability. Their mean physical quality of life score (SF-12v2) was lower than the average in the general population (41.0 vs 50.0). Nearly 30% of the participants had clinically significant signs of anxiety and/or depression. Pain frequency and magnitude of disability explained 59.0% of the variance in pain severity while sex, pain intensity, depression and education explained 60.1% of the variance in functional disability scores. Acetaminophen, oral nonsteroidal anti-inflammatory drugs, cortisone injections, orthotics, hand exercise, hand massage and heat/cold application were frequently

employed, while ergonomic principles, assistive devices, nerve mobilization and psychosocial intervention were much less used.

Conclusions. TMO can cause severe pain and affect various aspects of daily life. The new knowledge generated by this thesis will allow to improve the recommendations for TMO, thus facilitating a tailored management of this pathology from a biopsychosocial perspective.

Keywords: trapeziometacarpal osteoarthritis, rhizarthrosis, systematic review, descriptive study, biopsychosocial approach, pain, functional disability, psychological well-being, quality of life, healthcare resource use.

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ACC : anterior cingulate cortex

ACR : *American College of Rheumatology*

ACP : *American College of Physicians*

ACT : Acceptance and commitment therapy

ADL : activities of daily living

AE : adverse events

AGREE : *Appraisal of Guidelines for REsearch & Evaluation*

AHRQ : *Agency for Healthcare Research and Quality*

AINS : anti-inflammatoires non stéroïdiens

AMED : *Allied and Complementary Medicine Database*

AMSTAR : *Assessment of Multiple Systematic Reviews*

APL : abductor pollicis longus

CADTH: *Canadian Agency for Drugs and Technologies in Health*

CBT : Cognitive-behavioral therapy

CDSR : *Cochrane Database of Systematic Reviews*

CENTRAL : *Cochrane Central Register of Controlled Trials*

CÉR : Comité d'éthique de la recherche

CHUM : *Centre hospitalier de l'Université de Montréal*

CHUS : *Centre hospitalier universitaire de Sherbrooke*

CI : confidence interval

CIC : coefficient intraclasse

CIM : Classification internationale de la maladie

CINAHL : *Cumulative Index to Nursing and Allied Health Literature*

CISSS : *Centre intégré de santé et de services sociaux*

CIUSSS : *Centre intégré universitaire de santé et de services sociaux*

CP : chronic pain

CRCHUM : Centre de recherche du Centre hospitalier de l'Université de Montréal

CRPS : complex regional pain syndrome

CTET : Cognition-targeted exercise therapy

CTT : custom-made thermoplastic thumb-based

CT-TM : custom-made thermoplastic hand-based TM joint

DASH : *Disabilities of the Arm, Shoulder and Hand*

DASS : *Depression Anxiety Stress Scale*

DC : douleur chronique

EMB : *Evidence-Based Medicine*

ENRC : essai non randomisé contrôlé

EPHPP : *Effective Public Health Practice Project*

EPOC : *Cochrane Effective Practice and Organisation of Care Group*

ERC : essai randomisé contrôlé

ÉU : États-Unis

EULAR : *European League Against Rheumatism*

FCR : flexor carpi radialis

FRQ-S : *Fonds de recherche du Québec—Santé*

FU : follow-up

GA : graded activity

GEXP : graded exposure

GRADE : *Grading of Recommendations, Assessment, Development and Evaluation*

HADS : *Hospital Anxiety Depression Scale*

HaPI : *Health and Psychosocial Instruments*

HDA : hematoma distraction arthroplasty

HPA : hypothalamic-pituitary-adrenal

IASP : *International Association for the Study of Pain*

IMC : indice de masse corporelle

IMMPACT : *Initiative of Methods, Measurement and Pain Assessment in Clinical Trials*

IP : inter-phalangienne

IPP : inter-phalangienne proximale

IPD : inter-phalangienne distale

IRM : imagerie par résonnance magnétique

IT : interposition tendineuse

ITS : interrupted time series

JHT : *Journal of Hand Therapy*

LR : ligament reconstruction

LRTI : ligament reconstruction and tendon interposition

MA : meta-analysis

MCP : métacarpo-phalangienne

MM : mindfulness meditation

MRI : magnetic resonance imaging

MSD : musculoskeletal disorder

MST : mindfulness skills training

MT : metacarpal tunnel

NAc : nucleus accumbens

NGC : *National Guideline Clearing House*

NHS : *National Health Service*

NICE: *National Institute for Health and Care Excellence*

NRCT : non-randomized controlled trial

NRS : numeric rating scale

NSAID : nonsteroidal anti-inflammatory drug

OA : ostéoarthrose / osteoarthritis

OAI : *Open Archives Initiative*

OMERACT : *Outcome Measures in Rheumatology*

OMS : Organisation mondiale de la santé

OR : odds ratio

OTM : ostéoarthrose trapézo-métacarpienne

PAG : periaquaducal grey matter

PCS : *Pain Catastrophizing Scale*

PED : Physiotherapy Evidence Database

PF : physical function

PFC : prefrontal cortex

PGAP : *Progressive Goal Attainment Program*

PL: palmaris longus

PNE : Pain neurophysiology education

POMS : *Profile of Mood States*

PRWHE, Patient-Report Wrist Hand Evaluation

PRISMA : *Preferred Reporting Items for Systematic Reviews and Meta-analyses*

PSM : Pain self-management program

PST : prefabricated soft thumb-based

QdV : qualité de vie

QoL : quality of life

RCT : randomized controlled trial

RL : reconstruction ligamentaire

RoB : risk of bias

RS : revue systématique

RR : risque relatif ou risk ratio

RU : Royaume-Uni

S1 : primary cortical somatosensory area

S2 : secondary cortical somatosensory area

SD : standard deviation

SE : standard error

SF-12v2 : *Short Form-12 Health Survey*

SMD : standardized mean difference

SR : systematic review

STROBE : *Strengthening the Reporting of Observational Studies in Epidemiology*

T : trapézectomie

TI : tendon interposition

THA : total hip arthroplasty

TKA : total knee arthroplasty

TM : trapézo-métacarpienne / tunnel métacarpien

TRIP : *Turning Research Into Practice*

TS : treatment satisfaction

TSA : total shoulder arthroplasty

UdeM : Université de Montréal

UK : United Kingdom

USA : United States of America

VAS : Visual analog scale

VTA : ventral tegmentum

WHO ICTRP : *World Health Organization International Clinical Trials Registry Platform*

WHO-HPQ : *World Health Organisation Health and Work Performance Questionnaire*

À nos patients,

Que cette thèse puisse aider à soulager vos souffrances …

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Chapitre 1 – INTRODUCTION

« *The opposable thumb, unique to our species, is one of our essential defining traits. In concert with the human brain, it orchestrates masterful tasks with refined flexibility, creating mobility and stability in paradox. The thumb works in precise coordination with the fingers, whether poised to grasp a fistful of arrows or pen the perfect opening line* » (Ladd et al. 2014).[1] Le pouce est essentiel pour les activités au quotidien. Malheureusement, ce doigt critique peut être affecté par l'ostéoarthrose trapézo-métacarpienne (OTM). Ce dont les patients atteints d'OTM se plaignent le plus est la douleur à la base du pouce, ce qui limite leurs fonctions de la main, et peut entraver leur autonomie. Bien que l'OTM radiographique soit prévalente, l'OTM symptomatique l'est moins. Ce décalage serait en partie relié à des facteurs psychosociaux qui influencent l'expérience de la douleur. La gestion de l'OTM est souvent sous-optimale à cause d'une méconnaissance de l'impact de cette pathologie et des traitements efficaces basés sur des données probantes. Ce projet est composé de deux volets : (1) deux revues systématiques de la littérature scientifique portant sur les interventions thérapeutiques pour l'OTM et (2) une étude descriptive qui documente les caractéristiques et l'impact de l'OTM symptomatique, les facteurs biopsychosociaux de sa sévérité et l'utilisation des ressources en soins que font les personnes atteintes de cette pathologie.

La présente thèse est composée de six chapitres. Le chapitre 1 comprend l'introduction ainsi que l'organisation de la thèse alors que le chapitre 2 présente la recension des écrits. Les objectifs de la thèse sont décrits au chapitre 3 tandis que la méthodologie l'est au chapitre 4. Le chapitre 5 présente les résultats des deux revues systématiques et de l'étude descriptive. Enfin, suivent la discussion générale et la conclusion au chapitre 6.

Chapitre 2 – RECENSION DES ÉCRITS

2.1 Douleur chronique

2.1.1 Définition de la douleur

Selon l'*International Association for the Study of Pain* (IASP), la douleur est définie comme « une expérience sensorielle et émotionnelle désagréable associée à un dommage tissulaire réel ou potentiel ou s'en rapprochant ».[2,3] Lorsque la douleur persiste au-delà de trois mois, elle est considérée chronique. Selon la classification de la douleur chronique (DC) récemment élaborée par l'IASP en collaboration avec *l'Organisation mondiale de la santé*,[4] une DC peut être une maladie en soi (DC primaire) telle que la fibromyalgie ou un symptôme (DC secondaire) tel que la douleur arthrosique.[4-6] La DC primaire est associée à une détresse émotionnelle importante et/ou à un handicap fonctionnel et n'est pas mieux expliquée par un autre diagnostic. Son mécanisme de la douleur peut être (1) nociceptif (lié à une activation des nocicepteurs), (2) neuropathique (lié à une lésion ou une maladie affectant le système nerveux somato-sensoriel) ou (3) nociplastique (lié à une altération de la nociception malgré l'absence de preuve d'une lésion tissulaire activant les nocicepteurs ou d'une maladie ou lésion affectant le système somato-sensoriel).[2] Quant à la DC musculosquelettique secondaire, ses mécanismes de la douleur impliqueraient une inflammation ou une infection persistante, une étiologie auto-immune ou métabolique (ex. : arthrite rhumatoïde), des changements structuraux affectant les os, articulations, tendons ou muscles (ex. : ostéoarthrose symptomatique), ou des pathologies du système nerveux moteur (ex. : rigidité due à la maladie de Parkinson).[4,6]

2.1.2 Impacts de la douleur chronique

2.1.2.1 Conséquences physiques et psychosociales

La DC affecte de multiples sphères de la vie quotidienne : (1) le fonctionnement physique (diminution des activités de la vie quotidienne incluant le travail, la qualité de vie (QdV) reliée à la santé, la capacité de marche et des loisirs, augmentation des troubles du sommeil et de la fatigue); (2) le fonctionnement émotionnel (augmentation de la détresse psychologique incluant la dépression, les idées suicidaires, l'anxiété et la colère); et (3) le fonctionnement social (diminution des liens et des soutiens sociaux,

participation à des activités sociales).[7-11] Ces conséquences négatives de la DC sont plus marquées chez les individus touchés par les inégalités sociales, soit des personnes socioéconomiquement vulnérables, des femmes, des autochtones, certaines communautés ethniques et racialisées, les personnes de sexe et de genre différents, des victimes de la violence ou d'un traumatisme, des personnes dans une situation de handicap.[8,12-14] La DC étant invisible, les personnes qui en souffrent ne se sentent pas crues, voire stigmatisées.[3]

2.1.2.2 Conséquences économiques

À cause des conséquences négatives de la DC, l'utilisation des soins de santé chez les personnes souffrant de la DC est considérable, constituant un fardeau économique majeur, et ce, plus que d'autres maladies telles que cancers, maladies cardiaques, ou diabètes.[15] Au Canada, les coûts directs associés à la DC (i.e., les coûts associés aux soins de santé incluant des dépenses pour les services médicaux, les médicaments sur ordonnance et les soins hospitaliers internes et externes) se situaient entre 15,1 et 17,2 milliards $ en 2019, soit > 10% de l'ensemble des dépenses directes en santé.[3] Les coûts directs et indirects (perte de productivité) combinés estimés pour la même année étaient entre 38,2 et 40,3 milliards $.[3]

2.1.3 Modèle biopsychosocial de la douleur chronique

Puisque la DC peut avoir des conséquences néfastes dans différentes sphères de la vie d'un patient, toutes les conséquences devraient être tenues en compte lorsque les professionnels de la santé établissent un plan de traitement. Ainsi, une approche biopsychosociale intégrée est préconisée dans le processus d'évaluation et de gestion de DC dans le but de cerner les dimensions critiques et le caractère unique de l'expérience de la douleur. À cet effet, Gatchel[16,17] proposait en 2004 le *Biopsychosocial Model of Chronic Pain* qui est devenu l'approche conceptuelle reconnue dans ce domaine (Figure 1). Ce modèle fait une distinction entre les concepts de *douleur* et de *nociception*. Le premier fait référence à l'expérience subjective de l'individu, laquelle expérience est le résultat de la modulation de l'information sensorielle qui est transmise au cerveau via les processus neuronaux, c'est-à-dire, la nociception. Selon ce modèle, l'expérience de la douleur est unique à chaque individu, car elle résulte des interactions réciproques entre des facteurs biologiques (ex. : génétique, processus neuronaux à travers l'axe cérébro-spinal), psychologiques (ex. : cognitions, émotions) et sociaux (ex. : facteurs culturels, relation interpersonnelle). La gestion multidisciplinaire de la DC qui tient autant compte de ses dimensions biologiques que de ses

composantes psychosociales est non seulement un élément clé mais est aussi considérée comme l'étalon pour évaluer et traiter ce type de désordre.[18,19]

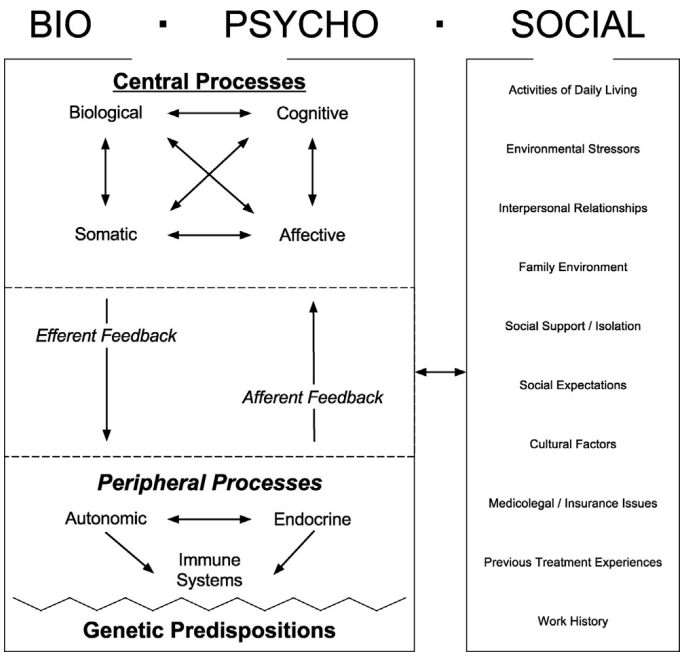

Figure 1. – Modèle biopsychosocial de la douleur chronique de Gatchel (2004)[17]

2.2 Problématique : L'ostéoarthrose trapézo-métacarpienne (OTM) – un problème de santé important, mais sa gestion est sous-optimale.

2.2.1 Symptômes de l'OTM non expliquées par des données radiographiques

L'ostéoarthrose trapézo-métacarpienne (OTM) est l'une des ostéoarthroses (OA) de la main la plus prévalente, la plus douloureuse et la plus handicapante.[20-22] Elle peut limiter la mobilité du pouce, la fonction de la main et la qualité de vie.[20-25] Surprenamment, l'écart entre la prévalence radiographique (i.e., avoir une évidence radiographique d'OTM sans ou avec symptômes) et celle symptomatique est grand (31,8% et 4,8%) selon une étude épidémiologique.[26] Les preuves scientifiques concernant les associations entre les données radiographiques et la sévérité de douleur rapportée est conflictuelle

(absente,[27-30] faible,[20,31,32] forte[33]). En d'autres mots, les individus avec de l'OTM radiographique peuvent être asymptomatiques et ne pas chercher de soins pour cette condition.[28,34] On pourrait deviner que cet écart s'explique par des caractéristiques de l'OA (ex. : synovite, lésions de moelle osseuse) indétectables par le rayon-x, mais détectable par de l'ultrason ou de l'imagerie par résonance magnétique (IRM). Toutefois, les données ultrasoniques semblent ne pas être associées à l'intensité de la douleur rapportée à la base du pouce, tandis que l'association entre les données d'IRM et la sévérité de la douleur n'est plus statistiquement significative une fois qu'on l'ajuste pour les données radiographiques relatives aux ostéophytes.[33] Face à la douleur non expliquée par de telles données objectives, il est permis de penser que des facteurs psychosociaux pourraient être en partie impliqués.[2,28,34-36] La section 2.5 du présent chapitre porte sur les facteurs biopsychosociaux qui pourraient contribuer au développement d'OTM radiographique (la section 2.5.1) et aux symptômes de l'OTM (la section 2.5.2).

2.2.2 Impacts de l'OTM autres que la douleur et les incapacités fonctionnelles

Bien que la douleur et les incapacités fonctionnelles associées à l'OTM ont été amplement étudiées,[20-23,27,34,37-39] d'autres aspects comme le bien-être psychologique ou la productivité des individus aux prises avec de l'OTM sont très peu documentés. Puisque les prévalences d'anxiété et de dépression sont élevées dans la population d'OA (environ 20%)[40,41] et que ces comorbidités peuvent affecter l'expérience de la douleur,[29,30,42,43] il s'avère important d'évaluer leur présence. Pour la productivité, certaines études ont été menées afin d'identifier des facteurs de risque occupationnels de l'OTM[32,44-46]; toutefois, à notre connaissance, aucune étude n'a documenté l'impact de l'OTM sur l'absentéisme et le présentéisme. Afin d'offrir de meilleurs soins aux patients et d'améliorer leurs conditions cliniques, ces aspects devraient être davantage étudiés et documentés. La présentation clinique de l'OTM sera abordée plus en détail dans la section 2.3.

2.2.3 Gestion de l'OTM

Il est bien documenté que la gestion de la DC de différentes origines est souvent sous-optimale[47] et celle de l'OTM n'y échapperait pas. Deux études européennes[48,49] ont révélé une lacune importante dans les soins d'OTM : la majorité de patients ne reçoivent pas les interventions non-pharmacologiques de

première ligne recommandées, bien qu'il soit documenté que de telles interventions pourraient retarder ou éviter une chirurgie.[50,51] Une des raisons de cette lacune peut être l'absence d'un guide de pratique clinique spécifique à l'OTM. Les guides de pratique pour l'OA de la main[52,53] existent et sont certes utiles pour choisir les catégories d'intervention. Toutefois, les guides ne spécifient pas quels médicaments, quelles orthèses, quels exercices et quels types d'enseignement à prodiguer en considérant le fait que l'OTM soit distincte des autres OA de la main[54,55] puisque la mobilité de l'articulation trapézo-métacarpienne (TM) est accrue comparativement à d'autres articulations de la main[56-58] et que l'OTM est plus douloureuse que d'autres OA de la main.[21] Les revues systématiques (RS) sur l'efficacité des interventions non-chirurgicales pour l'OTM existent, mais ne sont pas exhaustives en termes de types d'interventions,[59] avaient combiné des données hétérogènes dans une même méta-analyse,[60] ou n'avaient pas évalué les risques de biais des études primaires incluses.[61] Il en va de même pour les interventions chirurgicales. Il y a de multiples techniques chirurgicales pour l'OTM et elle doit être judicieusement choisie à cause de son impact clinique et économique important (effets bénéfiques et indésirables, coûts de soins, durée d'absence du travail).[62] Bien que certaines RS aient examiné l'efficacité des interventions chirurgicales pour l'OTM, elles ne sont pas exhaustive en termes de techniques chirurgicales[63,64] ou méthodologiquement sous-optimales (évaluation de risques de biais des études primaires incluses omise).[65,66] Lorsque la méthodologie est rigoureuse, la RS nécessite une mise à jour puisque les études primaires incluses ont été publiées avant 2013.[67] Il était donc nécessaire de mener une RS de qualité robuste qui inclut tous les types d'interventions non-chirurgicales pour l'OTM et une seconde portant sur toutes les interventions chirurgicales. De plus, la gestion de l'OTM diffère selon les continents ou les pays.[68] Tel que mentionné précédemment, deux études européennes[48,49] ont révélé que la gestion de l'OTM est sous-optimale, mais on ignore si c'est le cas au Québec ou ailleurs au Canada.

2.3 Présentation clinique de l'OTM

2.3.1 Caractéristiques biologiques et physiques

L'European League Against Rheumatism (EULAR) considère l'OTM distincte des autres OA de la main à cause des présentations cliniques uniques,[54,55] tandis que *l'American College of Rheumatology* (ACR) ne fait pas cette distinction.[69] L'OTM se trouve dans l'articulation trapézo-métacarpienne (TM), composée du trapèze et du premier métacarpe. Sa structure bi-concavo-convexe permet de mobiliser le pouce dans différentes directions : flexion-extension, abduction-adduction et circonvolution (rotation).[56-58] Cette

grande mobilité offre aux humains la possibilité de saisir des objets de divers calibres – une aiguille fine à un ballon de football par exemple, et leur permet ainsi de réaliser des activités variées. Bien que la stabilité de l'articulation TM soit assurée par les ligaments sur les faces palmaire, dorsale et latérale,[58] cette grande mobilité compromet la stabilité articulaire, rendant cette articulation vulnérable et susceptible à des lésions.[55,70] En plus, l'articulation TM est souvent soumise à une force compressive substantielle : lors d'une pince simple de 1 kg, les articulations interphalangienne et métacarpo-phalangienne en reçoivent 3 kg et 5 kg en moyenne respectivement, tandis que pour l'articulation TM, ceci peut se chiffrer jusqu'à 12 kg.[71] Cette force compressive peut s'élever jusqu'à 120 kg lors d'une prise forcée.[71]

Un œdème et/ou une proéminence osseuse à la base du pouce peuvent être présents à cause de l'inflammation, d'une subluxation métacarpienne ou des ostéophytes. La douleur et des crépitations provoquées par une palpation sur l'articulation TM peuvent indiquer une érosion du cartilage articulaire.[72,73] Lorsque des manœuvres provocatrices telles que des compressions axiales sur l'articulation TM sans ou avec des rotations simultanées du pouce (test de piston vs *grind test*[74]) génèrent de la douleur, l'OTM est soupçonnée.[75,76] L'incapacité à écarter le pouce, due à la douleur, la subluxation du métacarpe ou la contracture des tissus mous autour de la TM, engendrent une hyperextension compensatoire de l'articulation métacarpo-phalangienne, ce qui amène à une déformation du pouce en Z[77] ou '*squaring*'[55] (Figure 2). Aux stades avancés, de l'atrophie musculaire de l'éminence thénarienne peut être présente.[55]

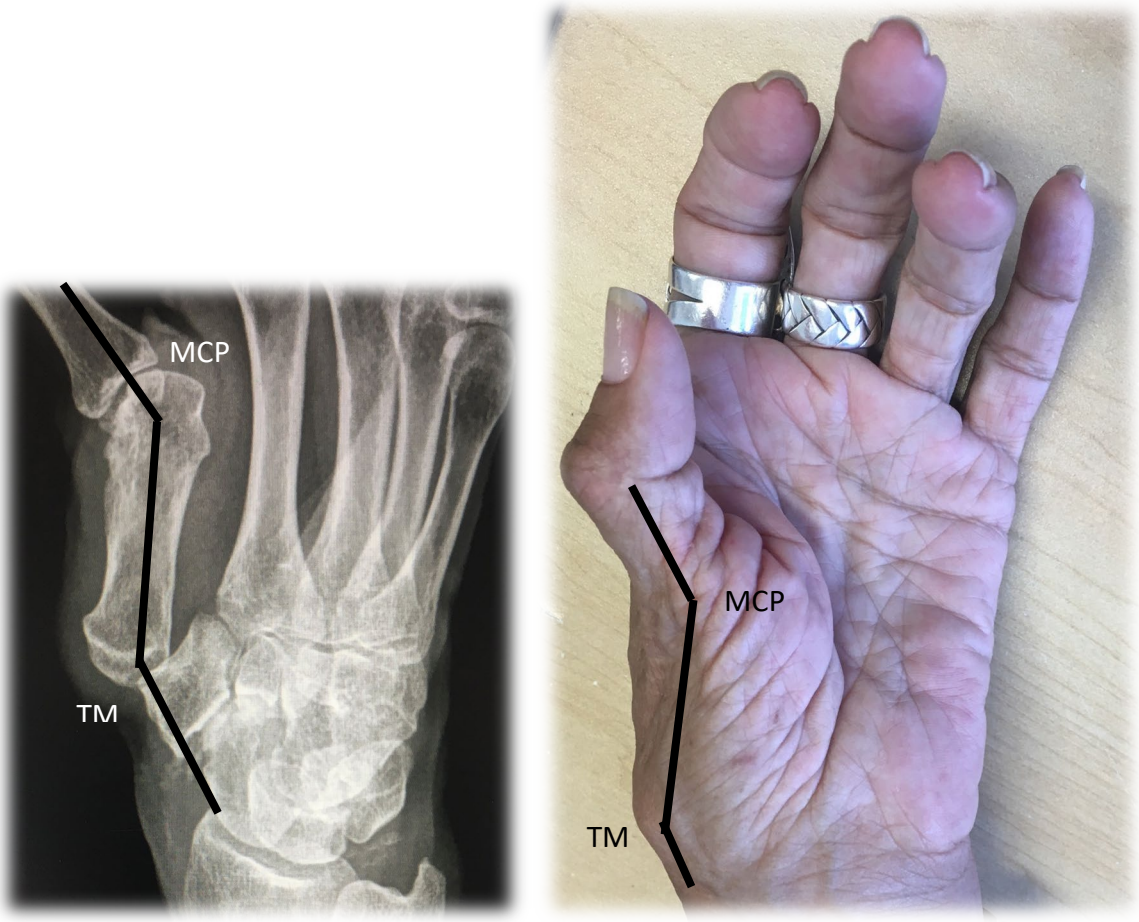

Figure 2. – Déformation en Z du pouce

Hyperextension de l'articulation métacarpo-phalangienne (MCP) et subluxation du métacarpe à l'articulation trapézo-métacarpienne (TM)

Quelques classifications selon des données radiographiques afin de définir les stades d'évolution d'OTM ont été proposées jusqu'ici.[35,78-80] Elles tiennent principalement compte de la présence du rétrécissement de l'espace articulaire, de sclérose sous-chondrale et/ou d'ostéophytes, ainsi que d'une subluxation du premier métacarpe[78-80] (voir Figure 3). L'imagerie par résonnance magnétique (IRM)[55] permet de visualiser des ostéophytes, la perte cartilagineuse, la synovite, les ligaments collatéraux lésés, la présence d'anomalie sous-chondrale, les lésions de la moelle osseuse et la subluxation.[81]

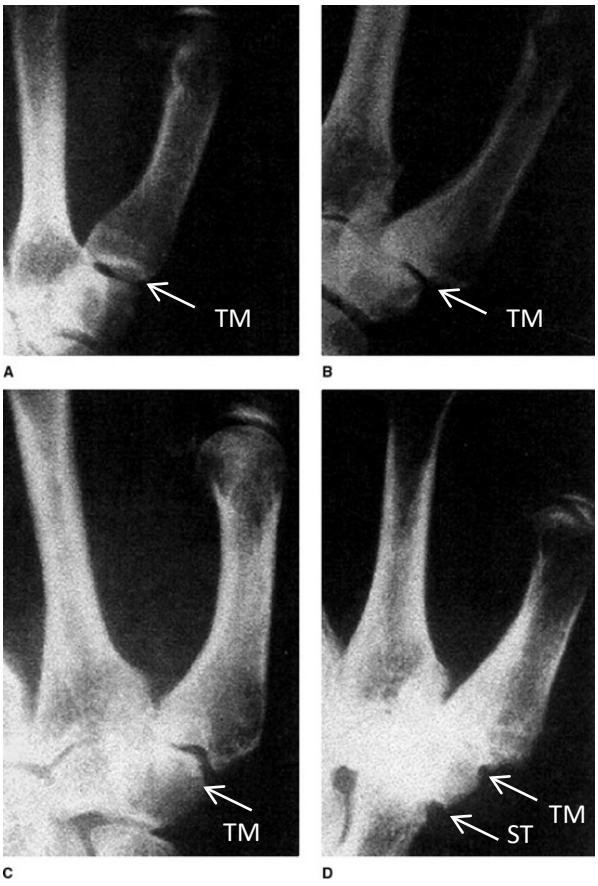

Figure 3. – Stades d'évolution de l'OTM selon la classification d'Eaton[82]

Image A : Au stade 1, l'articulation TM présente un espace articulaire normal.
Image B : Au stade 2, un léger rétrécissement de l'espace articulaire et une sclérose sous-chondrale minimale sont observés.
Image C : Au stade 3, un rétrécissement articulaire est sévère. Une subluxation du métacarpe modérée, la sclérose sous-chondrale sévère, et des ostéophytes proéminents sont présents.
Image D : Au stade 4, l'articulation TM est détruite. L'OA de l'articulation scapho-trapézienne (ST) est désormais mise en évidence.

Tel que mentionné précédemment, l'OTM peut être asymptomatique[28,34] ou au contraire, se manifester par une douleur et de la raideur à la base du pouce,[28,34,55,83] entraîner des limitations sur le plan de la mobilité du pouce,[23] de la force de la main,[83-87] de la fonction manuelle nécessaire pour accomplir des activités quotidiennes[21,34,48,85,88] et affecter la qualité de vie (QdV).[89] La douleur peut s'aggraver durant diverses activités, plus spécifiquement celles qui exigent une pince pouce-index forcée ou prolongée (ex. : tenir une clé, écrire au crayon), un écartement du pouce (ex. : ouvrir un bocal), ou une rotation forcée du poignet (ex. : tordre le linge, tourner une poignée de porte) affectant ainsi l'autonomie

des patients.[76,86,89-92] L'articulation TM peut perdre de 20% à 40% de sa mobilité. Selon l'étude de Gehrmann et al (2010),[23] l'amplitude articulaire moyenne de flexion-extension chez les individus sans OTM était de 59˚ ± 10˚ tandis que celle chez les individus atteints d'OTM était 45˚ ± 11˚; les valeurs pour l'abduction-adduction, 63˚ ± 13˚ vs 37˚ ± 6˚ et la pronation-supination, 62˚ ± 11˚ vs 49˚ ± 10˚. La force de préhension de la main affectée peut aussi être diminuée de 65 % ± 25 % ainsi que la force de pince de 60 % ± 25 %.[48] Deux études ayant évalué la limitation fonctionnelle manuelle à cause de l'OTM à l'aide du QuickDASH[93] (0 = aucune incapacité, 100 = incapacité maximale) ont montré des scores moyens très variables (18,0[34] vs 69,4[39]). Les activités difficiles à réaliser à cause de la maladie sont nombreuses : ramasser des petits objets, ouvrir un pot/une bouteille/une canette, écrire, utiliser une souris d'ordinateur, conduire l'auto, tourner une poignée de porte, tâches domestiques (ex. : jardinage, préparation de repas, ménage, tordre le linges, faire le lit, coudre), exercices physiques (ex. : vélo, utiliser des haltères) et activités artisanales (ex. : tricoter, faire du crochet).[83,88,94] Comparativement aux OA des articulations inter-phalangiennes (IP), l'OTM engendre plus de douleur et d'incapacités fonctionnelles.[21] Lorsque ces articulations (IP et TM) sont affectées par l'OA, la sévérité symptomatique est encore plus marquée.[21,48] Pour la QdV, ceux qui souffrent d'OTM montreraient une QdV physique, mesurée par le questionnaire SF-12, inférieure de 10-13 points comparativement à la norme.[24,95]

2.3.2 Bien-être psychologique

Quelques études ont évalué le bien-être psychologique chez la clientèle atteinte d'OTM. La QdV mentale telle qu'évaluée avec le SF-12 ne serait pas gravement affectée en général, les scores étant comparables à ceux de la population générale.[24,95] Le niveau de détresse psychologique mesuré avec le *Patient Health Questionnaire*-4 (PHQ-4)[96] serait de 1,6 ± 2,6 (0 = aucune indication pour une détresse psychologique, 12 = forte indication).[32] Quant à l'anxiété, son niveau moyen mesuré avec le *Pain Anxiety Symptome Scale*[97] varirait de 45,3 à 49,9 (0 = aucune anxiété, 200 = anxiété maximale).[42] Les niveaux de dépression mesurés par le *Centre for Epidemiological Studies - Depression Scale*[98] serait de 8,9 à 11,0[42] (un score ≥ 16, cliniquement significatif[99]) et par le *PROMIS Depression questionnaire*[100] seraient de 46 pour l'OTM symptomatique et 42 pour l'OTM non symptomatique[28] (le score 50 = la norme américaine[100]). Les scores moyens du catastrophisme face à la douleur varient de 5,6 à 12,2[32,42] sur le *Pain Catastrophizing Scale*[101] (0 = aucun catastrophisme; 52 = catastrophisme maximal). Une étude qualitative[83] a révélé que les individus aux prises avec l'OTM ressentent une perte de confiance en leur main affectée, de la frustration,

de la colère, de l'inquiétude, de l'appréhension face à l'avenir, un fardeau mental et du découragement. Par ailleurs, Calfee et al. (2015)[29] ont révélé que 20% des patients recrutés se disaient déprimés. Ce chiffre correspond à la prévalence de dépression de la population atteinte d'OA.[40,41]

2.4 Prévalences de l'OTM

2.4.1 Prévalence radiographique

Les taux de prévalence radiographique de l'OTM (i.e., OTM confirmée par la radiographie avec ou sans présence de symptômes) varient allant de 4,9% à 51,9%,[20,31,35,46,102-107] (Tableau 1). Cette grande variation serait due à l'hétérogénéité méthodologique des études (ex. : devis d'échantillonnage, classification d'OTM, groupes d'âge inclus), à différents types de population (pays, milieu urbain vs rural, communautaire vs national) et à la fidélité intra-/inter-juge limitée des lectures radiographiques.[103] La prévalence augmente avec l'âge.[20,35,46,103,104,106-108] La prévalence de l'OTM chez les femmes peut être deux[20,46,103,104] à trois fois[35] plus grande que celle chez les hommes. Les prévalences semblent varier selon les pays également : Américaines 57,0% à 65,5%,[105,109] Américains 44,2%,[105] Chinoises, 14,5%,[105] Chinois 19,4%,[105] Japonaises, 19,9%.[109] La plus récente étude japonaise (2016)[31] a démontré une prévalence japonaise beaucoup plus importante (≥ 50%). Il est possible que cet écart soit attribuable à l'hétérogénéité méthodologique, ces résultats doivent donc être interprétés avec circonspection.

Tableau 1. — Prévalence radiographique de l'OTM

Études, pays, devis	Taille d'échantillon (# de femmes)	Population	Groupe d'âge	Classification et critère de la présence d'OTM	Prévalence totale	Prévalence chez les femmes	Prévalence chez les hommes	Ratio femmes/ hommes
Armstrong 1994,[110] RU, révision de dossiers	143 (143)	Patients qui se sont présentés pour une fracture du radius dans un hôpital universitaire	45-70	Eaton-Littler (1-4) ≥ Niveau 2	N/A	32,9%	N/A	N/A
Becker 2013,[107] ÉU, révision de dossiers	r2321 (1559)	Patients qui se sont présentés pour une fracture du radius dans un centre médical tertiaire	31-101	Sodha (0-3) ≥ Niveau 2	50,5%	57,7%	35,7%	1,6
Dahaghin 2005,[20] Pays-Bas, étude transversale auprès de participants volontaires	3906 (2101)	Communauté *(The Rotterdam Study)*	55 +	Kellgren-Lawrence (1-4) ≥ Niveau 2	35,8%	21,2%	12,0%	1,8
Haara 2003,[46] Finlande, étude transversale auprès d'un échantillon systématique de 40 aréages	3595 (2035)	69 communautés	30 +	Kellgren-Lawrence (1-4) ≥ Niveau 2	11,5%	15%	7%	2,1
Haugen 2011,[102] ÉU, étude observationnelle longitudinale (suivi biannuel d'un échantillon aléatoire par secteur de recensement)	2301 (1300)	Progénitures de la cohorte originale de l'étude *Framingham* et leurs conjoints (1992-1995) et une novelle cohorte (2002-2005)	40-84	Kellgren-Lawrence (1-4) ≥ Niveau 2	31,8%	32,9%	30,3%	1,1
Kodama 2016,[31] Japon, étude transversale auprès de participants volontaires	1535 (1028)	Trois communautés (urbaine, montagnarde, côtière) *(The Research on Osteoarthritis/osteoporosis Against Disability (ROAD) study)*	40 +	Kellgren-Lawrence (1-4) ≥ Niveau 2	50,2%	50,0%	50,5%	1,0
Sodha 2005,[35] ÉU, révision de dossiers	615 (298)	Patients qui se sont présentés pour une fracture du radius dans un centre médical tertiaire	0 +	Sodha (0-3) ≥ Niveau 2	26,5%	39,1%	13,1%	3,0
Sonne-Holm 2005,[103] Danemark, étude transversale auprès d'un échantillon aléatoire	3355 (1295)	Une communauté urbaine	40 +	Kellgren-Lawrence (1-4) ≥ Niveau 2	4,9%	7,4%	4,0%	1,9
Toba 2006,[111] Japon, étude transversal auprès de	551 (551)	Une communauté agricole/halieutique *(The Hizen-Oshima Study)*	40-89	Kellgren-Lawrence (1-4) ≥ Niveau 2	N/A	10,2%	N/A	N/A

participants volontaires								
Van Saase 1989,[104] Pays-Bas, étude transversale auprès d'un échantillon aléatoire	6585 (3476)	Une communauté principalement agricole	19 +	Kellgren-Lawrence (1-4) ≥ Niveau 2	10,6%	13,9%	6,9%	2,0
Wilder 2006,[106] ÉU, étude transversale auprès de participants volontaires	3327 (2302)	Une communauté vieillissante *(The Clearwater Osteoarthritis Study)*	40 +	Kellgren-Lawrence (1-4) ≥ Niveau 2	20,5%	20,9%	19,7%	1,1
Yoshida 2002,[109] Japon, étude transversale auprès de participants volontaires	157 (157)	Une communauté agricole/halieutique *(The Hizen-Oshima Study)*	71-89	Kellgren-Lawrence (1-4) ≥ Niveau 2	N/A	19,9%	N/A	N/A
Yoshida 2002,[109] ÉU, étude observationnelle longitudinale (suivi biannuel d'un échantillon aléatoire)	655 (655)	La cohorte ortiginale de l'étude *Framingham* et leurs conjoints (1992-1993)	71-89	Kellgren-Lawrence (1-4) ≥ Niveau 2	N/A	65,5%	N/A	N/A
Zhang 2003,[105] Chine, étude transversale auprès d'un échantillon aléatoire par secteur de recensement	2507 (1503)	Quatre communautés *(The Beijing OA Study)*	60 +	Kellgren-Lawrence (1-4) ≥ Niveau 2	16,5%	14,5%	19,4%	0,7
Zhang 2003,[105] ÉU, étude observationnelle longitudinale (suivi biannuel d'un échantillon aléatoire par secteur de recensement)	1628 (978)	Progénitures de la cohorte originale de l'étude *Framingham* et leurs conjoints (1993-1994)	71-100	Kellgren-Lawrence (1-4) ≥ Niveau 2	51,9%	57,0%	44,2%	1,3

#, nombre; ÉU, États-Unis; N/A, non applicable; OTM, ostéoarthrose trapézo-métacarpienne; RU, Royaume-Uni.

2.4.2 Prévalence symptomatique

La prévalence de l'OTM symptomatique (i.e., OTM confirmée par la radiographie et/ou la présence des symptômes comme douleur ou incapacités fonctionnelles) varie de 1,0% à 7,1%[102,105,112-114] (Tableau 2). Comme pour la prévalence radiographique, les raisons de cette variation seraient attribuables à des

différences méthodologiques (ex. : définition des symptômes, populations).[112] Elle est de 2 à 4 fois plus élevée chez les femmes,[102,105,112-114] sauf que deux études réalisées en Chine et au Japon ont démontré que la prévalence est plus élevée chez les hommes que chez les femmes.[31,105] Comme pour la prévalence radiographique, la prévalence symptomatique d'OTM augmente avec l'âge.[113] La prévalence symptomatique diffère selon les sexes et les pays : Américaines 9,3%, Américains 3,7%, Chinoises, 0,9%, Chinois 1,2%.[105]

2.4.3 Distribution des ostéoarthroses (OA) de la main

L'articulation interphalangienne distale (IPD) serait la plus touchée par l'OA radiographique (Tableau 3), suivie de l'articulation TM, puis l'articulation interphalangienne proximale (IPP) ou métacarpo-phalangienne (MCP). Quant aux OA (Tableau 4), l'IPD est la plus affectée, suivie de l'IPP. Toutefois, l'OTM peut être la plus prévalente selon une étude.[22] Cette différence serait attribuable à des différents méthodologies (critères de sélection, critères de symptômes, définition de la présence d'OA interphalangienne).

Tableau 2. — Prévalence symptomatique de l'OTM

Études, pays, devis	Taille d'échantillon (# de femmes)	Population	Groupe d'âge	Critères de symptômes	Prévalence totale	Prévalence chez les femmes	Prévalence chez les hommes	Ratio femmes/ hommes
Dillon 2007,[112] ÉU, étude transversale auprès d'un échantillon multiétagé par grappe et starification	2498 (1181)	À l'échelle nationale (*the Third U.S. National Health and Nutrition Examination Survey)*	60 +	Présence de douleur, endolorissement, ou raideur pendant ≥ 6 semaines; ≥ 2 articulations élargies (TM, nodules d'Heberden ou de Bouchard) ; ≤ 3 articulations MCP enflées ou ne répond pas aux critères d'arthrite rhumatoïde de l'ACR; présence des nodules d'Heberden bilatérale	1,9%	2,9%	Non présenté, car l'estimation n'est pas statistiquement fiable selon les auteurs.	N/A
Haugen 2011,[102] ÉU, étude observationnelle longitudinale (suivi biannuel d'un échantillon aléatoire par secteur de recensement)	2301 (1300)	Progénitures de la cohorte originale de l'étude *Framingham* et leurs conjoints (1992-1995) et une novelle cohorte (2002-2005)	40-84	Présence de douleur ou endolorissement lors de palpation et/ou de mouvement du pouce	4,8%	7,0%	2,0%	3,5
Wolf 2014,[113] Suède, révision d'un registre de soins de santé	780204 (Non rapporté)	Région *(the Skåne Health Care Register)*	20 +	Déterminés par chaque médecin	1,4%	2,2%	0,6%	3,7
Zhang 2002,[114] ÉU, étude observationnelle longitudinale (suivi biannuel d'un échantillon aléatoire par secteur de recensement)	1032 (668)	Communauté *(The Framingham Study)*	71-100	Présence de douleur, endolorissement, ou raideur la plupart de temps	4,2%	5,1%	2,6%	2,0
Zhang 2003,[105] Chine, étude transversale auprès d'un échantillon aléatoire par secteur de recensement	2525 (1503)	Quatre communautés *(The Beijing OA Study)*	60 +	Présence de douleur, endolorissement, ou raideur la plupart de temps	1,0%	0,9%	1,2%	0,8
Zhang 2003,[105] ÉU, étude observationnelle longitudinale (suivi biannuel d'un échantillon aléatoire par secteur de recensement)	1628 (978)	Progénitures de la cohorte originale de l'étude *Framingham* et leurs conjoints (1993-1994)	21-81	Présence de douleur, endolorissement, ou raideur la plupart de temps	7,1%	9,3%	3,7%	2,5

#, nombre; ÉU, États-Unis; N/A, non applicable; OTM, ostéoarthrose trapézo-métacarpienne; RU, Royaume-Uni.

Tableau 3. – Distribution des OA radiographiques de la main

Études	Taille d'échantillon	# de femmes	Groupe d'âge	Classification et critère de la présence d'OA	TM (%)	MCP (%)	IPP (%)	IPD (%)
Dahaghin 2005,[20] Pays-Bas	3906	2101	55 +	Kellgren-Lawrence (1-4) ≥ Niveau 2	35,8	8,2	18,2	**47,3**
Haughen 2011,[26] ÉU	2301	1300	28+	Kellgren-Lawrence (1-4) ≥ Niveau 2	F 32,9	F 6,8	F 16,5	**F 35,1**
					H 30,3	H 11,9	H 13,5	H 28,7
Kodama 2016,[31] Japon	1635	1028	40 +	Kellgren-Lawrence (1-4) ≥ Niveau 2	F 33-40*	F 1-16*	F 17-41*	**F 57-71***
					H 34-40*	H 2-16*	H 16-28*	**H 45-64***
Marshall 2011,[115] RU	592	367	50 +	Kellgren-Lawrence (1-4) ≥ Niveau 2	45	24	33	**58**
Zhang 2003,[105] Chine	2525	1503	60 +	Kellgren-Lawrence (1-4) ≥ Niveau 2	F 14,5	F 15,8	F 13,3	**F 36,9**
					H 19,4	H 20,7	H 7,1	**H 32,6**
Zhang 2003,[105] ÉU	1628	978	21-81	Kellgren-Lawrence (1-4) ≥ Niveau 2	F 57,0	F 28,9	F 48,3	**F 77,9**
					H 44,2	H 32,6	H 31,7	**H 63,5**

ÉU, États-Unis; F, femmes; H, hommes; IPD, interphalangienne distale; IPP, interphalangienne proximale; MCP, métacarpo-phalangienne; OA, ostéoarthrose; RU, Royaume-Uni; TM, trapézo-métacarpienne.

*Comptabilisés en fonction de chaque doigt (droit, gauche, index, majeur, annulaire, auriculaire) et non l'ensemble de la main.

Tableau 4. – Distribution des OA symptomatiques de la main

Études	Taille d'échantillon	# de femmes	Groupe d'âge	Critères de symptômes	TM (%)	MCP (%)	IPP (%)	IPD (%)
Dillon 2007,[112] ÉU	2498 (la population générale)	1181	60 +	Présence de douleur, endolorissement, ou raideur pendant ≥ 6 semaines; ≥ 2 articulations élargies (TM, nodules d'Heberden/Bouchard) ; ≤ 3 articulations MCP enflées ou ne répond pas aux critères d'arthrite rhumatoïde de l'ACR; présence des nodules d'Heberden bilatérales	1,9	N/A	4,7	**5,4**
Marshall 2013,[22] RU	6306 (individus avec OA)	3333	50-98	Présence de douleur, endolorissement, ou raideur pendant ≥ quelques jours durant le dernier mois	**22,4**	N/A	20,4 (≥ 2 articulations)	
Zhang 2002,[114] ÉU	1032 (la population générale)	663	71-100	Présence de douleur, endolorissement, ou raideur la plupart de temps	F 5,0-5,1*	F 0,3-1,7*	F 6,0-9,3*	**F 8,5-11,9***
					H 2,2-3,0*	H 0,0-0,5*	H 2,2-3,6*	**H 1,6-4,4***
Zhang 2003,[105] Chine	2525 (la population générale)	1503	60 +	Présence de douleur, endolorissement, ou raideur la plupart de temps	F 0,9	F 0,9	F 2,3	**F 3,4**
					H 1,2	H 1,2	H 0,6	H 1,2
Zhang 2003,[105] ÉU	1628 (la population générale)	978	21-81	Présence de douleur, endolorissement, ou raideur la plupart de temps	F 9,3	F 2,6	F 12,1	**F 17,6**
					H 3,7	H 1,4	H 4,9	**H 7,5**

ACR, American College of Rhumatology; ÉU, États-Unis; F, femmes; H, hommes; IC, intervalle de confiance; IP, interphalangienne; IPD, interphalangienne distale; IPP, interphalangienne proximale; MCP, métacarpo-phalangienne; N/A, non applicable; RU, Royaume-Uni; TM, trapézo-métacarpienne.

*Comptabilisés en fonction de chaque doigt (droit, gauche, index, majeur, annulaire, auriculaire) et non l'ensemble de la main.

2.4.4 Écart entre la prévalence radiographique de l'OTM et celle symptomatique

Tel que rapporté à la section précédente 2.2.1, il y a un grand écart entre la prévalence radiographique de l'OTM et celle symptomatique. Cet écart pourrait s'expliquer en partie par les preuves conflictuelles concernant les associations entre les données radiographiques et la douleur (absente,[27-29] faible,[20,31,32,46] forte[33]). En d'autres mots, les individus peuvent manifester des modifications morphologiques importantes et ressentir peu ou pas de douleur, donc ne cherchent pas de soins pour cette condition.[28,34] Les associations entre la sévérité d'OTM radiographique et les incapacités fonctionnelles sont aussi rapportées absentes[30] ou faibles.[20,27,46] La sévérité radiographique d'OTM ne prédit pas non plus l'incapacité au travail.[46] Néanmoins, le stade avancé (destruction complète de l'articulation TM) peut être un bon prédicteur de la limitation fonctionnelle.[27]

La raison des preuves conflictuelles entre les données radiographiques et les symptômes serait d'une part expliquée par la sensibilité limitée du rayon X aux changements structuraux, notamment des composantes inflammatoires telles que la synovite ou des lésions de la moelle osseuse[116] qui ne pourraient être observées que par l'ultrason ou l'IRM. Toutefois, les données ultrasoniques ne sont pas statistiquement associées avec le niveau de douleur à la palpation.[33] Les associations entre les données d'IRM et la douleur deviennent non significatives lorsqu'elles sont ajustées par la présence d'ostéophytes radiographiques.[33] Face à la sévérité de douleur non explicable par des données objectives, l'on peut se pencher sur le rôle possible de certains facteurs psychosociaux.[28,34,35] Pour ce faire, les facteurs biopsychosociaux qui peuvent influencer une apparition ou aggravation d'OTM radiographique et celle symptomatique ont été recensés et présentés dans la section suivante.

2.5 Facteurs associés à l'OTM

2.5.1 OTM radiographique

2.5.1.1 Facteurs biologiques

Tel que mentionné à la section précédente, l'âge[20,31,35,46,103,104,106-108,115,117] est associé avec la sévérité d'OTM radiographique. Haara et al. (2004, Finlande)[46] ont démontré une association positive entre ces deux variables (rapport de cote (OR) = 2,6 95%IC 2,4-2,8 pour une augmentation de 10 ans). Quant au

sexe, sa relation avec l'OTM radiographique n'est pas concluante : six études ont révélé une association significative entre le sexe féminin et la présence d'OTM[20,35,46,103,104,117] tandis qu'une étude, entre le sexe masculin et l'OTM.[105] Six autres études ont démontré que l'écart entre les deux sexes était moindre.[26,105-107,115,118] Le pays d'origine peut être aussi un facteur associé avec l'OTM radiographique. Les asiatiques (Chinois et Japonais) présentent moins d'évidences radiographiques d'OTM que les Américains.[105,109] Le rapport des cotes (OR) de la prévalence chinoise vs la prévalence américaine chez les hommes est de 0,46 (95%IC 0,40-0,53, ajustés pour l'âge) et chez les femmes, 0.31 (95%IC 0,27-0,35).[105] L'OR de la prévalence japonaise vis-à-vis américaine est de 0,15 (95%IC 0,11-0,22); l'OR des hommes entre ces deux nationalités n'a pas été étudié.[109] Par ailleurs, les auteurs de l'étude[109] avertissent que cette différence peut être attribuable à d'autres facteurs plutôt qu'à la nationalité, par exemple, utilisation des baguettes vs fourchettes et couteaux.

L'influence génétique sur l'OTM radiographique est mise en évidence par plusieurs études. Par exemple, les sœurs d'une femme atteinte d'OTM ont un risque relatif (RR) de 6,9 d'avoir une OTM.[119] Des associations entre l'OTM et le gène MATN3[120-122] (encodeur de la protéine de matrice extracellulaire de cartilage non collagène) et le gène de rétinaldéhyde déshydrogénase 2 (ALDH1A2)[55,123] sont aussi rapportées.

L'obésité est faiblement associée avec l'OTM radiographique : OR = 1.29 (95%IC 1,15-1,43) pour une augmentation de 5kg/m^2,[46] et OR = 1.71 (95%IC 1.05-2.78) pour l'indice de masse corporelle (IMC) de 23,4-26,4 par rapport à l'IMC < 23,4 (RU, n = 1003).[124] Ces associations positives entre l'obésité et les articulations qui ne portent pas de poids corporels pourraient être dues à des mécanismes métaboliques altérés reliés à l'hypertension, la dyslipidémie ou le diabète.[22] L'hypermobilité articulaire est associée avec le développement d'OTM.[70,125-129] Ceux qui présentent une hyperextension de ≥ 70˚ dans l'articulation MCP ont trois fois plus de chances d'avoir une OTM sévère (OR = 3,05 (95%IC 1,69-5,5), i.e., le niveau ≥ 3 marqué par la classification de Kellgren-Lawrence[130]). L'OTM est plus présente dans les pouces gauches (30,2%) que ceux à droites (25,8%),[20] du moins, en ce qui concerne le niveau d'ostéophytes.[108] Cependant, le niveau de réduction spatiale de l'articulation TM et celui de sclérose osseuse sont à peu près les mêmes pour les deux pouces.[108]

2.5.1.2 Facteurs sociaux

Aucune association n'a été identifiée entre le niveau d'éducation et la sévérité de l'OTM[46] ou de l'OA de la main.[89] Une étude néerlandaise (n = 460)[89] a par ailleurs montré que le fait d'être marié (ou en cohabitation) et le fait d'être employé seraient légèrement associés avec la présence d'OA de la main. Les

OR ajustés sont 1,8 (95%IC 1,3-2,6) et 2,2 (95%IC 1,6-3,2) respectivement.[89] Cette étude n'a pas expliqué, toutefois, pourquoi ces facteurs seraient associées à l'OA radiographique. On peut spéculer que vivre avec quelqu'un qui nécessite des soins (ex. : conjoint en perte d'autonomie, jeune enfant) pourrait solliciter davantage le pouce et par conséquent augmenter l'usure articulaire. Être à l'emploi pourrait également augmenter l'usage du pouce et pourrait ainsi précocement endommager l'articulation en question.

2.5.1.3 Facteurs occupationnels

L'occupation semble aussi contribuer au développement de l'OTM radiographique. Une forte association entre des mouvements répétitifs du pouce (> 20 mouvements/minute et/ou flexion-extension du pouce au moins une fois/minute) et la sévérité de l'OTM (OR = 11,91, 95%IC 3,65-38,86) et une association modérée entre des pauses insuffisantes (perçues par les participants) et la sévérité radiographique (OR = 5,95, 95%IC 1,66-21,28) ont été rapportées (n = 161, France).[44] La dactylographie a été identifiée comme une occupation à risque (OR = 5,0, 95%IC 1,27-19,59).[45] L'usage rapide et répété de certains mouvements du pouce pourrait augmenter les stress mécaniques sur l'articulation et occasionner des changements dégénératifs du cartilage articulaire.[44] D'autres facteurs occupationnels tels que la charge de travail physique, l'occupation manuelle générale, la pince fine ou forte, la préhension manuelle, la pression sur l'éminence thénarienne du pouce, l'exposition à la vibration ou au froid, les conditions psychosociales ou organisationnelles au travail ne seraient pas associées à la sévérité radiographique de l'OTM. [32,44,46]

2.5.2 OTM symptomatique

Les facteurs de risque associés à la sévérité des symptômes d'OTM (douleur, incapacité fonctionnelle) n'ont pas été autant étudiés que dans d'autres OA douloureuses (ex. : genou, hanche), notamment les facteurs sociaux. Par conséquent, la section 2.5.2.3 comprend aussi des données scientifiques relatives à la douleur chronique d'origines arthrosiques autres que l'OTM.

2.5.2.1 Facteurs biologiques

Selon la littérature scientifique disponible, les rôles des facteurs biologiques (sexe, sévérité radiographique) sont controversés en tant que prédicteurs des symptômes reliés à l'OTM. Zhang et al. (2003)[105] rapportent que l'âge et la nationalité sont significativement associés à l'OTM symptomatique : le ratio de la prévalence des hommes chinois comparé à celle des hommes caucasiens est de 0,34 (95%IC 0,15-0,53) (ajusté pour l'âge); et le ratio de la prévalence des Chinoises par rapport à celle des Américaines

est de 0,08 (95%IC 0,04-0,12). Toutefois, l'influence du sexe diffère selon le pays : en Chine, la prévalence est plus élevée chez les hommes que les femmes tandis que la prévalence des Américaines est supérieure que celle des Américains (Tableau 2). Le rôle d'hyperextension de l'articulation MCP du pouce sur les symptômes d'OTM n'est pas clair. L'hyperextension active de cette articulation semble ne pas être associée à la douleur au pouce.[28,34] Toutefois, l'hyperextension passive de la MCP pourrait entraver les capacités fonctionnelles, mais cette variable n'aurait pas de rapport avec la douleur à la base du pouce.[34] Le pouce de la main dominante semble moins susceptible à la douleur à l'articulation TM selon une étude japonaise,[31] soit 34,0%, comparativement au pouce de la main non dominante, 39,5%.

2.5.2.2 Facteurs psychologiques

Selon quelques études,[27,29,30,32,34] certains facteurs psychologiques ont été associés à la sévérité de la douleur et/ou des incapacités fonctionnelles dans l'OTM en utilisant l'analyse de régression multiple.

Un modèle de l'intensité de la douleur de Hoogendam et al. (2019, n = 255, Pays-Bas)[32] expliquerait 43,9% de la variabilité par la détresse psychologique, la pensée catastrophique et la perception de la maladie, tandis que l'âge, le sexe, le niveau d'activités physiques au travail, et la sévérité radiographique n'étaient pas significativement associés à la sévérité de la douleur.

Pour les incapacités fonctionnelles, quatre études américaines[27,29,30,34] ont été menées afin de déterminer la contribution de certains facteurs psychologiques. Lozano-Calderon et al. (2008, n = 72, ÉU)[30] ont démontré que la dépression et le catastrophisme mais non l'anxiété expliquaient 51% de la variance dans la sévérité des incapacités fonctionnelles. L'âge, le sexe, la sévérité radiographique et le choix de traitement (chirurgie vs traitement conservateur) ont été exclus du modèle, puisque les analyses bivariées préalables n'ont pas détecté de relation statistiquement significative avec la variable dépendante. Le modèle de Hwang et al. (2011, n = 122, ÉU)[27] a expliqué 52% de la variance par la sévérité radiographique d'OTM, l'intensité de la douleur au pouce et celle ailleurs dans le bras. Quant à Calfee et al. (2014, n = 94, ÉU),[29] ils ont identifié des symptômes dépressifs et d'autres affections au niveau du membre supérieur qui expliquaient 34% de la variance dans la fonction de la main, mais non le sexe. Les modèles de régression de Becker et al. (2014, n = 128, ÉU)[34] ont montré que les pensées catastrophiques face à la douleur, les niveaux dépressifs et/ou le degré d'auto-efficacité face à la douleur étaient significativement associés aux incapacités fonctionnelles.

2.5.2.3 Facteurs sociaux

Les rôles des facteurs sociaux sur les symptômes de l'OTM ou l'OA sont moins clairs. L'état marital,[34] le niveau d'éducation,[42] le statut d'emploi[34] et l'ethnicité (hispanophone ou non)[34] ne présentaient pas de liens avec les symptômes reliés à l'OTM selon les analyses de régression bivariées de deux études (2014, n = 128, ÉU)[34] ou (2013, n = 62, ÉU).[42] Les liens entre la douleur arthrosique du genou, la cohabitation et le niveau d'éducation sont inconsistants (revue systématique narrative, 2016).[131] Une étude auprès de 267 individus avec l'OA du genou (147 afro-américains, 120 blancs non hispaniques, 2014, ÉU)[132] a démontré que les différences raciales/ethniques deviennent non significatives lorsque le niveau d'éducation et le revenu familial sont intégrés dans les modèles de sévérité de la douleur, ajustés pour l'âge, l'indice de masse corporelle et le site d'étude. Des niveaux d'éducation et de revenu plus élevés semblaient protecteurs.[132] Il est possible que le niveau d'éducation et le revenu familial aient des effets médiateurs entre les races/ethnies et la douleur.[132]

2.5.2.4 Facteurs occupationnels

L'étude transversale de Hoogendam et al. (2019, n = 255, Pays-Bas)[32] n'a identifié aucune association significative entre le niveau d'activités physiques au travail et la sévérité de la douleur de l'OTM.

2.6 Composantes psychologiques de la douleur et modalités thérapeutiques ciblant ces composantes en thérapie de la main (Article 1 - Pain-related psychological issues in hand therapy)

Tel que constaté dans la section 2.5.2, les associations des facteurs psychosociaux aux symptômes d'OTM ont été très peu étudiées. Alors, deux revues narratives de la littérature ont été menées afin d'identifier les facteurs psychosociaux pouvant influencer l'expérience de la douleur reliée à des pathologies plus élargies : (1) dans le domaine de la thérapie de la main présentée ici dans la forme d'un article, et (2) dans le domaine d'OA présentée dans la section 2.7 dans la forme d'un article également. Des interventions ciblant ces facteurs psychosociaux ont également été identifiées dans ces deux revues narratives.

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Article publié dans la revue Journal of Hand Therapy 2018; 31 : 215-226 (https://doi.org/10.1016/j.jht.2017.12.009).[133]

En tant qu'auteure principale, je confirme mon apport majoritaire à l'ensemble de cette revue narrative, soit la recherche des articles pertinents et la rédaction sous la supervision de ma directrice de recherche,

D^re Manon Choinière. Le 2^e auteur, D^r René Pelletier, a considérablement contribué la partie 2.6.3. Tous les auteurs ont révisé le manuscrit et approuvé la version finale.

2.6.1 Abstract

Introduction: Pain is a subjective experience that results from the modulation of nociception conveyed to the brain via the nervous system. Perception of pain takes place when potential or actual noxious stimuli are appraised as threats of injury. This appraisal is influenced by one's cognitions and emotions based on her/his pain-related experiences, which are processed in the forebrain and limbic areas of the brain. Unarguably, patients' psychological factors such as cognitions (e.g., pain catastrophizing), emotions (e.g., depression), and pain-related behaviors (e.g., avoidance) can influence perceived pain intensity, disability, and treatment outcomes. Therefore, hand therapists should address the patient pain experience using a biopsychosocial approach. However, in hand therapy, a biomedical perspective predominates in pain management by focusing solely on tissue healing.

Purpose of the Study: This review aims to raise awareness among hand therapists of the impact of pain-related psychological factors.

Methods and Results: This literature review allowed to describe (1) how the neurophysiological mechanisms of pain can be influenced by various psychological factors, (2) several evidence-based interventions that can be integrated into hand therapy to address these psychological issues, and (3) some approaches of psychotherapy for patients with maladaptive pain experiences.

Discussion and Conclusion: Restoration of sensory and motor functions as well as alleviating pain is at the core of hand therapy. Numerous psychological factors including patients' beliefs, cognitions, and emotions alter their pain experience and may impact on their outcomes. Decoding the biopsychosocial components of the patients' pain is thus essential for hand therapists.

2.6.2 Introduction

Pain in upper limb caused by a musculoskeletal disorder (MSD) is one of the main reasons why patients are referred to hand therapy. Many hand therapists rely on a purely biomedical approach to alleviate pain by focusing solely on the injured or degenerated tissues and helping to restore physical function.[134]

Nevertheless, it is well established that the pain experienced by MSD patients can be influenced by psychosocial factors such as the tendency to catastrophize in the face of pain, depression, and social support.[86,87,135-139] Furthermore, on a population level, the association between pain intensity and severity of tissue lesion may vary greatly and be absent to weak.[20,28,140-142] Therefore, it appears that pain is not a simple function of anatomical insult, but involves a complex interrelationship between the biological processes and psychosocial factors.[17,143,144] Pain is doubtlessly a highly complex phenomenon which involves multiple components and makes it a difficult experience to assess for clinicians. The biopsychosocial model of pain proposed by Gatchel (see Figure 4)[16,17] is helpful to understand this complex phenomenon. This model differentiates the concepts of *pain* and *nociception* where *pain* is the subjective experience that results from the modulation of the sensory information conveyed via the neural processes to the brain, that is, *nociception.* According to this model, the pain experience is unique for each individual because it is modulated by the reciprocal interactions among biological (e.g., genetics, neural processes across the neuraxis), psychological (e.g., cognition, emotions, past learning), and social factors (e.g., social support, culture).[16,17] Accordingly, understanding patients' *pain* is capturing how they react to *nociception*: what the nociceptive information conveyed by the nervous systems means to patients, is it perceived as a serious threat or a manageable situation? (pain cognitions); how patients feel in response to nociception, are they anxious or under control? (pain emotions); and how they behave, do they avoid potentially painful gestures or continue their life as before (pain behaviors)? Thus, when hand therapists face patients' pain, they need to understand the nociceptive origin (biological), their pain-related thoughts, emotions, and behaviors (psychological) which themselves interact with social factors.[16,145-147] The use of a biopsychosocial model provides both increased predictive power for the development of chronicity of symptoms.[148-150] Used as a treatment model for MSD, biopsychosocial models are associated with better outcomes than biomedically oriented interventions.[151,152] Indeed, pain management in a biopsychosocial perspective is not only acknowledged as a key feature but also widely recognized as the best treatment approach[18,19] and this can be best done by multidisciplinary teams as recommended by various pain-expert organisations including the *International Association for the Study of Pain* (IASP).[19,153,154]

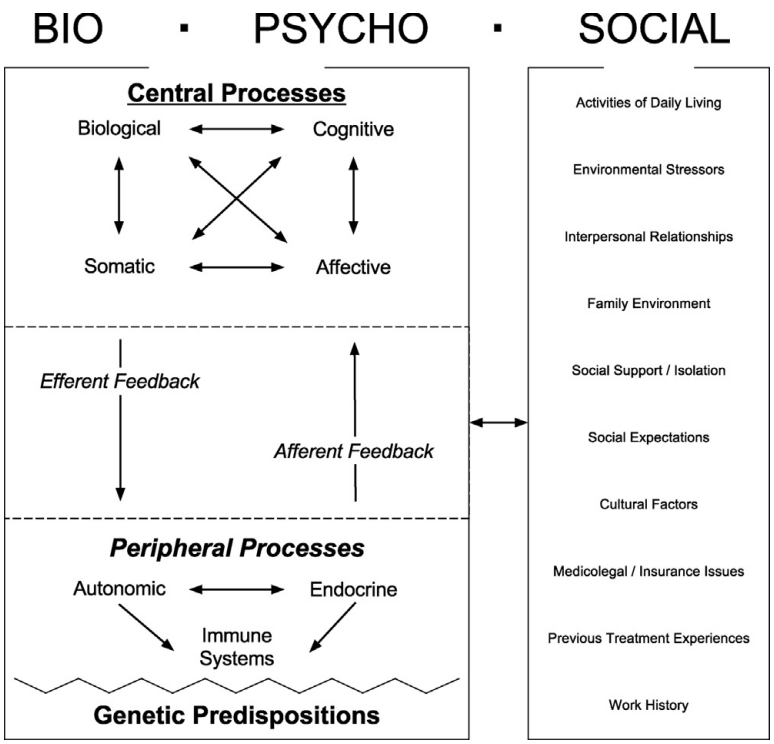

Figure 4. – A conceptual model of the biopsychosocial interactive processes involved in health and illness (Gatchel, 2004)[17]

The importance of integrating pain-related psychological factors in hand therapy was highlighted in a special edition of the *Journal of Hand Therapy* (JHT) in 2011.[155] However, the tendency to focus solely on biophysical pain aspects continues to persist. For example, among more than 50 scientific articles published in the JHT between October 2016 and September 2017, only four included psychosocial factors as either dependent or independent variables, namely, self-efficacy,[156,157] health literacy,[158] and compliance.[159] Since pain affects hand function[160-163] and is influenced by psychosocial factors,[138] hand therapy without integrating these important dimensions is surely not optimal. There are several reasons why psychological issues are still almost absent from hand therapy. As demonstrated by a recent study investigating attitudes among American orthopedic surgeons, the main barriers for addressing these issues were lack of time, stigma associated with psychological factors, and lack of adequate training.[164] There is good reason to believe that the same is true for hand therapists. However, if the clinicians are convinced of the importance of psychological influences on patients' recovery, they will act on these issues by prioritizing their interventions despite lack of time.

This review, therefore, aims to 1) raise awareness among hand therapists of the impact of pain-related psychological risk factors by reviewing the neurophysiological mechanisms of pain and describing how they can be influenced by various psychological factors, 2) propose several evidence-based interventions that can be integrated into hand therapy to address these psychological issues, and 3) describe some approaches of psychotherapy for patients with maladaptive pain experiences.

2.6.3 Neurophysiological mechanisms of pain

The following section provides a brief review of the neurophysiology of pain (Figure 5). For more details, the readers are referred to the reviews of Apkarian (2011),[165] Baliki and Apkarian (2015),[144] Basbaum et al. (2009),[166] and Bushnell (2013).[143]

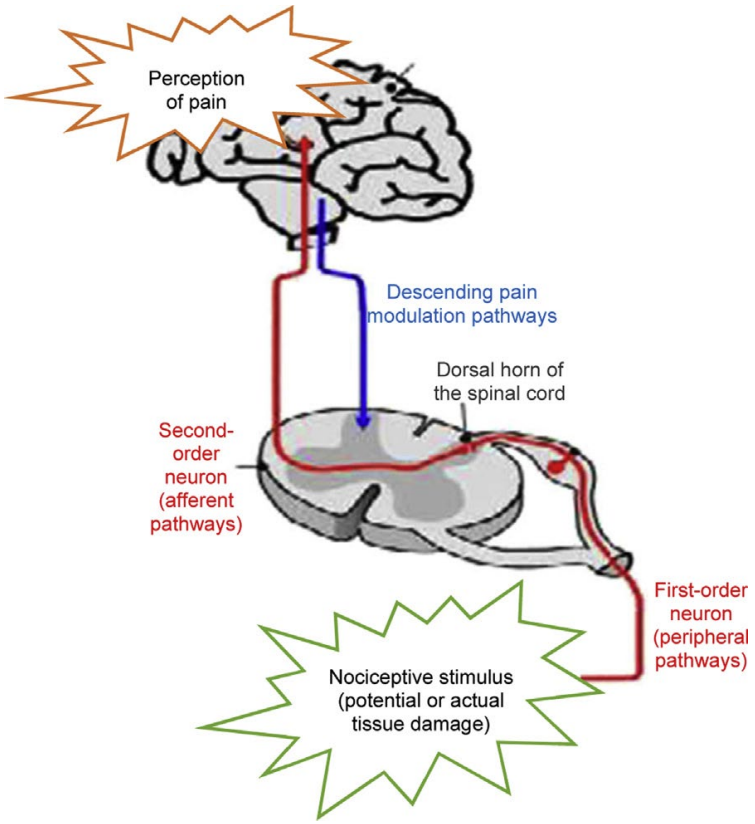

Figure 5. – Peripheral and central pain pathways

Adapted from Nijs J, Van Houdenhove B.[167] From acute musculoskeletal pain to chronic widespread pain and fibromyalgia: application of pain neurophysiology in manual therapy practice. *Manual Therapy.* 2009;14(1):3-12. (Reprint permission obtained from RightsLink®)

2.6.3.1 Peripheral pathways: From the nociceptors to the dorsal horn of the spinal cord

When one's body receives potential tissue-damaging stimuli such as heat or pressure, these noxious stimuli are detected by free nerve endings (nociceptors) that, once converted into nerve impulses, transmit nociceptive information along first-order Aδ- or C-fibers.[168,169] These first-order neurons synapse onto second-order neurons in the dorsal horn of the spinal cord. When tissue damage occurs, inflammatory mediators (e.g., tumour necrosis factor-α, nitric oxide, bradykinin) also act directly or indirectly on nociceptors and nociceptive transmission.[170]

2.6.3.2 Ascending pain pathways: From the dorsal horn of the spinal cord to the brain

The second-order neurons convey the nociceptive information from the spinal cord to the brain stem in areas involved in arousal and attention and via the thalamus, to primary and secondary cortical somatosensory areas which are specialized in the processing of the sensory-discriminative dimensions of pain (e.g., location and duration of the stimulus).[143,166] Projections from the brain stem, thalamus, and somatosensory areas also target the limbic, mesolimbic and prefrontal areas such as the ventral tegmentum, nucleus accumbens, prefrontal cortex, cingulate cortex, amygdala, and hippocampus.[143,166] These areas are involved in the processing of the cognitive, affective, and motivational dimensions of nociception.[143,166] The pain experience is reflective of the processing of these structures which integrates the individual's past experiences, values, expectations, cultural beliefs, and salience relative to the self in response to nociception.[144,171-177] Therefore, the pain experience for the individual suffering from upper limb MSD is the result of a complex perceptual process by the peripheral and central nervous systems that involve various sensory-discriminative, cognitive, affective, and motivational aspects.

2.6.3.3 Descending pathways of pain modulation: From the brain to the spinal cord dorsal horn

Multiple descending pain pathways originating in the brain modulate ascending nociceptive signals in the dorsal horn of the spinal cord. Descending modulation of nociceptive input involves a balance between inhibitory and facilitatory processes that are dictated by behavioral priorities and altered by pathological and psychological (that is, cognitive, affective and motivational) states.[172] Under normal circumstances, activity in the descending modulatory pathways decreases the transmission of nociceptive stimuli by impacting nociceptive transmission within the dorsal horn of the spinal cord.[172] These descending modulatory systems are influenced by limbic, mesolimbic and prefrontal structures as described above. These descending systems, under certain conditions, may amplify the nociceptive transmission within the dorsal horn of the spinal cord, inducing *central sensitization*.[173,178-180] *Central sensitization* is an amplification of neural signaling within the central nervous system, due to increased excitation or reduced

inhibition, that elicits pain hypersensitivity.[181] The changes associated with central sensitization are multifactorial, being reflected by neuro-molecular, structural and functional changes within the nociceptive pathways as the result of central (i.e., descending modulatory processes) and peripheral factors (e.g., inflammation, peripheral neuropathy).[179,181-184]

Perception of pain takes place when the brain interprets the noxious signal as a threat of injury.[144] It is hypothesized that the conversion of (potential) nociception to conscious pain perception relies on the cortico-limbic threshold which appraises the noxious input,[144] and nociceptive magnitude may be modulated by psychological factors such as cognition, mood, attention, and expectation.[143,185-187] This is why perception of pain intensity is not proportionally related to magnitude of nociception. For example, injured soldiers in the battlefield may not feel any pain, and conversely, observing significant others experiencing pain can induce pain and activates some pain-related brain regions in the observer's brain.[143,188]

2.6.3.4 From acute to chronic pain

Many factors can be involved in the transition from an acute to a chronic pain state.[182,189,190] Some authors suggest that pain chronicity occurs when there is a long-term shift in the cortico-limbic mechanisms which converts (potential) nociception to pain in genetically predisposed individuals.[144,191] This long-term shift is believed to enhance pain-related learning which will be imprinted in memory.[144] Maladaptive pain thoughts and behaviors may also be involved in the transition from acute to chronic pain.[192,193] For example, activity changes in the forebrain areas have been found in patients with chronic pain who tend to catastrophize pain[194,195] and display conditioned fear responses such as avoidance.[196] As mentioned earlier, several neuroimaging studies have demonstrated some brain activity shifting from the somatosensory areas to the cognitive-affective-motivational centers.[197,198] This shift suggests important links between pain, emotion and memory, that is, suffering from chronic pain depends on the psychological states rather than the nociceptive stimuli[199-201] when pain can no longer be explained by tissue lesion. This link between pain and psychological issues suggests that the biomedical assumption – there has to be nociception to have pain – may not be always true. In the light of these findings, Apkarian proposes the definition of chronic pain as "*a persistence of the memory of pain and/or the inability to extinguish the memory of pain evoked by an initial inciting injury*".[201] Moreover, it is worth mentioning that the IASP has recently acknowledged "nociplastic pain" which designates "pain that arises from altered nociception despite no clear evidence of actual or threatened tissue damage causing the activation of peripheral nociceptors or evidence for disease or lesion of the somatosensory system causing the pain".[202]

2.6.4 MSD pain-related psychological factors

Several psychological factors can positively or negatively influence pain and disability associated with MSD. These factors which impact on pain perception via the central nervous system have functional consequences on patient's responses to nociceptive input, their pain experience, their methods of coping with pain, and ultimately their outcomes. These psychological factors are classified into the following categories: cognitive, affective, and behavioural.[203]

2.6.4.1 Cognitive factors

Pain cognitions are how individuals appraise potential or real nociceptive stimuli based on their previous experiences and salience to the self. For example, non-noxious input may be appraised as a threat. Individuals may feel pain in the absence of an apparent noxious input. As well, actual tissue damage may not evoke any pain. The cognitive factors which influence pain perception are presented as follows.

2.6.4.1.1 Pain self-efficacy

Pain self-efficacy is "*the sense that one will be able to manage pain*".[204] This pain-related factor is protective, associated with less severe pain and better function in MSD patients[205-210] and appears to be one of the best predictors of better outcomes.[205,206,210,211] Helping patients to reinforce their self-efficacy by promoting effective coping strategies is a critical aspect of rehabilitation for patients suffering from pain (see Section 3.2.5).

2.6.4.1.2 Pain catastrophizing

Pain catastrophizing is an "exaggerated negative orientation to actual or anticipated pain comprising elements of rumination, magnification and helplessness".[212,213] Patients with this maladaptive thinking have "a tendency to magnify the pain experience, to feel helpless when thinking about pain, and to ruminate on the pain experience".[139] Pain catastrophizing has been associated with increased pain, numbness, and/or disability in different pain conditions including upper limb MSD.[142,205,207,208,214-219] Pain catastrophizing at 1 to 2 months post-fracture has been shown to be a better predictor of pain and disability 8 months later than other psychological factors such as depression, anxiety, and post-traumatic stress disorder.[220] Reducing the tendency to catastrophize in the face of pain has been shown to be the best predictor for successful rehabilitation of low back pain and whiplash injury.[214,215,221] To our knowledge, no such studies have been conducted in patients with painful upper limb MSD.

2.6.4.1.3 Perceived injustice

Perceived injustice is "an appraisal cognition comprising elements of the severity of loss consequent to injury, blame, a sense of unfairness, and irreparability of loss".[213,222,223] This factor has been associated with increased pain intensity and this relationship has been shown to be positively mediated by anger[224] and negatively by self-efficacy.[225] Other studies also documented the influence of perceived injustice on pain behaviors, disability, and depressive symptoms.[206,213,222] For example, this psychological factor has been shown to be a predictor of work disability one year after injury among individuals with back and neck injuries.[222]

Patients' feelings of injustice may be directed to their employers, colleagues, person who caused the accident (e.g., driver), insurers, family, significant others, friends, and society.[226] Healthcare providers may also be viewed as sources of injustice due to inappropriate assessment/treatment, long wait times, and non-empathic attitudes (e.g., punitive responses to patient's pain expression, ignoring pain-related psychological problems, blaming pain on psychological aspects of patients).[226] It is therefore crucial that healthcare providers dispense care with empathy, in open, non-judgmental, and non-defensive manners to improve the therapeutic alliance with the patient.[226]

2.6.4.1.4 Negative pain thoughts

Negative pain thoughts refer to "*automatic, overprotective, unduly pessimistic thoughts triggered by nociception*" (e.g., "*hurt equals harm*").[147,227] These maladaptive thoughts have been shown to be associated with higher pain intensity scores, greater disability, and higher depression levels.[147,205,227] Negative pain thinking may lead to pessimistic misinterpretation of therapists' advice by the patients (e.g., "*You must make ergonomic adjustments to avoid pain*") and exacerbates maladaptive pain thoughts (e.g., "*Pain during hand therapy exercises means that I am causing damage or inflammation*").[147] To avoid this kind of misinterpretation, clinicians may encourage patients to be positive and active, for example, "*Movers do better. You want to be a mover*".

2.6.4.1.5 Cognitive fusion

Cognitive fusion is a "tendency for behavior to be overly regulated and influenced by cognition [such that] a person acts on thoughts as though they are literally true"[228] and, has been recognized as one of the strongest predictors of psychological distress.[229] Some studies have shown that this tendency may be associated with higher pain intensity scores and greater functional limitations in patients suffering from chronic pain of various origins including upper limb MSD.[229-231] Patients may be particularly maladaptive

when pain catastrophizing and cognitive fusion cohabit, as they are convinced that their catastrophic thinking about pain is true (e.g., "the pain will never improve").[231]

2.6.4.1.6 Psychological inflexibility

Psychological inflexibility consists of an "inability to take value-based actions in the presence of unwanted thoughts, feelings, or bodily symptoms" by "responding in a reflexive, habitual, or impulsive manner to internal private events (e.g., thoughts, emotions, sensations) or external situations, and often relying on avoidant coping strategies".[232,233] It involves six interrelated processes: experiential avoidance, cognitive fusion, attachment to conceptualized self, lack of contact with the present moment, lack of values clarity, and unworkable action.[234] For example, patients with psychological inflexibility may not perform daily activities, work, or do exercises despite the recognition of the benefits of these activities on their pain experience. Reducing psychological inflexibility has been shown to be directly and indirectly associated with decreasing pain intensity and disability in chronic pain patients including those suffering from upper limb MSD.[232,235-237]

2.6.4.1.7 Cognitive intrusion of pain

Cognitive intrusion of pain occurs in three steps: 1) pain distracts one's attention; 2) pain becomes the center of attention; then 3) the individual is no longer able to disengage from pain.[238,239] According to a study conducted among patients with upper limb MSD, cognitive intrusion of pain appears to mediate the relationship between pain intensity and pain interference with daily activities.[163] Based on the results of their study, the authors conclude that mindfulness meditation (see Section 3.3.2) might be useful for patients who display cognitive intrusion as it may help them to be conscious of how their attention is preoccupied by pain and learn to redirect their attention toward their ongoing activity by cognitive behavioral therapy (see Section 3.3.1).[163]

2.6.4.2 Emotional factors

As mentioned earlier, emotional factors can modulate pain perception. This may also be true for patients who suffer from painful upper limb MSD. The following types of emotion have been shown to influence the pain experience in this clientele of patients.

2.6.4.2.1 Depression

Greater symptoms of depression (e.g., diminished interest, low self-esteem, hopelessness) have been associated with greater pain severity, more disability, and poor treatment outcomes for various pain conditions.[207,209,216,240-246] They have been identified as a predictor of post-surgical pain and physical functional limitation subsequent to minor hand surgery[207] as well as return-to-work after rehabilitation among injured workers including upper limb MSD.[241] However, the influence of depressive symptoms may also depend on the type of diagnosis: one cross-sectional study conducted among 156 patients with trigger fingers (stenosing tenosynovitis) did not show any relationship between depression levels and pain intensity.[208]

2.6.4.2.2 Anxiety

Anxiety (e.g., restlessness, feeling tense) is another important psychological factor which can alter the pain experience. In the domain of hand therapy, an association between higher anxiety levels and increased pain intensity has been reported in patients with trigger finger, carpal tunnel syndrome, benign tumor.[142,207] Anxiety has been identified as an important predictor of chronic pain along with depression in patients undergoing extremity trauma.[247] Interventions aimed at reducing anxiety levels may therefore help to minimize or prevent chronic pain.[190] Finally, some psychologists and psychiatrists view anxiety and depression as highly related and recommend to consider both together when addressing psychological distress or emotional suffering.[248,249]

2.6.4.2.3 Health anxiety

Health anxiety, also termed hypochondriasis, is the "preoccupation with a belief in or fear of having a serious illness",[250] that is, an excessive illness concern despite of the lack of medical evidence.[251] Health anxiety has been associated with more pain-related limitations among patients with hand or arm disorders.[252-254] An association has also been found between health anxiety and the presence of an idiopathic type of pain[252-254] —i.e., pain which is vague, diffuse, nonspecific, and medically unexplained.[255] Moreover, idiopathic pain in upper limbs has been associated with poorer physical function.[255] Therefore, patients exhibiting health anxiety and suffering from idiopathic pain may require special attention in terms of management and be best supported by a multidisciplinary team.

2.6.4.2.4 Anger

Anger intensity and its regulation (either suppression or expression) negatively impact pain outcomes.[224,256-259] The sources of anger may stem from treatment failures, workers' compensation or other financial claims, problems with finances and family relationships (see also *Section 2.1.3*).[203]

2.6.4.2.5 Fear of pain and avoidance behaviors

The *Fear-avoidance model of pain,* introduced more than 30 years ago,[260] has been refined by J. Vlaeyen and others.[165] Fear of pain is an emotional response, often accompanied by anxiety and maladaptive cognitions such as negative pain thoughts or catastrophization.[165,261,262] It is provoked by anticipation of pain rather than a noxious stimulation, and causes avoidance of pain-provoking movements.[165,261,262] As seen here, the aforementioned psychological factors are, all intricately related concepts. Results of a meta-analysis (2016) revealed small to moderate associations between pain-related fear and pain intensity in different pain conditions (e.g., fibromyalgia, low back pain, upper limb pain).[263] Fear of pain has been identified as a predictor of pain chronicity[264,265] and may be more disabling than pain itself.[266] Along with catastrophic thinking, fear of movement and (re)injury (kinesphobia)[267] has been demonstrated to be among the most important predictors of upper-limb-specific functional limitations among patients with different upper limb conditions.[135] Avoiding exercise or activities not only results in disuse and subsequently deconditonning,[211] but also reinforces the erroneous beliefs that exercise/activities are harmful, which in turn increase patients' disability.[203] Prescribing untailored exercise/activities to fearful patients can also enhance this vicious cycle, thus, hand therapists should be extremely careful when choosing exercise or activities for these patients.[211]

2.6.4.2.6 Negative affectivity

Negative affectivity is the "predisposition toward negative thoughts and feelings, including worry, self-criticism, and negative misinterpretations of self, others and the future, and associated with psychological distress (depression, anxiety)."[268,269] Negative affectivity may lead to greater pain catastrophizing, kinesiophobia, anxiety, and less efficient coping strategies (e.g., avoidance), and thereby result in limited physical function.[269,270] Patients who suffer from chronic pain (including upper limb pain) and who exhibit negative affectivity traits may certainly benefit from support to improve their skills for managing stress and distress and enhancing their resiliency.

2.6.5 As hand therapists, how can we address pain-related psychological issues in our clinical practices?

That hand therapists have a clear understanding of the cognitive and emotional aspects of human illness behaviors is essential and imposes a switch from a biomedical to a biopsychosocial approach in their clinical practice. Key elements in pain management indeed involve 1) the early recognition of the role of psychological factors in the pain experience and maladaptive pain behaviors, 2) the need of sustained support, empathic communication, and redirection of patient maladaptive emotions and thinking towards more adaptive ones, and 3) the implication of professionals from other disciplines than hand therapy when required.[139,221,271] Ways to identify pain-related psychological risk factors, assessment tools, and interventions that can be incorporated into hand therapy are presented below. Some types of psychotherapeutic interventions are also discussed.

2.6.5.1 Identification of pain-related psychological risk factors

Maladaptive cognitions, beliefs and behaviors regarding pain should be recognized as early as possible even in acute stages. As hand therapists, we should create non-judgmental, comfortable environments for patients so that they can acknowledge and freely express their emotions and cognitions. Some statements or specific words that patients employ when communicating with their healthcare providers may help therapists to identify patients' distress and maladaptive pain experiences.[272] Bot et al. (2012)[272] went through as many as 61 interviews with patients with upper limb MSD and identified that statements such as "*I can't"* interpreted as "*It's disabling*", and "*Something is wrong*" interpreted as "*It's difficult to believe that I'll be OK*" may be suggestive of the presence of maladaptive cognitions and/or pain catastrophizing which can in turn affect the pain experience. Once patients' maladaptive cognitions or behaviors are detected, well-validated tools can be used to confirm their presence (see Table 5).

Table 5. – Most commonly used instruments for assessing pain-related psychological factors

Psychological factors	Assessment tools
Cognitive factors	
Pain self-efficacy	• *Pain Self-Efficacy Questionnaire*[273]
Pain catastrophizing	• *Pain Catastrophizing Scale*[101]
Perceived injustice	• *Injustice Experience Questionnaire*[222]
Negative pain thoughts	• *Negative Pain Thoughts Questionnaire*[227]
Psychological inflexibility	• *Psychological Inflexibility in Pain*[274]
Cognitive fusion	• *Cognitive Fusion Questionnaire*[228]
Cognitive intrusion of pain	• *Experience of Cognitive Intrusion of Pain*[275]
Emotional factors	
Depression	• *Beck Depression Inventory*[276,277]
	• *Depression Anxiety Stress Scale* (DASS)[278]
	• *Depression Subscale of the Profile of Mood States* (POMS)[279]
	• *Hospital Anxiety and Depression Scale* (HAD)[280]
	• *Patient Health Questionnaire 9 Items*[281]
Anxiety	• *State-Trait Anxiety Inventory*[282]
	• *Anxiety Subscale of the POMS*[279]
	• *HAD*[280]
	• *DASS*[278]
Health anxiety	• *Health Anxiety Inventory*[283]
Anger	• *Anger-Hostility Subscale of the POMS*[279]
	• *Chronic Pain Acceptance Questionnaire*[284]
Fear-avoidance	• *Fear-Avoidance Beliefs Questionnaire*[285]
	• *Tampa Scale of Kinesphobia*[286]
Negative affectivity	• *Negative affectivity subscale of the Type D Scale*[287]

2.6.5.2 Once dysfunctional pain-related psychological factors are identified, what could and should we do as hand therapists?

When maladaptive pain-related psychological issues are identified in patients, they should be addressed promptly to avoid unnecessary suffering and minimize the risk of pain chronicity. Some of them may require help and need to be referred for psychotherapy within a multidisciplinary pain treatment facility. With limited resources within our healthcare system, this may, however, represent quite a challenge. The following are some interventions addressing psychological issues that can be integrated into hand therapy. Underlying principles of some relevant psychotherapeutic modalities are also reviewed.

2.6.5.2.1 Pain neurophysiology education (PNE)

Providing patients with education about neurophysiological mechanisms of pain (e.g., descendent pain modulation mechanism) has been associated with changes in patients' pain-related beliefs, pain intensity, and physical/psychological/social function in different chronic conditions.[211,221,288-296] Readers are recommended to consult the practice guidelines written by Nijs et al. (2011)[297] and their practical tools offered in different languages that are available online http://www.paininmotion.be/EN/sem-tools.html. Patients learning neurophysiological pain processing and how it is related to their pain thoughts, emotions, as well as behaviors, will help them to understand the concept of nociception and the relevance of biopsychosocial interventions.[211] When they understand that pain reflects perceived threats and not necessarily tissue damage, it is easier for them to accept that exercises can improve their condition.[211,291] They will thus be more prone to adhere to therapy and change their beliefs/cognitions regarding activities and participation.[297]

2.6.5.2.2 Graded activity (GA) and graded exposure (GEXP)

GA and GEXP incorporate behavioral and cognitive approaches to increase patients' participation in pain-related activities[298] to modify maladaptive beliefs from "*the activity hurts*" to "*the activity is safe*".[221,299,300] GA consists in measuring baseline functional capacity and then establishing individual programs of suboptimal level of exercises/activities which will be gradually increased.[221,300] GA aims to achieve the next target by experiencing positive feelings of achievement and developing self-efficacy, as well as positive reinforcement given by the therapist.[221,301] GEXP encourages a confrontational response by exposing patients to feared situations that patients avoid[301-303] and graduation of exposure is based on the level of fear.[261,301] Patients' fear and anxiety can be reduced when they realize that the activities are inoffensive. Application of tolerable level of exposure produces disconfirmations between expected pain and absence of pain, as well as between expected harm and non-harmful consequences thereby correcting the original overestimation of pain and its consequences.[221,304] A randomized controlled trial (2016) has demonstrated the efficacy of using GEXP in reducing pain and fear as well as improving physical function in patients with an upper limb complex regional pain syndrome.[305] According to a systematic review (2016), GEXT seems more effective than GA in terms of function and pain catastrophizing for chronic back pain.[301] Nonetheless, GA has been shown to be more effective than a control condition for improving function.[301]

2.6.5.2.3 Cognition-targeted exercise therapy (CTET)

CTET combines the two interventions PNE and GEXP, aiming at desensitization of the brain for pain caused by fear of movement and deconstruction of pain memories which induce avoidance.[306] Detailed

instructions are given in the article written by Nijs et al. (2015).[306] Phase 1 consists of PNE to change patients' pain beliefs highlighting the relation between fear-avoidance and pain. In Phase 2, patients are initiated to *time-contingent neuromuscular training*. *Motor imagery* (visualization of doing the exercise) precedes increasing the level of exercise difficulty. Patients' cognitions regarding exercise-related pain are discussed and patients are encouraged to integrate the concepts of PNE acquired in Phase 1. The next step tackles *feared movements and activities* that are avoided by patients, by applying the GEXP principles. As the last step, CTET suggests exposition to controlled level of *stressful situations*. Efficacy of this relatively new approach is unknown for the moment, yet, combining the two evidence-based interventions (PNE and GEXP) seems promising to improve clinical symptoms of patients with fear-avoidance.

2.6.5.2.4 The Progressive Goal Attainment Program (PGAP)

This program was elaborated by M. Sullivan (a health psychologist) and his colleagues and is designed for individuals with chronic pain; it is offered by trained allied health professionals such as occupational therapists and physical therapists.[215] The 2-day training is offered worldwide, as well as online training (www.pdp-pgap.com), thus accessible to hand therapists. It targets modifiable pain-related psychological factors such as fear of movement/re-injury, pain catastrophizing, perceived injustice, disability beliefs, and depression.[213,307-309] Patients undergo the PGAP for a maximum duration of 10 weeks. It aims to maximize pre-injury activity involvement within different life role domains including family, social and occupational roles, by scheduling structured activity strategies and GA involvement to target the psychological factors.[307-309] The efficacy of the PGAP has been demonstrated among injured workers and patients with low back pain and whiplash.[215,309,310] It represents a very interesting and relevant therapeutic avenue in hand therapy for those patients with pain-related disability.

2.6.5.2.5 Pain self-management program (PSM)

Self-management is "*the individual's ability to manage the symptoms, treatment, physical and psychological consequences and lifestyle changes inherent in living with a chronic condition*".[311] The premises of self-management are: 1) *self-efficacy building*; 2) *self-monitoring*; 3) *goal-setting and action-planning*; 4) *decision-making*; 5) *problem-solving*; 6) *self-tailoring*; and 7) *partnership between patients and health care providers*.[312] PSM may target different aspects of lifestyle such as planning, pacing activities, food/alcohol consumption, medication, exercise/physical activities, sleep, ergonomic principles, social/recreational activities, and psychological aspects (constructive thinking, focus shifting, mood improvement, relaxation/visualization).[313-315] There are different PSM modalities: face-to-face sessions,

online education, interactive voice messages, telephone support, tapes/video.[311,312] There is a paucity of evidence on efficacy of PSM in patients with pain-related psychological factors. Nonetheless, a longitudinal randomized controlled trial (2016) has demonstrated efficacy of PSM combined with anti-depressors on self-efficacy skills to manage pain and depression among depressed patients with back or lower limb MSD chronic pain.[315] Their standardized pain self-management manual is available upon request.[315]

2.6.5.3 Psychotherapeutic modalities

Although dispensing psychotherapy is reserved to trained therapists, understanding the principles of some modalities is certainly useful for hand therapists who collaborate with psychotherapists to support their patients. Several psychotherapeutic modalities that address pain-related psychological issues exist including *cognitive behavioral therapy*, *acceptance and commitment therapy*, and *mindfulness skill training*.

2.6.5.3.1 Cognitive-behavioral therapy (CBT)

CBT aims at replacing maladaptive thoughts causing maladaptive emotions and behaviors with more adaptive ones, by helping patients become aware of the interrelations between thoughts, feelings, and behaviors, and of their automatic negative or inaccurate thoughts.[139] CBT entails different techniques: 1) *education and socialization* focus on mind-body relationships while building the therapeutic alliance and normalizing the situation; 2) *cognitive restructuring* aims at identification of automatic thoughts and cognitive errors (e.g., catastrophizing) and their restructuration; 3) *acceptance* – i.e., grief of the loss and shifting focus from being pain free to increasing functionality; 4) *relaxation training* includes diaphragmatic breathing and progressive muscle relaxation to decrease suffering associated with emotions such as anxiety and anger; 5) *desensitization* addresses avoidance, in conjunction with *relaxation training* and *cognitive restructuration*, to engage in gradually more activities previously avoided; 6) *attention diversion* consists of distraction strategies (e.g., hobbies, music, imagination); 7) *behavioral activation* focuses on engaging in mastery and pleasurable activities; and finally 8) *activity pacing,* a key skill to learn for successful energy management.[139] Hand therapist who wish more information about CBT are referred to an excellent article published in the JHT in 2011.[139] According to a Cochrane review (2012), CBT has small to moderate positive effects on pain severity, disability, mood, and catastrophizing thoughts when compared to treatment as usual or waiting list, and small positive effects on disability and pain catastrophizing when compared to other active treatments.[316] In hand therapy, the efficacy of a combination of CBT and relaxation strategies has been demonstrated in terms of pain

intensity, pain catastrophizing, anxiety, depression, and post-traumatic stress disorder.[317] Multimodal CBT including relaxation, imagery, stress management, development of coping skills, education about disease and medication, and/or development of communication skills seems to be effective in the management of rheumatoid arthritis and osteoarthritis for pain, disability, and/or psychological status.[318,319]

2.6.5.3.2 Mindfulness skills training (MST)

MST, originated from Buddhism, includes an awareness of external and internal experiences such as sensations (e.g., pain), negative feelings, or difficult thoughts and an acceptance of these experiences in a non-judgmental way so that individuals are freed to engage in the present moment.[320-324] Pain patients who are "mindful" are aware of their pain, accept it, and utilize their cognitive and emotional resources for here-and-now activities, rather than struggling to erase all their pain through medication or lifestyle change.[325] The structure of MST entails five facets: (1) *observing internal and external experience* (e.g., feelings, thoughts, sensations); (2) *describing internal experiences*; (3) *acting with awareness*, that is, being attentive to one's activities of the moment instead of acting on automatic pilot; (4) *non-judging (not criticizing) one's inner experience*; and (5) *non-reacting to one's inner experience*.[326] There is growing evidence confirming the efficacy of MST on pain and physical function.[321,327-329]

2.6.5.3.3 Acceptance and commitment therapy (ACT)

ACT, developed by Hayes and his colleagues, is a behavioral therapy based on an empirical analysis of human cognition.[232,330-333] ACT's main objectives are to improve function and decrease pain interference of value-driven activities.[330] In contrast to CBT, ACT aims at accepting and being willing to experience pain rather than reducing it when the former effort is ineffective.[232,235,334] CBT focuses on changing the content of thoughts and reducing negative emotions while ACT emphasizes changing awareness of and relationships to thoughts by recognizing their existence in order to resume value-driven activities that enrich life[330,333] even though these activities may induce (fear of) pain.[232] Efficacy of ACT among patients with various chronic pain conditions is well documented.[232,235,332-335]

2.6.6 Conclusion

Restoration of sensory and motor functions as well as alleviation of pain are at the core of hand therapy. However, pain management in this field continues to be largely guided by a biomedical approach that fails to recognize the abundance of scientific evidence supporting that pain is a multidimensional experience that involves not only a sensory component but also important affective and motivational aspects.

Numerous psychological factors including patients' beliefs, cognitions, and emotions alter their pain experience and may impact on their outcomes. Acknowledging and addressing maladaptive reactions to pain and injury can help people get and stay well. How a person responds to pain has important implications on treatment choices. Decoding the biopsychosocial components of the patients' pain is thus essential for hand therapists. In other words, "*Hand therapy touches not only hands, but hearts, minds, and livelihoods*" as pointed out by Bonnie Olivett, the *Nathalie Barr Lectureship* recipient in 1992.[336]

2.7 Composantes psychosociales associées à la douleur arthrosique et modalités thérapeutiques ciblant ces composantes (Article 2 - Pain in osteoarthritis: A narrative review from a psychosocial perspective)

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En tant qu'auteure principale, je confirme mon apport majoritaire de cette revue narrative (la recherche bibliographique des références et la rédaction) sous la supervision de ma directrice de recherche D[re] Manon Choinière. Tous les auteurs ont révisé le manuscrit et approuvé la version finale.

2.7.1 Abstract

Purpose of the Review The lack of a clear relation between radiographic osteoarthritis severity and pain severity suggests that various psychosocial factors play a critical role in the patients' pain experience via central sensitization. This review aimed at presenting a brief overview of the pain neurophysiological

mechanisms, then examining results of the most recent studies on psychosocial factors which influence the pain experience in individuals with OA, as well as efficacy of interventions addressing the impact of these psychosocial factors on pain severity and other outcomes (e.g., physical function, anxiety, self-efficacy).

Recent Findings. Anxiodepressive symptoms, pain catastrophizing, pain coping styles, kinesiophobia, somatization, pain self-efficacy, optimism, psychological resilience, treatment expectation, self-efficacy for pain communication, positive affect, borderline personality features, cognitive function, mindfulness, employment status, education, household composition, marital tension, spouse confidence, social support, and unsupervised exercise can positively or negatively influence the pain experience in individuals with OA. Various psychological interventions, pain neuroscience education, acceptance commitment therapy, and mindfulness meditation can improve the OA pain experience.

Conclusion. OA pain experience can be influenced by various psychosocial factors. Patients with OA should be provided with tailored pain management program which involves different biopsychosocial interventions.

2.7.2 Introduction

Osteoarthritis (OA) is one of the most disabling diseases in industrial countries.[338] Individuals with OA can experience substantial pain-related losses in terms of joint mobility, muscle strength, functional/financial autonomy, emotional well-being, social roles (e.g., spouse, worker), social support, and quality of life, leading to the necessity of important life adjustments.[339-345] A number of studies have highlighted the importance of multifaceted interventions to address these losses.[343,345-350]

Although OA pain has been treated mainly with a biomedical approach,[351-353] the absence of a clear relation between OA severity determined by X-ray or magnetic resonance imaging (MRI) and self-reported pain intensity, along with interindividual variability in the patients' pain experience, have forced researchers to further investigate the mechanisms involved in pain perception.[351,354-356] Defined as "*an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage*",[2] pain is not only influenced by biological factors but also by psychosocial ones.[2,16,357] As a matter of fact, psychological variables appear to be stronger predictors of pain than biological ones. A recent cross-sectional study[32] conducted among 255 patients with thumb base OA has revealed that age, sex, intensity of physical activity at work, and OA X-ray severity accounted for only 6%

of the variance in pain severity; when psychological variables (pain catastrophizing, psychological distress, illness perception) were added, the model explained as much as 47 % of the variance. Therefore, health professionals, when taking care of OA patients, should enlarge their scope of treatments "*beyond traditional medical and demographic variables*"[358] including various biopsychosocial interventions.[52,53,359]

The role of psychosocial factors in the pain neurophysiological mechanisms[143,144,166,351,353,360-365] and in the immune system[363,364,366-370] has been extensively examined. Pain mechanisms are composed of peripheral and central ascending/descending pathways in the nervous system (Figure 6).[169] Peripheral pathways conduct (potentially) tissue-damaging stimuli (noxious stimuli) from the nociceptors to the dorsal horn of the spinal cord. Through the ascending pathways, the nociceptive information is then conveyed to the thalamus and the primary/secondary cortical somatosensory areas (S1, S2) specialized in the sensory-discriminative dimension of pain such as location and duration of the stimulus,[143,166] as well as to the limbic, mesolimbic and prefrontal areas involved in the cognitive, affective and motivational dimensions of pain (e.g., nucleus accumbens (NAc), anterior cingulate cortex (ACC), insula, amygdala, hippocampus, ventral tegmentum (VTA), prefrontal cortex (PFC)).[143,166] Descending pathways originate from the brain to modulate (inhibit or facilitate) the ascending nociception at the spinal dorsal horn via periaqueductal grey matter (PAG).[172] These pathways are influenced by the limbic, mesolimbic, and prefrontal areas according to pathological and psychological states.[172] When nociception is amplified in the central nervous system, hypersensitivity to the noxious input occurs, and this phenomenon is called *central sensitization*.[181] In OA patients, the reported forms of central sensitization are hyperalgesia, widespread pain, referred pain, allodynia, neuropathic pain, altered spinal reflex, impaired conditioned pain modulation, and temporal/spatial summations.[363-365,371-374]

The immune system also plays a critical role in protecting the body from injuries and infections. However, when inflammatory responses become excessive, they can damage the body structures more than the pathogen itself as observed in arthritis, diabetes, or cancer.[375,376] Under normal conditions, the hypothalamic-pituitary-adrenal (HPA) axis suppresses the proinflammatory responses by releasing the glucocorticoid cortisol from the adrenal cortex.[370,377-379] Yet, immune cells may become less sensitive to the anti-inflammatory effects of glucocorticoids when both cortisol and pro-inflammatory cytokines increase.[367-370,380] This phenomenon has been observed under psychological stress (e.g., social conflict, low socioeconomic status).[370,381-383] Furthermore, chronic stress and prolonged adrenal glucocorticoid exposure could cause functional and structural changes in the hippocampus, PFC, and amygdala[381,384] which are involved in emotion regulation and inflammatory responses by activating the HPA axis.[361]

Depression or anxiety is also known to alter immune system responses and prolong inflammation[366-370] through the sympathetic nervous system and the HPA axis.[370,385,386]

As pain and inflammation are a resultant of the complex process of the sensory-discriminative and the cognitive-affective-motivational structures,[144,172,177] the patients' pain experiences are variable and some authors have attempted to establish OA pain phenotypes.[387-393] Among them, a systematic review conducted by Dell'Isola et al. (2016)[388] has examined psychological factors involved in OA pain. Based on 24 studies, they identified six phenotypes of knee-OA pain: (1) chronic pain with prominent central sensitization and presence of psychological distress, poor coping style, sleep disturbances, fatigue, and widespread pain (prevalence: 16-19% of the population with knee OA); (2) inflammatory phenotype with high levels of inflammatory biomarkers (prevalence: 16-30%); (3) metabolic phenotype characterized by a systemic metabolic syndrome such as obesity or hypertension (prevalence: 11-27%); (4) alteration in bone and cartilage (prevalence: 0.2-1.3%); (5) mechanical overload damaging (prevalence: 12-22%); and (6) minor joint disease characterized by low degeneration, mild clinical symptoms with slow progression over time (prevalence: 17-47%).

In light of the above considerations, OA pain is variable from one individual to another. It is regulated by neurophysiological mechanisms and immune system responses, which are in turn influenced by psychosocial factors. However, little is known about which specific psychosocial factors could influence OA pain/inflammation nor about the efficacy of psychosocial interventions addressing these factors. This present article thus aimed at reviewing the most recent studies on psychosocial factors influencing OA pain and evidence-based interventions addressing these modifiable factors.

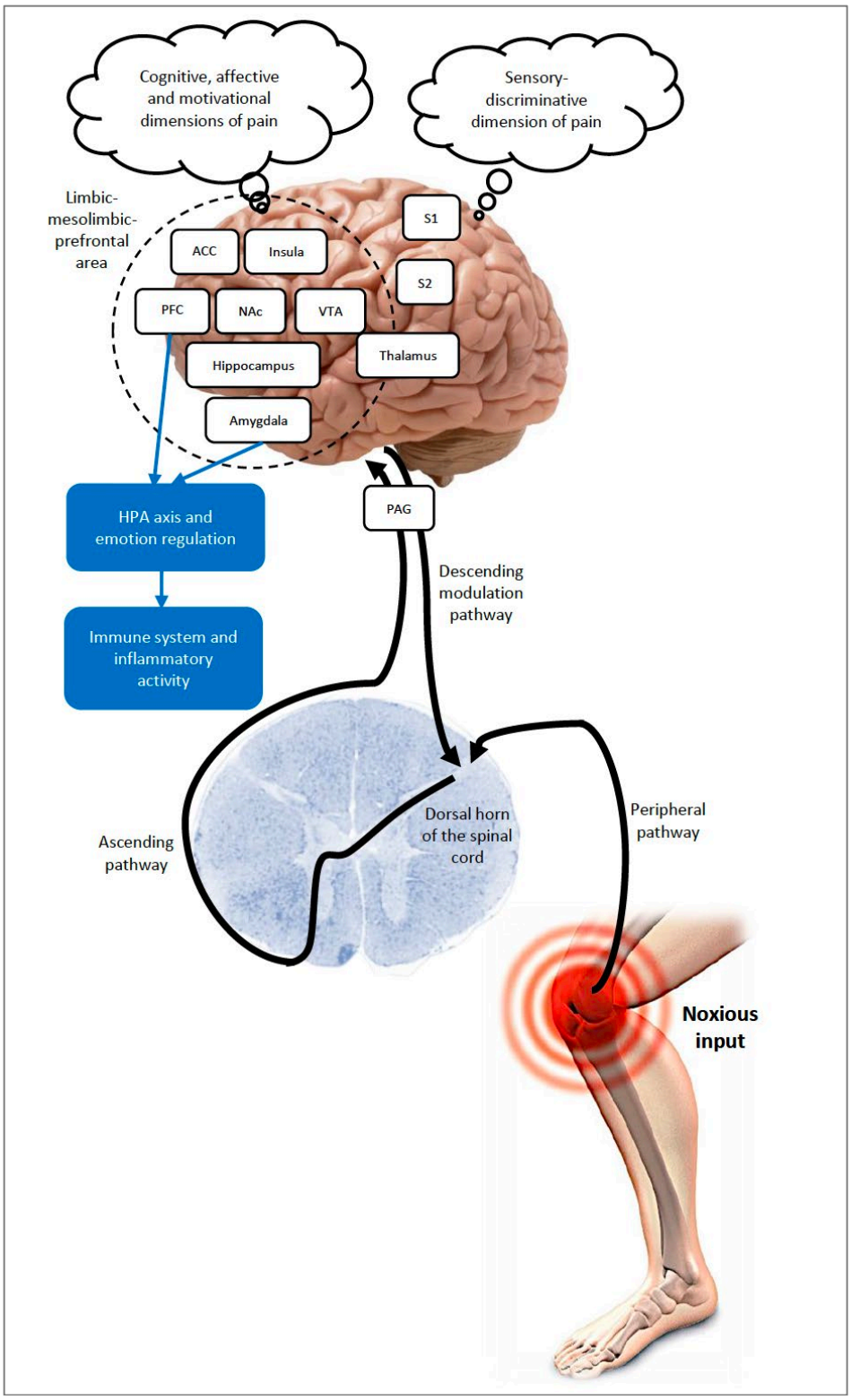

Figure 6. – Simplified neurophysiological mechanisms of pain

ACC, anterior cingulate cortex; HPA, hypothalamus-pituitary-adrenal gland; NAc, nucleus accumbens; PAG, periaqueductal grey; PFC, prefrontal cortex; S1, primary somatosensory cortex; S2 secondary somatosensory cortex; VTA, ventral tegmentum area.

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2.7.3 Psychosocial factors influencing OA pain experience

To identify psychosocial factors influencing OA pain experience (e.g., pain severity, physical function, psychological well-being), a literature search was conducted through PubMed using the following key concepts: 'pain', 'psychological', 'psychosocial', and 'osteoarthritis' for references published in English during the last 5 years (June 15, 2016 - June 15, 2020). Hand search in the reference lists of the included articles also allowed us to identify other relevant studies. Through the literature search, the identified psychosocial factors are presented below and in Table 6. When multiple studies for a given psychosocial factor were identified, systematic reviews (SRs) including more primary trials were prioritized over SRs with fewer trials or individual studies (longitudinal, cross-sectional). OA pain and postoperative OA pain were treated separately since the natures of pain are different: the latter involves an acute pain component in addition to chronic OA pain.

Table 6. – Psychosocial factors influencing OA pain experiences

Psychosocial factor	Study design (diagnosis)	Pain	Physical function	Postoperative pain	Postoperative physical function	Anxio-depressive symptoms	Pain catastrophizing	Self-efficacy	Stress
Anxiodepressive symptoms	Narrative SRs (OA,[40] knee OA,[131] THA,[394] TKA[394,395])	**P**[40,131]	**P**[131,394]	**I**[40,394,395]	**I**[394,395]				
Pain catastrophizing	Prospective studies (knee OA[396,397]), cross-sectional studies (thumb OA,[32] knee OA[398]), narrative SR (TKA[395])	**P**[32,396,397]	**Np**[396,397]	**P**[395]	**Np**[395]				
Pain coping styles	Narrative SR (TKA[395])			**P**[395]	**P**[395]				
Kinesiophobia	Narrative SRs (hip OA,[399] TKA[395])	**Np**[399]	**I**[399]	**Np**[395]	**Np**[395]				
Somatization	Cross-sectional studies (knee OA,[400] rheumatismal diseases including OA[401]), SR (TKA[402])	**P**[400,401]	**P**[401]	**P**[402]	**P**[402]				
Pain self-efficacy	Prospective studies (knee OA[396,397]), cross-sectional studies (knee OA[403])	**Np**[396,397]	**P**[396,397,403]						
Optimism	Cross-sectional study (knee OA[404])	**P**[404]							
Psychological resilience	cross-sectional study (knee OA[404]), prospective study (TSA[405])	**P**[404]		**P**[405]					

Treatment expectation	Cross-sectional study (knee OA[406])	**Np**[406]	**Np**[406]			**P**[406]		**P**[406]	
Self-efficacy for pain communication	Cross-sectional study (OA)[407]	**P**[407]	**P**[407]			**P**[407]	**P**[407]		
Positive affect	Prospective study (knee OA[408])	**P** (1 mo after treatment),[408] **Np** (3 mo)[408]							
Borderline personality features	Prospective study (TKA[409])			**P**[409]					
Cognitive function	Prospective study (early arthritis including OA[410]), narrative SR (hip OA[399])	**P**[410]	**I**[399]						
Mindfulness	Cross-sectional study (knee OA[411])	**Np**[411]	**Np**[411]			**P**[411]		**P**[411]	**P**[411]
Employment status	Narrative SR (hip OA[399])	**Np**[399]	**Np**[399]						
Education	Narrative SRs (hip OA,[399] knee OA,[131] TKA[394])	**I**[131,399]	**I**[131,399]	**I**[394]					
Household composition	Narrative SRs (hip OA,[399] knee OA[131])	**I**[131]	**Np**[131,399]						
Marital tension	Prospective study (knee OA[412])	**P**[412]							
Spouse confidence	Prospective study (knee OA[413])	**P**[413]	**P**[413]						
Social support	Narrative SR (hip OA[399])		**Np**[399]						
Unsupervised exercise	Narrative SR (hip OA[399])	**P**[399]	**P**[399]						

I, inconsistent evidence; mo, month; Np, non-predictor; OA, osteoarthritis; P, predictor; SR, systematic review; THA, total hip arthroplasty; TKA, total knee arthroplasty; TSA, total shoulder arthroplasty.

2.7.3.1 Psychological factors

2.7.3.1.1 Anxiety, depression, and psychological distress

Anxiety is narrowly related to depression and both together represent psychological distress.[248,249] Anxiety and depression are prevalent in the OA population, being present in approximately 20% of the patients.[40,41] A 3-year prospective Australian study (2019, n = 115,094)[414] showed that their incidences are higher in OA patients than in other chronic diseases. Hazard ratios of the incidence of anxiety associated with OA compared to healthy individuals were 2.01 (95%CI 1.80, 2.23), 1.11 (95%CI 1.03, 1.20) with long-term cancer, 1.26 (95%CI 1.14, 1.39) with cardiovascular disease, and 1.10 (95%CI 0.98, 1.24) with diabetes. The hazard ratios of incidence of depression for these diseases were 1.94 (95%CI 1.80, 2.10), 1.19 (95%CI 1.13, 1.25), 1.08 (95% CI 1.00, 1.16), and 1.18 (95%CI 1.09, 1.28) respectively. According to a Korean national survey (2020, n = 6,343),[415] the odds ratios (OR) of individuals with OA for depressive mood, psychological distress, and suicidal ideation compared to the healthy population were 2.80 (95%CI 1.31, 3.31), 1.92 (95%CI 1.21, 3.05) and 1.97 (95%CI 1.31, 2.94) in men, and 1.51 (95%CI 1.16, 1.95), 1.36 (95%CI 1.07, 1.72) and 1.92 (95%CI 1.49, 2.46) in women.

The predictive value of anxiodepressive symptoms for OA pain and physical functioning has been supported by two narrative SRs (2016, knee OA, 5 studies[131]; 2016, OA, 13 studies[40]), but those on postoperative pain/physical function are inconsistent among the three narrative SRs (2017, total knee arthroplasty (TKA) and total hip arthroplasty (THA), 10 studies[394]; 2016, OA, 13 studies[40]; 2016, TKA, 12 studies[395]).

According to the available literature, it appears that OA pain and depression are interdependently related. Based on the UK data from three-time points taken at every two years (named waves 1, 2, and 3) among 516 individuals with early arthritis including OA (2019),[410] the levels of pain severity, cognitive function, and depression measured prior to a diagnosis of arthritis (wave 1) predicted the subsequent pain level two years later at wave 2 ($p < 0.001$, $p = 0.001$, and $p = 0.025$ respectively). Moreover, the pain level at wave 1 predicted the depression level at wave 2 ($p = 0.008$) while the levels of pain and depression at wave 2 in turn predicted the level of cognitive function at wave 3 (two years after wave 2). Their p values were 0.032 and 0.017 respectively.

Some studies have also shown that emotional distress would differently impact postoperative pain depending on sex or race. Preoperative anxiety and depression scores were found to be better predictors of higher postoperative pain in men than women 2 weeks after surgery, but not at 48 hours or

6 weeks (prospective trial, 2019, n = 100, TKA, UK).[416] Another study suggested that high levels of depression would contribute to greater OA pain in Asian Americans than in White Americans (cross-sectional study, 2017, n = 100, knee OA, USA).[417]

2.7.3.1.2 Pain catastrophizing

This psychological factor is defined as an "exaggerated negative orientation to actual or anticipated pain comprising elements of rumination, magnification, and helplessness".[212,213] It interferes with the descending pain pathways, causing central sensitization.[418] Pain catastrophizing serves as a social function to coping with pain and relying on support from others. [212] Thus, those who have better pain communication skills (communicating their pain to their partner and receiving partner's understanding and helpful responses) appear to experience less pain catastrophizing.[419] Higher levels of catastrophizing in patients with knee OA would predict higher levels of pain one and five years later but not physical function (multivariate linear mixed model, p = 0.013, 2016, n = 111, Finland[396]; p = 0.015, 2020, n = 108, Finland,[397] respectively). A large multicenter cross-sectional study in which 1,112 people with painful knee OA were enrolled (2020, USA[398]) also revealed that those who had a greater tendency to catastrophize in the face of pain were likely to report more severe pain (OR = 1.50, 95%CI 1.03, 2.19 with MRI evidence of a full-thickness cartilage lesion with bone marrow lesion; OR = 1.79, 95%CI 1.26, 2.54 without MRI evidence). Postoperative pain may also be affected by the psychological factor: a narrative SR (2016, 7 studies[395]) demonstrated strong relations between preoperative pain catastrophizing and post-TKA pain. However, this psychological factor would not be associated with post-TKA physical function (2016, 2 studies).[395]

2.7.3.1.3 Pain coping styles

Pain coping is defined as "people's behavioral and cognitive attempts to manage or tolerate pain and its effects".[420] According to a narrative SR (2016, 2 studies),[395] poor coping strategies such as less problem-solving, dysfunctional and passive (praying, catastrophizing) coping styles predict more severe post-TKA pain and worse knee function after 6 or 12 months of surgery.

2.7.3.1.4 Kinesiophobia

This psychological factor is defined as "an irrational and debilitating fear of physical movement and activity resulting from a feeling of vulnerability to painful injury or reinjury".[286] The available evidence on the predictor value of kinesiophobia on pain experience is inconclusive. A narrative SR (2016, hip OA)[399] found

weak evidence that fear-avoidance beliefs are not a predictor of increasing pain (based on a longitudinal study), as well as inconsistent evidence about its predictive value for physical function deterioration (based on 3 trials). Another narrative SR (2016, TKA, 4 studies)[395] found strong evidence of no positive association between kinesiophobia and postoperative pain/physical function.

2.7.3.1.5 Somatization

Somatization refers to "the experience and communication of somatic distress in response to psychosocial stress and seeking medical help for it".[421] It is "characterized by a constant scanning of the environment for threats, a tendency to focus on certain relatively weak and infrequent body sensations and a predisposition to intensify somatic sensations, making them more alarming, noxious, and disturbing".[422,423] A cross-sectional study (2018, n = 133, knee OA, Canada)[400] shows that somatization would be one of predictors of central sensitization assessed by the self-reported questionnaire *Central Sensitization Inventory*[424] (multivariable linear regression, $p < 0.005$) along with widespread pain ($p = 0.046$) and anxiodepressive symptoms ($p = 0.009$). Another cross-sectional study (2018, n = 14,695, OA, rheumatoid arthritis, fibromyalgia, Japan)[401] also revealed that people with a higher somatizing tendency is more likely to experience a higher level of physical disability with sick leave due to pain compared to those with a low tendency (OR = 4.51, 95%CI 3.64, 5.58).

Preoperative levels of somatization would partially influence postoperative outcomes. According to an SR (2019, 6 prospective studies),[402] preoperative poor mental health conditions (including somatization, pain catastrophizing, anxiety, and depression) had moderate predictive values of negative TKA outcomes at 12 months after surgery (SMD = -0.74, 95%IC -1.04, -0.44 for pain; SMD = -0.56, 95%IC -0.80, -0.32 for physical function).

2.7.3.1.6 Pain self-efficacy

Pain self-efficacy is "the sense that one will be able to manage pain"[204] and "judgments of whether (one's) coping efforts are likely to be effective or not".[352] This factor is protective and positively influences the pain experience. Higher levels of pain self-efficacy were also shown to be associated with better physical function ($r = 0.35$, $p < 0.001$) in a cross-sectional study (2019, Nigeria, n = 89, knee OA),[403] as well as in two longitudinal studies with a same cohort, one and five years later, but not with pain (multivariate linear mixed model, $p = 0.012$, 2016, n = 111[396]; $p = 0.006$, 2020, n = 108, Finland,[397] respectively).

2.7.3.1.7 Optimism

Optimism is "a personality attribute associated with the tendency to expect positive outcomes for the future, which often results in an increased sense of hopefulness and confidence".[404] Several studies have shown that optimism may beneficially influence pain, but the results are somewhat inconsistent across studies. A mediation model was assessed in a cross-sectional study (2018, n = 150, knee OA, USA)[404] and its findings suggest that greater optimism would be associated with enhanced endogenous pain inhibitory capacity which in turn, would be associated with less severe clinical knee pain.[404] This model explained 46.7% of the variance in pain severity. Furthermore, the study revealed that optimism moderates the relationship between psychological resilience and conditioned pain modulation for those with low optimism, but not for those with high optimism. Higher optimism levels were also shown to be protective against increased movement-evoked knee-OA pain in non-Hispanic black people; however, this relation was not demonstrated in non-Hispanic whites (cross-sectional study, 2019, USA, 105 non-Hispanic blacks & 96 non-Hispanic whites).[425]

2.7.3.1.8 Psychological resilience

Resilience is defined as "the process of negotiating, managing, and adapting to significant sources of stress or trauma".[426,427] A cross-sectional study (2018, n = 150, USA)[404] has reported that resilience is weakly correlated with knee OA pain ($r = -0.181$, $p < 0.05$). Greater resilience is associated with enhanced conditioned pain modulation in patients with low optimism[404] (see the section ***Optimism***). For postoperative pain, a longitudinal study (2019, n = 70, USA)[405] has shown that resilience would be a pain predictor at a minimum of 2 years following total shoulder arthroplasty (ANOVA, $p = 0.03$).

2.7.3.1.9 Treatment expectation

Positive treatment expectation of pain relief would elicit placebo analgesia by activating the ACC-PFC-PAG pathway[143] and subcortical structures (e.g., hypothalamus, amygdala),[428] as well as by reducing pain-related activity in the ipsilateral dorsal horn.[428,429] On the contrary, the anticipation of pain increase can enhance perceived pain intensity (nocebo effects) in healthy subjects by activating the cerebral regions associated with pain (e.g., thalamus, cingulate cortex, PFC),[430] the HPA axis[360] and/or the cholecystokininergic systems.[431] However, the mechanisms of placebo/nocebo effects appear to be somewhat different between healthy subjects and those who have chronic pain.[432] According to a study involving 262 patients with knee OA (2017, USA),[406] higher outcome expectation for physical and mental benefits was associated with greater pain self-efficacy (OR = 1.25, 95%CI 1.11, 1.41) and fewer depressive

symptoms (OR = 0.84 for each 5-point increase, 95%CI 0.73, 0.97), but not with less pain (OR = 0.97, 95%CI 0.76, 1.25) or better physical function (OR = 0.97, 95%CI 0.90, 1.04).[406]

2.7.3.1.10 Self-efficacy for pain communication

Self-efficacy for pain communication refers to "patients' level of confidence in communicating their pain to their partner and receiving their partner's understanding and helpful response" as well as "partner's level of confidence in their ability to understand and respond effectively to the patients' pain".[407] Patients' higher self-efficacy for pain communication has been shown to be weakly to moderately correlated with lower levels of pain intensity ($r = -0.45$, $p < 0.001$), physical disability ($r = -0.45$, $p < 0.001$), psychological distress ($r = -0.58$, $p < 0.0001$), and pain catastrophizing ($r = -0.62$, $p < 0.0001$) (cross-sectional study, 2008, n = 38, USA, OA).[407] This is in line with another study[419] which had demonstrated that OA patients having better ability to communicate their pain would be less inclined to catastrophize in the face of pain (see the section *Pain catastrophizing*).

2.7.3.1.11 Positive affect

A longitudinal study (2019, n = 88, knee OA, Japan)[408] showed that positive affect, pain intensity at baseline, and disease duration predicted pain reduction one month after conservative treatment (AUC = 0.793, 95%IC 0.687, 0.898). However, this was not true 2 months later where pain catastrophizing and pain self-efficacy were the sole significant predictors (AUC = 0.808, 95%IC 0.682, 0.934). In another study using a cross-sectional design which included 105 non-Hispanic blacks and 96 non-Hispanic whites (2019, USA),[425] it was found that a higher level of positive affect was associated with lower movement-evoked knee-OA pain in non-Hispanic blacks, but the impact of positive affect on the pain was surprisingly inverse in non-Hispanic whites. The trial authors hypothesized that this result was due to increased sympathetic activation by high-arousal positive emotion.[425]

2.7.3.1.12 Borderline personality features

Borderline personality features are characterized by "defensive propensities such as projection, denial, dissociation or splitting, rather than healthier defensive operations, for example, reaction formation, isolation, undoing, suppression, and repression".[433] Only one study examined the impact of this psychological variable on pain perception in OA patients. Linear regression analysis of the data collected in a longitudinal study (2020, n = 144, knee OA, Germany)[409] demonstrated that postoperative pain one year after TKA was predicted by lower preoperative knee function ($p < 0.0001$), gender ($p = 0.03$), and

primitive defensive borderline features (p = 0.04). However, these factors accounted for only 18% of the variance in postoperative pain.

2.7.3.1.13 Cognitive function

As discussed in the previous section entitled *Anxiety, depression, and psychological distress,* there are significant interdependent relationships between cognitive function, depression, and pain.[410] However, a narrative SR including two trials (2016, hip OA)[399] found that the association between cognitive function and physical function is inconsistent.

2.7.3.1.14 Mindfulness

Mindfulness refers to "the ability or practice of maintaining a nonjudgmental state of heightened awareness of one's thoughts, emotions, or experiences on a moment-to-moment basis".[326,411] It includes five facets: (1) *observing*: "the ability to attend to or notice internal and external stimuli" (e.g., sensations, emotions, cognitions); (2) *describing*: "noting or mentally labeling observed stimuli with words"; (3) *acting-with-awareness*: "attending to one's current actions, as opposed to behaving automatically or absentmindedly"; (4) *non-judging*: "refraining from evaluation of one's sensations, cognitions, and emotions as negative, unacceptable, or intolerable"; and (5) *non-reactivity to experience*: "the ability to allow thoughts and feelings to come and go, without getting caught up in or carried away by them".[326,411] In an American study including 80 patients with knee OA (2017),[411] results of the multiple regression analysis revealed that mindfulness was significantly associated with less depressive symptoms (p < 0.001), lower levels of stress (p < 0.001), and better pain self-efficacy (p = 0.005). Although it was not significantly associated with pain and physical function (p = 0.08 and p = 0.24 respectively), mindfulness moderated the effect of pain on stress suggesting that this factor may influence the way patients cope with pain.

2.7.3.2 Social factors

2.7.3.2.1 Employment status

A narrative SR on hip OA (2016)[399] found that employment status was not a predictive factor for pain deterioration based on 1 trial, nor physical function based on 3 trials.

2.7.3.2.2 Education

Although there is weak evidence that low education levels negatively impact hip-OA pain severity (narrative SR, 2016, 1 study),[399] the available evidence on knee OA is inconsistent: for pain (narrative SR,

2016, 3 trials),[131] physical functioning (narrative SR, 2016, knee OA, 3 trials[131]) and postoperative TKA pain (narrative SR, 2017, 2 trials[394]).

2.7.3.2.3 Household composition

A narrative SR (2016, knee OA, 2 studies)[131] found inconsistent evidence on the predictive value of household composition (living alone or with someone) for pain. This social factor was found to be a non-predictor of physical function deterioration (narrative SR, 2016, knee OA, 2 studies[131]; narrative SR, 2016, hip OA, 2 studies[399]).

2.7.3.2.4 Spousal relation

The type of spousal relation appears to have some impact on pain severity and physical disability. According to a prospective study (2018, n = 145, USA, knee OA),[412] greater marital tension was related to more negative affect which was in turn associated with more severe OA pain. Those who had more severe pain experienced more negative affect and marital tension next day.[412] An 18-month longitudinal trial conducted among 152 individuals with knee OA (2016, USA)[413] revealed that spouse confidence for patients' arthritis management was indirectly related to improvement in functional limitations through increased empathic responses to patients' pain across 6 months and decreased solicitous responses across 12 months. These multiple mediation regression models accounted for 54 % at 6 months and 43 % at 12 months of the variance in patients' functional limitations.[413]

2.7.3.2.5 Social support

A narrative SR (2016, hip OA, 3 studies)[399] found strong and weak evidence that social support is not a predictor of physical function deterioration. Doing physical exercise without supervision may be a predictor of deterioration of pain and physical function in patients with hip OA (narrative SR, 2016 hip OA, 1 study).[399]

2.7.4 Interventions addressing pain-related psychosocial factors

To assess the efficacy of interventions targeting psychosocial factors in OA pain experience, a literature search was conducted through PubMed using the following concepts, 'intervention', 'pain', 'osteoarthritis' 'psychological' and 'psychosocial', and covered the last 10-year publications (June 15, 2011 - June 15, 2020). The interventions whose efficacy for OA pain experience was supported by a systematic

review (SR) are presented below as well as in Table 7. When no SR was available, findings of randomized controlled trials (RCTs) conducted with OA patients were extracted. The efficacy on OA pain and postoperative OA pain was separately examined as the natures of pain are different (chronic pain with or without acute pain).

2.7.4.1 Psychological interventions

Meta-analyses of an SR (2018, OA)[434] exploring the efficacy of various forms of psychotherapy (cognitive behavioral therapy (CBT), hypnosis, coping skill training, supportive therapy, imagery) revealed a small effect on pain at post-treatment (SMD = −0.28, 95% CI −0.48, −0.08, 9 RCTs); a moderate effect on pain self-efficacy at post-treatment (SMD = 0.58, 95%CI 0.40, 0.75, 5 RCTs), small effects 6 months later (SMD = 0.35, 95%CI 0.10, 0.60, 2 RCTs) and 12 months later (SMD = 0.36, 95%CI 0.10, 0.63, 2 RCTs); and significant effects on pain coping at post-treatment (mean difference 22.21, 95%CI 12.15, 32.27; mean difference 1.64, 95%CI 0.03, 3.25, 2 RCTs).

The results of another narrative SR (2017, knee OA, 4 RCTs)[435] suggest that coping skill training combined with weight management or exercise would be more efficacious for reducing pain than weight management alone, coping skill training alone or standard care at 12-week to 12-month post-treatment ($p < 0.05$).

According to the more recent narrative SR (2019, 12 RCTs)[436] examining the efficacy of psychological interventions for improving pain outcomes after TKA, listening to self-chosen music while the patients were sedated during the surgery would be effective for postoperative pain reduction measured with a visual analog scale (0-10) at 3 hours after TKA (1.5 ± 1.4 vs 3.9 ± 3.4, $p = 0.01$) and at 24 hours (2.4 ± 1.7 vs 4.1 ± 2.9, $p = 0.04$) compared with the control (a white noise). Postoperative progressive muscle relaxation with biofeedback during continuous passive motion after surgery reduced postoperative pain at Days 1 to 5 (repeated measures ANOVA, $p < 0.001$). As for CBT, a superior effect of postoperative interventions compared to standard care on postoperative pain was shown at 6-month follow-up (repeated measures ANOVA, $P = 0.003$). Other types of perioperative interventions were not superior to their comparator in terms of postoperative pain severity: easy-listening music, soothing piano and Chinese violin music, music with different degrees of harmonicity and rhythmicity, live music during bicycling pedalling exercise, pre-recorded hypnosis, pain coping skill program, postoperative enhanced management by motivational interviewing, and preoperative CBT.

Table 7. – Efficacy of interventions targeting psychosocial factors in OA pain experience

Intervention vs comparator	Study design (diagnosis)	Pain	Physical function	Post-operative pain	Post-operative physical function	Anxiety	Depressive symptoms	Pain catastro-phizing	Pain-coping	Kinesio-phobia	Pain self-efficacy	Mind-fullness
Psychological interventions (CBT, hypnosis, coping skill training, supportive therapy, and imagery) vs control	MA (OA[434])	**++** (PT), **NS** (3 mo, 6-9 mo, 12-18 mo)	**NS** (PT, 6 mo, 12 mo)			**NS** (PT)	**NS** (PT)		**S** (PT)		**+++** (PT), **++** (6 mo, 12 mo)	
Coping skill training + weight management or exercise vs coping skill training alone, *weight management alone,* or standard care	Narrative SR (knee OA[435])	**S** (12 wk-12 mo)										
Perioperative patient-selected music vs white noise	Narrative SR (TKA[436])			**S** (3 hr, 24 hr)								
Postoperative CBT vs control	Narrative SR (TKA[436])			**S** (6 mo)								
Postoperative progressive muscle relaxation with biofeedback vs control	Narrative SR (TKA[436])			**S** (1-5 d)								
Other types of perioperative intervention (easy-listening music, soothing piano and Chinese violin music, music with different	Narrative SR (TKA[436])			**NS** (variable)								

degrees of harmonicity and rhythmicity, live music, pre-recorded hypnosis, coping skill training, enhanced management by motivational interviewing, preoperative CBT) vs ***control***										
Pain neuroscience education *vs* ***control***	MA (CP including OA[437])	**NS** (< 3 mo, 3-6 mo)	**S** (< 3 mo, 3-6 mo)					**S** (< 3 mo), **NS** (3-6 mo)	**S** (< 3 mo)	
Acceptance commitment therapy *vs* ***control***	MA (CP including OA[438])	**NS** (PT, 3 mo)	**++** (PT, 3 mo)				**+++** (PT, 3 mo)			
CBT *vs* ***Acceptance commitment therapy***	MA (CP including OA[438])	**++** (PT), **NS** (6 mo)	**NS** (PT, 6 mo)			**NS** (PT, 6 mo)	**++** (PT), **NS** (6 mo)			
Mindfulness meditation *vs* ***control***	MA (CP including OA[439])	**++** (4-60 wk)	**NS** (8-26 wk)				**+** (6-24 wk)			
Postoperative mindfulness meditation *vs* ***control***	RCT (TKA[440])			**NS** (3 mo), **S** (12 mo)	**NS** (3 mo), **S** (12 mo)				**NS** (3 mo, 12 mo)	**NS** (3 mo, 12 mo)

+ trivial effect; ++, small effect; +++, medium effect; ++++, large effect; CBT, cognitive-behavioral therapy; CP, various chronic pain including OA; d, days; hr, hours; MA, meta-analysis; mo, months; NS, statistically non-significant; OA, osteoarthritis; PT, post-treatment; RCT, randomized controlled trial; S, statistically significant, yet the effect size is unknown; SR, systematic review; TKA, total knee arthroplasty; wk, week.

2.7.4.2 Pain neuroscience education

Pain neuroscience education (PNE) is an intervention aiming to reconceptualize an individual's understanding of pain as less threatening.[437] They may be named as pain biology education or pain neurophysiology education.[437] Meta-analyses including participants with chronic pain of various origins (2019)[437] showed significant positive effects of PNE on short-term (< 3 months) physical disability (mean difference -4.09/100, 95%CI -7.72, -0.45, 10 RCTs), medium-term (3-6 months) physical disability (mean difference -8.14/100, 95%CI -15.60, -0.68, 7 RCTs), short-term catastrophizing reduction (mean difference -3.33/52, 95%CI -6.01, -0.65, 9 RCTs) and kinesiophobia reduction (mean difference -13.55/100, 95%CI -25.89, -1.21, 7 RCTs). For short-term and medium-term pain, as well as medium-term catastrophizing, the effects of PNE are statistically not significant (mean difference -5.91/100, 95%CI -13.75, 1.93, 9 RCTs; -6.27/100, 95%CI -18.97, 6.44, 7 RCTs; and -5.26/52, 95%CI -10.59, 0.08, 6 RCTs, respectively).

2.7.4.3 Acceptance commitment therapy

Acceptance commitment therapy (ACT) "attempts to increase valued action in the presence of pain and bring about behavioral change and improvements to functioning", "by developing 'psychological flexibility' through six key processes: 'acceptance', 'cognitive defusion', 'values-based action', 'contact with the present moment', developing an 'observer self' that can change depending on the context, and 'committed action' in line with important values".[438,441] An SR conducted in 2017[438] concluded on the efficacy of ACT in various types of chronic pain including OA in terms of pain reduction, physical function improvement, and psychological well-being amelioration. The companion meta-analysis showed small positive effects of ACT on physical function (at post-treatment, SMD = -0.45, 95% CI -0.73, -0.18, 5 RCTs; 3 months later, SMD = -0.41, 95% CI -0.71, -0.12, 4 RCTs), and medium effects on depression (at post-treatment, SMD = -0.52, 95% CI -0.8, -0.24, 4 RCTs; 3 months later, SMD = -0.52, 95% CI -0.90, -0.14, 4 RCTs). For pain reduction, ACT's effects were small and not statistically significant (at post-treatment, SMD = -0.26, 95% CI -0.53, 0.00, 6 RCTs; 3 months later, SMD = 0.29, 95% CI -0.59, 0.00, 4 RCTs).

ACT would be slightly less efficacious than CBT in terms of reduction in pain (SMD = 0.38, 95% CI 0.01, 0.75, 1 RCT) and depression (SMD = 0.39, 95% CI 0.02, 0.76, 1 RCT) after treatment,[438] and the effect differences would become statistically non-significant at 6 months (for pain, SMD = 0.35, 95% CI -0.02, 0.72; for depression SMD = 0.35, 95% CI -0.02, 0.72, 1 RCT). For physical function and anxiety, the effect differences between ACT and CBT are not statistically significant (physical function at post-treatment, SMD = 0.23, 95% CI -0.14, 0.60; physical function at 6 months post-treatment, SMD = 0.12, 95% CI -0.25, 0.48,

1 RCT; anxiety at post-treatment, SMD = 0.16, 95% CI -0.21, 0.53; anxiety at 6 months post-treatment, SMD = 0.14, 95% CI -0.23, 0.51, 1 RCT).

2.7.4.4 Mindfulness meditation

Mindfulness meditation (MM) is "thought to work by refocusing the mind on the present and increasing awareness of one's external surroundings and inner sensations, allowing the individual to step back and reframe experiences",[439] "thereby developing a greater sense of emotional balance and well-being".[322] Growing evidence has shown MM's positive physiological effects: inflammation alleviation by reducing IL-6,[442] increasing cortical thickness in the right insula and the somatosensory cortex and reducing psychological states such as worry, anxiety, depression, and alexithymia,[443] structural enlargements in a prefrontal network,[444] PFC activation,[445] and amygdala activity reduction.[445] The meta-analyses of the SR (2017)[439] revealed that, compared with all types of controls, MM would have small effects on various types of chronic pain at follow-up time of 4-60 weeks (SMD = 0.32, 95%CI 0.09, 0.54, 30 RCTs) and a trivial effect on depressive symptoms at follow-up time of 6-24 weeks (SMD = 0.15, 95%CI 0.03, 0.26, 12 RCTs). For physical function, the effect difference between MM and control groups was not statistically significant (SMD = 0.30, 95%CI -0.02, 0.62, 4 RCTs). For postoperative outcomes, an RCT (2019, n = 127, TKA, Australia)[440] concluded on the superior efficacy of a preoperative 8-week MM program compared to treatment as usual in terms of reduced postoperative knee pain at 12 months after TKA (mean difference, -10.3/100 points, 95% CI -19.0, -1.6, p = 0.021) and improved knee function (mean difference, -10.2/100 points, 95% CI -19.2, -1.3, p = 0.025); however, at 3 months post-surgery, MM's effects were not significantly superior ($p > 0.05$). For other outcomes such as pain self-efficacy or mindfulness, no statistically significant differences were observed between the groups at 3-month and 12-month post-TKA ($p > 0.05$).

2.7.5 Conclusions

There is growing evidence that psychosocial factors are involved in the processes of OA pain and inflammation. This present review has identified such psychosocial factors and evidence-based interventions targeting psychological factors in OA pain experience. Some of the psychosocial factors have been considerably studied to the extent that their relations with pain severity or physical function are supported by at least one SR; others however have not. Therefore, the findings of these psychosocial factors need to be interpreted with great caution. We must also bear in mind that the effects of certain

psychosocial factors (emotional distress, optimism, positive affect) on OA pain experience are found to be moderated by race or sex. Pertaining to interventions targeting psychological factors, psychotherapy, pain neuroscience education, acceptance commitment therapy, and mindfulness meditation have shown at least small or statistically significant effects on pain and/or other outcomes.

In conclusion, since OA pain experience can be influenced by various psychosocial factors, patients with OA should be provided with a pain management program involving different biopsychosocial interventions.

2.8 Gestion de l'OTM

2.8.1 Lacunes dans la gestion de la douleur chronique d'origine arthrosique

Malgré des décennies de recherche portant sur l'évaluation et la gestion de la douleur chronique (DC), il est bien documenté que divers types de syndromes douloureux sont communément sous-traités et un grand nombre de patients vont d'un médecin à l'autre en quête d'un soulagement.[47] Un des obstacles majeurs à la gestion optimale de la DC incluant l'OA réside dans l'accès limité à des soins de santé adéquats. Ainsi, diverses études canadiennes[446-449] ont démontré que beaucoup de patients souffrant de différents types de DC éprouvent de la difficulté à avoir un accès opportun à des soins spécialisés dans le domaine de la douleur et se retrouvent ainsi sur de longues listes d'attente. D'autres études dans le domaine spécifique de l'OA du genou ont révélé que de 55% à 90% des patients atteints de ce type de problème qui avaient été référés à un chirurgien orthopédiste auraient dû être gérés par un autre type de professionnel de la santé à l'aide de traitements plus conservateurs.[450-452] Cette tendance est aussi observé pour la clientèle atteinte d'OTM. Selon une étude norvégienne (2019, n = 180),[48] seulement 21% des patients ont été référés en ergothérapie ou physiothérapie avant de rencontrer un chirurgien spécialisé pour la main. Ils n'ont alors pas reçu des traitements non pharmacologiques de première ligne recommandés (ex. : exercices, orthèses, aides techniques).[453-455] Une étude britannique (2020)[49] incluant 160 patients atteints d'OTM et provenant de 32 institutions de la santé a démontré que seulement 46% de patients avaient reçu une orthèse, 38%, un programme d'exercices, et 26% de l'éducation sur les principes ergonomiques. Ce type d'orientation inappropriée des patients dans le système de santé, jumelé au manque de gestion adéquate et efficace en temps opportun, peut engendrer une détérioration prématurée du fonctionnement physique du patient, de son bien-être psychologique et de sa QdV reliée à la santé. Cependant, la gestion de l'OTM diffère selon les continents ou les pays[68] et on n'a pas de connaissance si les interventions basées sur des données probantes sont dispensées aux patients atteints d'OTM au Canada. Aucune étude n'a documenté les ressources en soins et services de santé (ex. : type de professionnels, type de médicaments, méthodes antalgiques non-chirurgicales) utilisées par des individus souffrant d'OTM jusqu'à présent.

2.8.2 Absence d'un guide de pratique clinique spécifique à l'OTM

Tel que mentionné dans la section 2.2, il n'y a pas de guide de pratique clinique spécifique à l'OTM. Selon les recommandations de l'OA de la main élaborées par *l'European League Against Rheumatism* (EULAR)[52] et de l'*American College of Rheumatology* (ACR),[53] différents traitements sont disponibles (Tableau 8). En ce qui a trait aux traitements pharmacologiques, les anti-inflammatoires topiques non stéroïdiens (AINS) et oraux, l'acétaminophène, le tramadol, le duloxène et les injections intra-articulaires de cortisone sont fortement ou conditionnellement recommandés. Quant aux interventions non pharmacologiques, les orthèses, les exercices de la main, les programmes d'autogestion (principes ergonomiques, modération des activités), les aides techniques, l'application thermique (froid/chaud) et le taping neuro-proprioceptif sont suggérés. L'acupuncture et la thérapie cognitivo-comportementale sont aussi considérées. Des interventions chirurgicales pour l'OTM ne devraient être envisagées que lorsque les interventions conservatrices n'ont pas réussi à soulager la douleur.[52]

Tableau 8. – Recommandations de l'*European League Against Rheumatism* (EULAR) et de l'*American College of Rheumatology* (ACR) pour la gestion de l'OA de la main

EULAR[52]	ACR[53]
Principes généraux	
• Le but primaire de la gestion de l'OA de la main est **de contrôler les symptômes** (ex. : douleur, raideur) et **d'optimiser la fonction de la main**, afin de **maximiser des activités, la participation et la QdV**. • Tous les patients devraient se voir offrir des **informations sur la nature et le cours de la maladie**, ainsi que de **l'éducation sur les principes d'autogestion** et des **options de traitement**. • La gestion de l'OA de la main devrait être **personnalisée** en tenant compte de sa localisation et de sa sévérité, ainsi que des comorbidités. • La gestion de l'OA de la main devrait être basée sur **la décision partagée** entre le patient et le professionnel de la santé. • La gestion optimale de l'OA de la main nécessite **une approche multidisciplinaire**. En plus des modalités non pharmacologiques, des options pharmacologiques et chirurgicales devraient être considérées.	• **Un plan de traitement compréhensif** pour la gestion d'OA pourrait inclure des interventions éducationnelles, comportementales, psychosociales et physiques, ainsi que des médications topiques, orales et intra-articulaires. • Le choix des traitements devrait être en partie basé sur **les croyances et les préférences du patient**, ainsi que sur **son état médical**. Comorbidités, traumatismes, sévérité de la maladie, antécédents chirurgicaux, et accessibilité aux soins devraient être considérés.
Approche pharmacologique	
• Des **traitements topiques** sont préférables aux traitements systémiques pour des raisons de sécurité. Des **AINS topiques** sont le premier choix pharmacologique. • Des **analgésiques oraux**, surtout des **AINS** devraient être considérés pour une durée limitée afin de soulager les symptômes. Le **paracétamol** et le **tramadol** (avec ou sans paracétamol) peuvent être utilisés, toutefois, il n'y a pas de preuves solides pour appuyer leur efficacité. • Le **sulfate de chondroïtine** pourrait être utilisé pour diminuer la douleur et améliorer la fonction. • L'**injection intra-articulaire de cortisone** ne devrait pas être utilisée en général, à moins qu'il y ait de l'inflammation. Elle peut être considérée pour des OA interphalangiennes douloureuses. • Les patients avec de l'OA de la main ne devraient pas être traités avec des **médicaments conventionnels** ou des **antirhumatismaux modificateurs de la maladie**.	• Des **AINS oraux** sont fortement recommandés. • Des **AINS topiques,** l'**acétaminophène,** le **tramadol**, la **duloxétine,** et la **chondroïtine** sont conditionnellement recommandés. • Des **injections intra-articulaires de cortisone** sont conditionnellement recommandées comparativement à d'autres formes d'injection incluant de l'acide hyaluronique. • Les **bisphosphonates**, la **glucosamine**, l'**hydroxychloroquine**, la **méthotrexate**, les **inhibiteurs du facteur de nécrose tumorale** et l'**antagoniste au récepteur de l'interleukine 1** ne sont pas recommandés et ce, fortement. • De façon conditionnelle, des **injections intra-articulaires de l'acide hyaluronique,** la **capsaïcine topique,** la **colchicine,** les **opioïdes autres que le tramadol, l'huile de poisson** et la **vitamine D** ne sont pas recommandés.
Approche conservatrice non pharmacologique (physique)	

• De l'**éducation** et de l'**entraînement aux principes ergonomiques, des activités modérées** et **l'utilisation d'aides techniques** devraient être offerts à tous les patients. • Des **exercices pour améliorer la fonction et la force musculaire et pour diminuer la douleur** devraient être considérés pour tous les patients. • Des **orthèses** devraient être considérées **pour l'OTM** afin de diminuer les symptômes. Une utilisation à long terme est préconisée.	• Des **exercices** et des **programmes d'auto-efficacité et d'autogestion** sont fortement recommandés. • Des **orthèses** sont fortement recommandées **pour l'OTM**. • Des **interventions thermales** (chaleur humide, diathermie, ultrason, chaleur/froid, paraffine) sont conditionnellement recommandées. • Le **taping neuro-proprioceptif** est conditionnellement recommandé **pour l'OTM**. • De façon conditionnelle, l'**ionophorèse** n'est pas recommandée **pour l'OTM**.
Approche chirurgicale	
• Une **chirurgie** devrait être considérée pour les patients atteints d'anomalies structurales si d'autres modalités ne sont pas efficaces pour soulager la douleur. Une **trapézectomie** devrait être considérée pour l'OTM. La réadaptation devrait être offerte après la chirurgie.	
Approche psychosociale	
	• La **thérapie cognitivo-comportementale** est conditionnellement recommandée.
Approche en médecine alternative	
	• **Acupuncture** est conditionnellement recommandée.

ACR, *American College of Rheumatology*; AINS, anti-inflammatoires non stéroïdiens ; EULAR, *European League Against Rheumatism* ; OTM, ostéoarthrose trapézo-métacarpienne; QdV, qualité de vie.

Deux études européennes ont rapporté que 15-36% de patients ayant reçu des interventions non pharmacologiques en premier (orthèse, thérapie de la main) ont dû subir une chirurgie 2-7 ans plus tard.[51,456] La motivation de passer par la chirurgie chez des individus avec de l'OTM semble avoir un lien direct avec la sévérité des incapacités fonctionnelles et non avec la sévérité radiographique.[37,457,458] La question qu'on se pose ici est : « quels traitements non chirurgicaux sont les plus efficaces pour l'OTM afin de prévenir ou retarder une chirurgie ? » Les recommandations concernant l'OA de la main de l'EULAR et l'ACR[52,53] (Tableau 8) certes aident les cliniciens à choisir les catégories d'intervention, mais les informations fournies par ces recommandations ne sont pas suffisamment détaillées (ex. : type d'orthèse, exercices, enseignement). Vu la spécificité du pouce[54,55] qui représente 50% des fonctions de la main,[58] sa mobilité accrue comparativement à d'autres articulations de la main[56-58] et le fait que l'OTM est plus douloureuse que d'autres OA de la main,[21] un guide plus adapté à l'OTM est nécessaire. Tel que mentionné précédemment (la section 2.2), les revues systématiques (RS) existantes ne sont pas exhaustives en termes de types d'intervention[60] ou sont méthodologiquement sous-optimales (ex. : absence d'appréciation de la

qualité méthodologique des études primaires,[61] inclusion des essais cliniques hétérogènes dans une même méta-analyse[60]).

Quant aux techniques chirurgicales pour l'OTM, l'EULAR[52] recommande la trapézectomie simple en se basant sur la RS de Wajon et al (2015)[67] car cette revue n'a pas trouvé de bénéfice additionnel d'une technique à l'autre et que des techniques plus complexes que la trapézectomie simple ont tendance à induire plus de complications sans générer de bénéfice. Cependant, cette RS a été retirée de la *Cochrane Library* depuis 2017 en raison de commentaires internes auxquels les auteurs doivent répondre. Lorsqu'ils le feront, leurs conclusions pourraient alors être modifiées. En effet, la trapézectomie simple est la plus pratiquée en Angleterre[459] tandis que la reconstruction ligamentaire accompagnée d'une interposition tendineuse est la plus populaire aux États-Unis.[460-462] Par ailleurs, cette technique est plus dispendieuse que d'autres comme la trapézectomie simple[463] et ne garantit pas de meilleurs résultats en termes de fonction manuelle, d'interférence de la douleur et dépression comparativement aux traitements non chirurgicaux (AINS/orthèse/injections) après 6 mois. En effet, ceux qui avaient été opérés avaient un niveau de fonction manuelle moins élevé et plus de douleur.[464] D'autant plus, le choix de technique chirurgicale a un impact sur la durée d'absence du travail.[62] Elles doivent alors être judicieusement choisies en tenant compte de leurs coûts, bénéfices et effets indésirables. Malheureusement, l'efficacité factuelle des interventions chirurgicales pour cette pathologie fait défaut, laissant les chirurgiens et les patients sans soutien dans leur processus de prise de décision. Bien qu'il y ait des RS examinant l'efficacité de l'intervention pour l'OTM, aucune d'entre elles n'est exhaustive en termes de techniques chirurgicales (n'incluant que des techniques chirurgicales particulières).[63,64] De plus, certaines sont méthodologiquement sous-optimales (omettant une évaluation de risques de biais des études primaires incluses[65,66]) alors que d'une autre plus rigoureuse méthodologiquement, mais nécessitant une mise à jour puisque les études primaires incluses ont été publiées avant 2013.[67] En conséquence, une RS rigoureuse visant à synthétiser la littérature scientifique sur l'efficacité des traitements non chirurgicaux et chirurgicaux était nécessaire afin de raffiner les recommandations de l'EULAR et l'ACR pour l'OTM.

2.9 Conclusions de la recension des écrits

La douleur chronique affecte différentes sphères de la vie des individus telles que les capacités fonctionnelles et la qualité de vie (QdV). Elle se manifeste différemment d'une personne à l'autre puisqu'elle est sous l'influence de différents facteurs biopsychosociaux. La douleur associée à l'OTM ne

fait pas exception. La gestion de l'OTM symptomatique n'est pas toujours optimale, probablement due à une méconnaissance de la maladie et par l'absence de guide de pratique clinique spécifique à cette pathologie. Afin de mieux comprendre l'expérience reliée à l'OTM de chaque individu et lui offrir les soins adéquats, ainsi que d'améliorer sa QdV, il est crucial de documenter les données probantes appuyant l'efficacité des traitements spécifiques à l'OTM, d'investiguer l'impact de cette pathologie (douleur, incapacité physique, QdV, bien-être psychologique, productivité), d'examiner les facteurs biopsychosociaux qui influencent la douleur et l'incapacité physique, et documenter la gestion de l'OTM, c'est-à-dire, l'utilisation des ressources en santé que font les personnes atteintes d'OTM.

Chapitre 3 – OBJECTIFS

3.1 Objectifs généraux

Le but général de la thèse était de recenser l'efficacité de toutes les interventions existantes pour l'OTM et de documenter l'impact clinique de l'OTM, d'identifier des facteurs biopsychosociaux associés à l'OTM symptomatique et de répertorier l'utilisation des ressources en soins que font les personnes atteintes de ce type d'arthrose.

3.2 Objectifs spécifiques

3.2.1 Volet I : Revues systématiques de la littérature sur l'efficacité des interventions pour l'OTM

1. Identifier toutes les interventions existantes (non-chirurgicales et chirurgicales)
2. Documenter, à l'aide d'une revue systématique de la littérature scientifique, l'efficacité des interventions en ce qui a trait à la douleur, aux incapacités fonctionnelles, au bien-être psychologique, à la QdV, à la satisfaction vis-à-vis du traitement et aux effets néfastes.

3.2.2 Volet II : Étude descriptive transversale sur l'impact clinique, les facteurs biopsychosociaux associés à la sévérité de la douleur et des incapacités fonctionnelles, et la gestion de l'OTM

1. Documenter la sévérité et l'impact clinique de l'OTM symptomatique sur le fonctionnement quotidien des patients, leur bien-être psychologique, leur QdV reliée à la santé, et leur productivité au travail,
2. Examiner les associations entre différents facteurs biopsychosociaux et la sévérité de la douleur et des incapacités fonctionnelles, et
3. Documenter les modalités thérapeutiques non-chirurgicales utilisées par les personnes atteintes d'OTM de même que le type de professionnels de la santé consultés.

Chapitre 4 – MÉTHODOLOGIE

4.1 Volet I : Revues systématiques de la littérature sur l'efficacité des interventions pour l'OTM (Article 3 - Efficacy of treatments and pain management for trapeziometacarpal (thumb base) osteoarthritis: Protocol for a systematic review)

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Ce protocole de la revue systématique a été publié dans la revue *BMJ Open* 2015;5(10) (http://dx.doi.org/10.1136/bmjopen-2015-008904).[465] L'article est reproduit ici avec l'autorisation de la revue.

En tant qu'auteure principale, je confirme mon apport majeur à la conception du protocole et la rédaction du manuscrit sous la supervision de ma directrice de recherche D^{re} Manon Choinière. La bibliothécaire-informationniste, M^{me} Daniela Ziegler, a développé les stratégies de recherche et fait une contribution substantielle concernant les sources d'information et la recherche de la littérature. Tous les co-auteurs ont révisé le manuscrit et approuvé la version finale.

4.1.1 Abstract

Introduction: The thumb is essential for daily activities. Unfortunately, this digit is commonly affected by trapeziometacarpal osteoarthritis (TMO), handicapping a large number of individuals. TMO constitutes an increasing human and economic burden for our society whose population is ageing. Limited access to adequate treatment is among the most important obstacles to optimal TMO management. Poor understanding of TMO characteristics, lack of knowledge about evidence-based treatments, simplistic pain management plans based solely on the patient's physical condition, absence of inter-professional communication, and lack of multidisciplinary treatment guidelines contribute to inadequate TMO management. On the long term, our research project aims at improving the quality of care and services offered to TMO patients by developing a patient-centered, evidence-based multidisciplinary management clinical pathway coordinated across the healthcare system. This proposed systematic review is a prerequisite to ensuring evidence-based practices and aims to document the efficacy of all the existing modalities for TMO management.

Methods and analysis: The protocol of the systematic review is registered with PROSPERO (Registration number CRD42015015623) and will be conducted using the guidelines *Cochrane Handbook for Systematic Reviews of Interventions.* We will identify studies in English and French concerning TMO treatments through searches in Cochrane Central, EMBASE, MEDLINE, PsychINFO, CINHAL, PubMed, OT Seekers, PEDRO, and the grey literature. Two reviewers will independently screen study eligibility, extract data, and appraise studies using published assessment tools. Meta-analyses will be undertaken where feasible; otherwise, narrative syntheses will be carried out. The robustness of evidence will be assessed using the GRADE system.

Ethics and dissemination: Ethics approval is not required for this study. A comprehensive knowledge exchange and transfer (KET) plan incorporating effective strategies will be used to disseminate the findings of this review and utilize them to optimize TMO management.

4.1.2 Introduction

Trapeziometarcarpal osteoarthritis: an understudied but important health problem.

The most prevalent cause of chronic pain in the world is osteoarthritis (OA).[466,467] Its prevalence is increasing in an alarming manner with the ageing of the population, and it is estimated it will double before the year 2020.[468] This anticipated increase is somewhat frightening considering that OA is associated with numerous adverse consequences for affected individuals as well as increasing economic costs for our society.[339,468-470] Based on the meta-analysis of Pereira et al. (2011) on OA prevalence, hand OA is more prevalent than knee/hip OA, yet hand OA has been much less studied.[471] Despite the fact that the thumb accounts for approximately 50% of overall hand function and is essential in our daily activities,[58] relatively few studies have documented the prevalence of trapeziometacarpal osteoarthritis (TMO). Most of our knowledge comes from American and European studies which are based solely on radiographic findings: the prevalence rates of TMO ≥ Grade 2 (on 4- or 5-point severity scale) are highly variable ranging from 11.5% and 50.5%.[20,35,46,106,107] TMO was found to be more prevalent in women than men, but the prevalence steadily increases with age in both genders. The prevalence of symptomatic TMO (as defined by the presence of clinical symptoms with or without radiographic findings) and the rates vary between 1.0% and 15.9%.[26,105,110,112-114,118,472] Some studies have revealed that only a weak to modest association between TMO radiographic findings and clinical symptoms (pain and/or functional disability) exists[20,110] — i.e., patients may exhibit important structural changes, yet report little or no pain; or patients may experience severe pain with little radiological evidence of TMO. Botha-Scheepers et al. (2009)[140] followed a group of hand OA patients over a 2-year period and found that the progression of pain intensity and physical functioning was unrelated to X-ray findings.[140] Based on the extensive clinical experience of three of the co-authors (PH, NB, TH) of this article, the above rates of symptomatic TMO are most likely to be underestimated because healthcare professionals commonly have insufficient knowledge of TMO characteristics and misdiagnose the origin of the pain (e.g., tendinopathy vs TMO). As a result, these patients are referred to a hand specialist long after TMO first appears.

The chief complaint of patients with TMO is persistent pain at the thumb base[21,75,473] which limits their hand functions,[21,88,90] reducing both thumb mobility[474] and hand strength,[84,86,87] thereby affecting their daily activities (e.g., holding objects, preparing meals, writing).[86,89,90] However, only a few studies have either quantified the severity of TMO pain and/or its impact on various aspects of daily living other than physical functioning.[89,140]

Management of TMO and pain-related symptoms

Despite decades of research on pain assessment and management, it is well documented that chronic pain disorders of various origins continue to be commonly under-treated, mistreated or untreated, with a large number of patients going from one doctor to another seeking pain relief.[47] One of the major barriers to optimal management of persistent pain disorders including OA is the limited access to adequate healthcare services. Patients commonly have difficulty gaining *timely* access to *appropriate* pain care[446,448,449] leading to a premature or an increased deterioration of their physical functioning, psychological well-being, and health-related quality of life while waiting for treatment. Management of TMO and pain-related symptoms can be provided by different healthcare professionals including primary care physicians, rheumatologists, physiatrists, orthopedic surgeons, plastic surgeons, radiologists, pharmacists, physical therapists, and/or occupational therapists. However, these clinicians (including hand specialists) often work in silos and manage TMO patients based on their own clinical experience rather than on well-documented scientific evidence. Other obstacles to adequate TMO management include 1) poor awareness and understanding of the characteristics of TMO (and especially in the primary sector of care), 2) lack of knowledge about evidence-based effective treatments, and 3) simplistic pain management plans based solely on patients' physical condition which do not necessarily meet all their needs. Finally, the fact that healthcare professionals commonly have insufficient knowledge and training for managing chronic pain disorders should not be neglected.[475,476]

Management of TMO involves various modalities including pharmacological therapy,[75,477,478] corticosteroid/hyaluronic acid injections,[21,75,478] hand exercises,[82,478,479] orthoses,[21,82,477,478,480] joint protection education,[477] assistive devices,[82,477] physical agent modality[477,478,480] and surgery.[82,478,481] However, the relative efficacy of these modalities remains poorly documented, some of them recommended for the treatment of hand OA in general while others are specifically for TMO. Furthermore, earlier systematic reviews examining the efficacy of TMO treatment have focused solely on one type of modality (e.g., surgery, orthoses).[482,483] Chronic pain disorders commonly have significant adverse consequences in various domains of a patient's life,[26 39] and it is widely acknowledged that a multidisciplinary approach which takes into account the biopsychosocial components of the pain experience constitutes the "gold standard" for managing this type of disorder.[16,19] Therefore, there is a need to conduct a systematic review from a multidisciplinary perspective which integrates all the existing therapeutic modalities for TMO in order to 1) document their relative efficacy, and 2) examine the modalities whose efficacy for TMO is supported by scientific evidence and those which are not, without

creating confusion between effective modalities with absence of documented evidence and ineffective modalities supported by evidence.

Objectives

Our ultimate aim is to improve the quality of care and delivery of services for TMO patients by developing a patient-centered, evidence-based TMO management clinical pathway[484] coupled to most optimal treatments which are evidence-based. As a prerequisite, a systematic review of the literature is needed to document the efficacy of the existing pharmacological, non-pharmacological and surgical modalities to relieve pain and improve function in TMO patients. This paper aims at presenting the protocol for this systematic review of the literature.

4.1.3 Methods and analysis

The guidelines for systematic review of the literature *Cochrane Handbook for Systematic Reviews of Interventions*[485] are referred to. The review will involve five steps (See Figure 7).

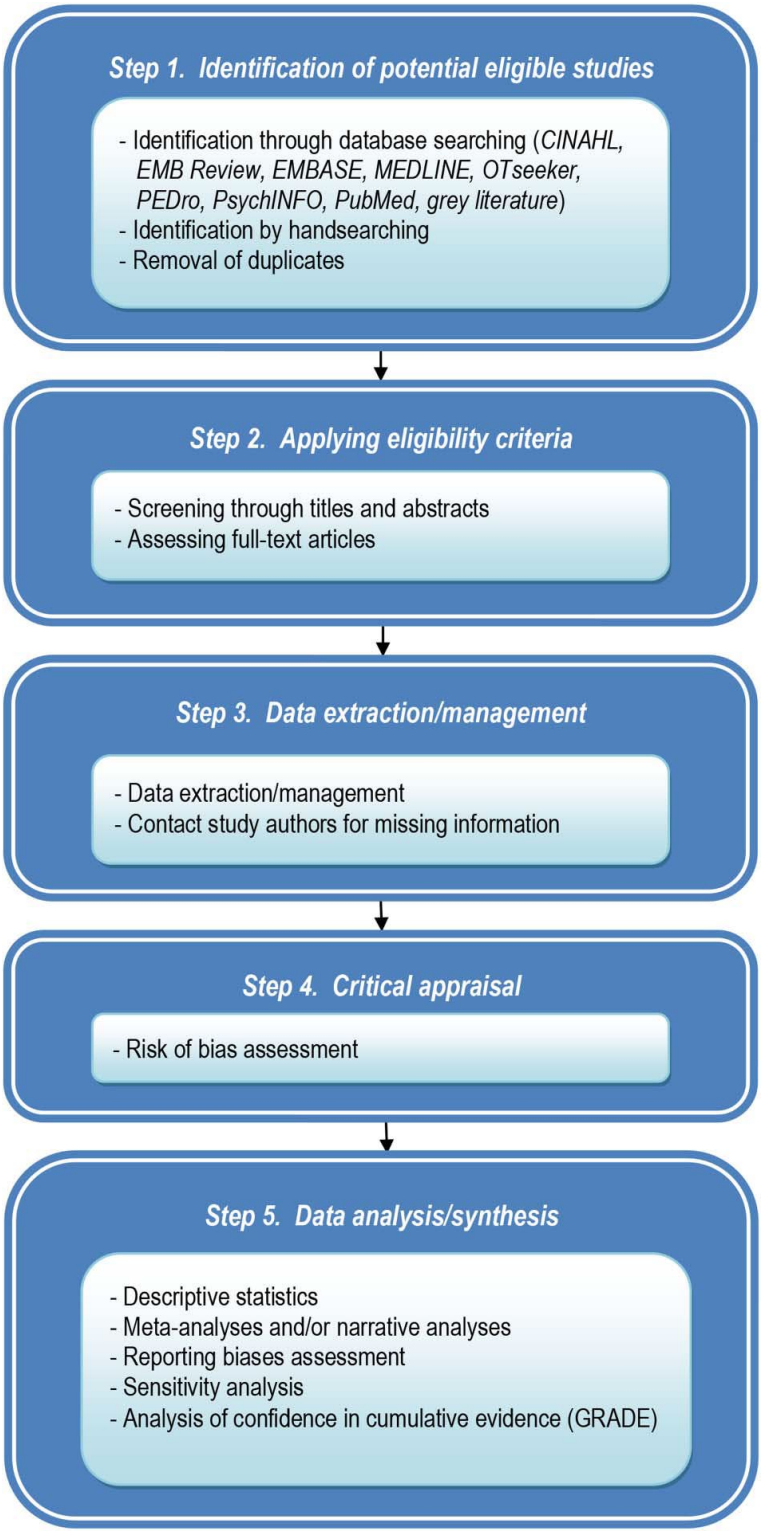

Figure 7. – Process of the systematic review.

Research team

The team combines relevant and complementary disciplines with members in pain psychology and pharmacology (MC), epidemiology and biostatistics (LL), plastic surgery (PH), radiology (NB), physiotherapy (NG), occupational therapy (TH) and library information science (DZ). The research expertise of MC is in the field of pain assessment/management and knowledge translation. The second author's research expertise (LL) focuses on knowledge transfer on primary care clinical practices in the cardiovascular and pain fields. The third author (PH) runs the largest hand clinic in the province of Quebec (Canada) and follows about 50 TMO patients yearly. The fourth author (NB), a radiologist and a researcher, routinely performs image-guided steroid injections. The fifth author (NG) has research expertise in systematic reviews of the literature, lower limb osteoarthritis, and technology assessment. The sixth author (DZ) has collaborated on a series of systematic reviews. Finally, TH, a PhD student and occupational therapist, has treated TMO patients for over 13 years.

Step 1. Identification of potential eligible studies

Our academic librarian-informationist (DZ) will search through bibliographic electronic databases CINAHL (from 1937 onwards), EMB Review (from 1991 onwards), EMBASE (from 1974 onwards), MEDLINE (from 1946 onwards), OTseeker, PEDro, PsychINFO (from 1806 onwards), PubMed, and the grey literature (CADTH, Clinical Trials, National Guideline Clearing House, NICE, MedNar, Google Scholar, OAIster and Open Grey). The first search will combine words and expressions for three conceptual groups: trapeziometacarpal joint, osteoarthritis, and treatment. To ensure that psychotherapeutic modalities for TMO will be picked up, the following keywords will be added: *cognitive therapy, cognitive behavior therapy, relaxation, biofeedback, supportive psychotherapy, group therapy* and *counseling.* For the second search, the first two conceptual groups will be the same while the third group will focus on "pain". For each database, we will use words and expressions from controlled vocabulary (MESH, EMTREE and others) and free text searching. The searches will be restricted to articles published in English and French. Handsearching will also be used to identify other references (TH, MC). A pilot search through the CINAHL, EMB Review, EMBASE, MEDLINE, OTseeker, PEDro, PsychINFO and PubMed have identified approximately 2000 references, demonstrating the study's feasibility.

Step 2. Applying eligibility criteria

Once the results from multiple searches will be merged by the librarian (DZ) using the reference management software EndNote, duplicate records will be removed (DZ, TH). Titles and abstracts of studies

will be screened independently by two reviewers for eligibility (MC, TH). Agreement between the two reviewers will be established using kappa statistic.[486] Full text copies of potentially relevant reports will be retrieved (TH). They will be analyzed against eligibility criteria and the results will be recorded in Part 1 (General Information) and Part 2 (Eligibility) of the *Cochrane Effective Practice and Organisation of Care Group (EPOC) Data Abstraction Form* [486] by the two screeners. In the cases where no consensus is reached by the two reviewers, a third reviewer (PH) will determine the eligibility of the study. Part 1 of the EPOC form includes study identification (surname of first author and year of first full report of study), date form completed, name of person extracting data, report title, publication type, study funding source and possible conflicts of interest. Part 2 consists of study characteristics (type of study, participants, types of intervention/outcome measure).

Criteria for considering studies for this review

i. Types of studies

Meta-analyses, systematic reviews of the literature, randomized controlled trials (RCT) will be included. If there are no RCT, non-randomized controlled trials, controlled before-after studies, interrupted time series and repeated measures studies will be considered as well as observational studies (cohort, case-control).[478,487] Case series, review articles, editorials and commentaries will be excluded. The studies with higher evidence will be prioritized to determine the efficacy of therapeutic modalities. Results of most recent systematic reviews and those of reviews including more studies will be prioritized if there is more than one systematic review on a given intervention.

ii. Types of participants

Studies conducted among TMO adults who had received treatment to decrease pain and/or improve function will be included. Studies on diseases other than primary TMO (e.g., traumatic osteoarthritis, rheumatoid arthritis), on osteoarthritis other than the trapeziometacarpal joint, or on animals will be excluded. Studies including osteoarthritis of different joints will be included if the data of TMO are separately presented.

iii. Types of interventions

All the existing therapeutic modalities for TMO treatments (e.g., pharmacological, non- pharmacological, surgical) to reduce pain and improve function will be included. The possible interventions are “drug

therapy", "surgery", "manual therapy", "psychotherapy", "orthoses", "acupuncture", "hand exercises", "assistive devices", "education", "joint injections", "joint protection", "laser therapy" and "thermotherapy". The comparators are another intervention or a non-exposed control group.

iv. Type of outcomes

Primary outcomes are pain and function, considered core outcomes for osteoarthritis clinical trials according to the international consensus group OMERACT (*Outcome measures in Rheumatology*).[359,488] Secondary outcomes are patients' psychological well-being, health-related quality of life and treatment satisfaction.

Step 3. Data extraction/management

Data will be independently extracted by two persons (MC, TH) using Part 3 of the EPOC data abstract form[486] (Population and Setting) which explores population description, setting, inclusion criteria, exclusion criteria, and methods of recruitment. Part 4 (Methods) looks at aims of study, design, unit of allocation, start date, end date, and duration of participation. Part 5 (Risk of bias) will be used at Step 4. Part 6 (Participants) considers total number of participants, withdrawals and exclusion, severity of illness, co-morbidities, other treatment, relevant sociodemographics, and subgroups. Part 7 (Intervention group) takes into account description of intervention, duration of treatment period, and others. Part 8 (Outcomes) records outcome name, time points measured/reported, outcome definition, person measuring/reporting, unit of measurement, scales, and others. Part 9 (Results) varies according to study design and nature of outcome (dichotomous/continuous). It mainly concerns comparison, outcome, subgroup, results, baseline data, number of missing participants, statistical methods and appropriateness of these methods, and others. Part 10 (Applicability) questions if important populations have been excluded from the study, if the intervention is likely to be aimed at disadvantaged groups, and if the study directly addresses the review question. Part 11 (Other information) includes key conclusions, references to other relevant studies, correspondence required for further study information, and others. In cases where data are missing, study authors will be contacted.

Step 4. Critical appraisal

Risk of bias in individual studies will be separately assessed by two reviewers (MC, TH). In the cases of disagreement, discussion will take place to achieve consensus. If necessary, the third one (PH) will appraise the study. Different assessment tools will be used depending on study design: *Assessment of Multiple*

Systematic Reviews (AMSTAR) for systematic reviews of the literature,[489] EPOC *Risk of Bias Tool* for controlled studies and for interrupted time series (ITS) studies,[490] *Effective Public Health Practice Project* (EPHPP) *Quality Assessment Tool for Quantitative studies* for cohort studies or case-control study).[491]

i. AMSTAR[489]

The questionnaire is composed of 11 items. It examines the methodological quality of a systematic review including double review, exhaustive research strategy, heterogenic analysis and publication bias. It scores each criterion on 4 scales "yes", "no", "can't answer" and "not applicable" and total score on 7 scales. Its inter-rater reliability for each item is moderate to perfect (0.51< kappa <1.00) and excellent for the global score (kappa=0.84, 95% confidence intervals (CI) 0.67-1.00). Its construct validity (Pearson coefficient) is 0.72 (95%CI 0.53-0.84). The minimal detectable difference is 0.64.[492]

ii. EPOC *Risk of Bias Tool for studies with a separate control group*[490]

This tool includes the five domains of bias determined by the *Cochrane Risk of Bias Tool*[493] - selection (random sequence generation and allocation concealment), performance, attrition (method addressing incomplete outcome), detection and reporting (selective outcome reporting) - and two other criteria regarding "similarity of baseline outcome measurements between experimental and control groups" and "similarity of baseline characteristics between experimental and control groups". Each item is scored "yes" for high risk, "no" for low risk and "unclear" if not specified in the paper.

iii. EPOC *Risk of Bias Tool for ITS studies*[490]

This tool examines four domains of risks of bias determined by the *Cochrane Risk of Bias Tool* [493] (performance, attrition, detection and reporting bias) and three risks of bias associated with the ITS study design; “was the intervention independent of other changes?”, “was the shape of the intervention effect pre-specified?” and “was the intervention unlikely to affect data collection?”

iv. EPHPP *Quality Assessment Tool for Quantitative studies*[491]

This tool will be used to assess cohort and case-control studies. It includes the items defined by the *Strengthening the Reporting of Observational Studies in Epidemiology* (STROBE) *Statement.*[494] It includes 21 items from 8 categories (selection, study design, confounders, blinding, data collection methods,

withdrawals and drop-outs, intervention integrity and analyses). This tool is considered one of the best tools for systematic review.[495] Content validity and construct validity, and inter-rater and intra-rater reliability have been demonstrated (kappa=0.74, intraclass correlation coefficient=0.77).[491,496] Administration time is 10 to 15 minutes and its ease of use has been reported.[491,495]

Step 5. Data analysis/synthesis

i. Characteristics of included studies

Descriptive statistics will present features of included studies in terms of study design, clinical and sociodemographic characteristics of participants, studied TMO treatments and their results.

ii. Efficacy analysis of each therapeutic modality

Meta-analyses will be undertaken using the Cochrane Group's Review Manager software (RevMan 5.1)[497] unless heterogeneity among studies is demonstrated by the I^2 statistic, i.e., $I^2 \geq 50\%$.[498] For continuous outcomes, mean differences and standardized mean differences will be used for meta-analysis. For dichotomous outcomes, odd ratios, risk ratios, absolute risk reduction, and number needed to treat will be computed. For longitudinal studies, risk ratios or hazard ratios will be calculated; for case-control studies, odd ratios will be computed. In the presence of substantial variation among studies, narrative syntheses will be favoured and studies will be classified in logical categories.[499] In cases where data are missing, study authors will be contacted; otherwise, participant attrition will be treated by intention-to-treat analysis.[486] Missing statistics (e.g., standard deviation) will be calculated from available data (e.g., standard error will be reported from p-values or 95% confidence intervals).[486]

iii. Reporting biases assessment and sensitivity analyses

Reporting biases across studies will be analyzed by funnel plots when feasible—i.e., at least 10 studies are included in the meta-analysis to ensure the power of the tests.[486] Sensitivity analyses will be undertaken in case the eligibility of some studies in the meta-analysis is doubtful (e.g., low quality studies).[486]

iv. Confidence in cumulative evidence

The robustness of evidence will be assessed by using the GRADE classification[500-513] and its software GRADEpro.[514] Two tables will be dressed for each therapeutic modality. "Clinical Evidence Profile" Tables present quality of evidence for each outcome while "Clinical Evidence Summary of Findings" Tables will

provide end users (administrators, healthcare professionals, patients) with key information helping them with decision making in choosing the right treatments.[500]

4.1.4 Ethic and dissemination

Ethics approval is not required for this study. Once completed, the systematic review findings will be presented to a group of stakeholders during a one-day workshop where researchers, clinicians from various disciplines, managers/decision-makers and patients will work together to elaborate a TMO management clinical pathway. This partnership between researchers and end-users will contribute to effective knowledge exchange and transfer.[515] With regard to our end-of-project KT plan, we will draw upon three key principles: 1) developing communication vehicles adapted to the target audience; 2) presenting concise messages; and 3) creating settings for exchange and discussion.[516] We consider the target audiences to be the: 1) scientific community, 2) healthcare professionals, 3) general public including TMO patients or those afflicted with other types of osteoarthritis or chronic pain disorders, and 4) administrators. In addition to traditional vehicles (e.g., scientific meetings, publications), we will also create a module tab on the website of the Quebec Pain Research Network and on the *Centre hospitalier de l'Université de Montréal* (CHUM) website where the results of the project will be made accessible to the different targeted audiences. The final product (TMO management clinical pathway) will be made available in the form of a two-fold pamphlet, one will be specifically for healthcare professionals, while the other for TMO patients (i.e., patient decision aids), elaborated by following the recommendations of the *International Patient Decision Aids Standards Collaboration*.[517,518] They will be duly delivered and subsequently presented to different institutions from the primary to tertiary sectors of care.

4.1.5 Discussion

TMO is a chronic and degenerative disease which can seriously handicap patients, hence affecting their quality of life. However, TMO management is far from optimal due to several obstacles including limited access to adequate healthcare services. Developing a patient-centered, evidence-based multidisciplinary treatment algorithm for TMO is paramount to improving the quality of care to this patient clientele. It will help guide the decision–making process of clinicians and TMO patients in choosing the most suitable therapeutic modalities. To do so, a systematic review is a prerequisite, and to our knowledge, we are the first to propose the conduct of an extensive and comprehensive literature review of all the existing

treatments for TMO including pharmacological, non-pharmacological and surgical modalities, not limited to any one discipline. Language restriction to English and French for the literature search is a limitation of the proposed protocol such that language bias is possible. However the obtained findings will be crucial in developing a TMO treatment algorithm useful to all stakeholders across the healthcare continuum.

4.2 Volet II: Étude descriptive sur la sévérité et les facteurs associés à l'intensité de la douleur et les incapacités fonctionnelles chez les patients aux prises avec l'OTM

Les procédures méthodologiques employées dans cette étude sont décrites dans l'article soumis pour publication dans *Journal of Hand Therapy* qui apparaît à la section 5.3 du chapitre 5 de la présente thèse. Une copie de l'approbation de l'étude par le Comité d'éthique de la recherche du CHUM est reproduite à l'Annexe 2 alors que le Formulaire de consentement l'est à l'Annexe 3. Le questionnaire utilisé dans cette étude est également disponible à l'Annexe 4.

Chapitre 5 – RÉSULTATS

5.1 Volet I : Efficacité des interventions non-chirurgicales pour l'OTM (Article 4 - Efficacy of non-surgical interventions for trapeziometacarpal (thumb base) osteoarthritis: A systematic review)

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Cet article a été publié dans la revue *Arthritis Care & Research* (Hoboken) 2020;72:1719-35 (https://doi.org/10.1002/acr.24084).[519] L'article est reproduit ici avec l'autorisation de la revue.

En tant qu'auteure principale, je confirme mon apport majeur à la conception du protocole, la recherche des références, l'extraction les données, l'évaluation des risques de biais des études incluses et la rédaction du manuscrit sous la supervision de ma directrice de recherche, D^re^ Manon Choinière. La bibliothécaire-informationniste M^me^ Daniela Ziegler a exécuté la recherche de la littérature. La contribution de M. Sylvain Laprise a été aussi considérable à l'extraction les données et l'évaluation des risques de biais. D^rs^ Patrick Harris, Nathalie Bureau et Nathaly Gaudreault ont révisé le protocole, apporté des clarifications sur certains types d'intervention ou la méthodologie. Tous les auteurs ont révisé le manuscrit et approuvé la version finale.

5.1.1 Abstract

Objective This systematic review (SR) aimed to synthesize the literature on the efficacy of existing non-surgical interventions for trapeziometacarpal osteoarthritis (TMO).

Methods A medical librarian conducted an electronic search in 16 databases. Two authors independently carried out study selection, data extraction, and risk of bias assessment. The *Agency for Healthcare Research and Quality* guidance was followed to integrate a valid body of evidence from the existing SRs. Intervention effects were estimated based on the *Cochrane Collaboration* review methodology.

Results We identified 17 SRs, 34 randomized controlled trials (RCTs), and 6 non-RCTs. Most of them had unclear or high risk of biases. Evidence of low to moderate quality supports the superiority of the following interventions for pain and/or physical function: 1) *saline* over *steroid intra-articular injections confirmed by radiography;* 2) *saline injections* over *sham (i.e., pressure) in tender subcutaneous areas*; 3) *custom-made thermoplastic thumb orthosis* over *no intervention* or *a control*; 4) *custom-made thermoplastic hand-based trapeziometacarpal (TM) joint orthosis* over *no intervention;* 5) *radial nerve mobilization* over *sham ultrasound*; 6) *combination of hand exercises, TM-joint and median/radial nerve mobilization* over *sham ultrasound*.

Conclusion This comprehensive SR allowed collating evidence-based data on the efficacy of non-surgical interventions for TMO. *Steroid intra-articular injection*s would not be more effective than *saline injections*. Rehabilitative interventions (*orthosis, exercises, nerve mobilization*) would be efficacious. However, these findings must be treated with circumspection due to methodological limitations in many studies.

5.1.2 Introduction

The thumb participates in 50% of hand functions, thus is essential for daily activities.[58] Unfortunately, 1-7% of adults suffer from painful thumb base due to trapeziometacarpal osteoarthritis (TMO),[105] one of the most prevalent and painful hand osteoarthritis.[21] It limits thumb mobility,[474] reduces hand functions, and related activities.[21] Despite decades of research, chronic pain of various origins continues to be commonly undertreated.[47] Patients with chronic pain have difficulty gaining timely access to appropriate care leading to a premature or an increased deterioration of their quality of life.[47] Patients with TMO usually receive non-surgical interventions and 15-36% of them may end up with surgery 2-7 years later.[51,520] The question that we ask here is which non-surgical treatments are most efficacious. If appropriate treatments are timely provided, surgery may be avoided or at least postponed. Yet, a lack of knowledge on evidence-based efficacy of TMO interventions does not allow us to answer this question.[462] Although some systematic reviews have been conducted, they are neither comprehensive in terms of types of intervention[59] or methodologically sound (e.g., absence of critical appraisal,[61] inclusion of heterogeneous trials in a same meta-analysis[60]). Therefore, this systematic review aimed to synthesize the scientific literature on the efficacy of all existing non-surgical interventions for TMO using rigorous methodology.

5.1.3 Materials and methods

Our PROSPERO-registered protocol (CRD42015015623) was developed using the *Cochrane* intervention review methodology[485] and has been published (https://tinyurl.com/n4cwyk3).[465] The *Agency for Healthcare Research and Quality* guidance[521] was followed to integrate a valid body of evidence from the existing systematic reviews.

5.1.3.1 Literature search

A comprehensive search was conducted by an experienced medical librarian (the sixth author, DZ) in 16 bibliographic databases including CINHAL, EMB Reviews, Embase, MEDLINE, OTseeker, PEDro, PsychINFO, PubMed, and 8 grey literature databases up to July 4, 2018 (Figure 8). The following search terms were combined: thumb, trapeziometacarpal (TM) joint, osteoarthritis, intervention, pain (Annexe 1). Languages were restricted to English and French. Handsearching was performed from the included studies by TH.

5.1.3.2 Study selection

Two authors (TH and MC) independently screened titles/abstracts of studies against the following eligibility criteria: 1) study designs (systematic review, randomized controlled trials (RCTs), non-RCTs (NRCTs) including controlled before-after studies, interrupted time series, repeated measure studies); 2) population (adults with primary TMO); 3) interventions (any types); and 4) outcomes (pain, physical function, psychological well-being, quality of life, treatment satisfaction, adverse events). Full-text copies of potentially relevant records were retrieved by TH. Their eligibility was independently assessed against the aforementioned criteria 1), 2) and 4) by TH and MC. Regarding Criterion 3 (interventions), only non-surgical interventions were included. When MC became unavailable, the second author (SL) replaced her. Any disagreement was discussed to reach a consensus. To assess the methodological quality issued from the identified systematic reviews, the minimum set of the *Agency for Healthcare Research and Quality*'s criteria (multiple data-source search, predefining eligibility criteria, risk of bias assessment, evidence quality considerations)[521] were further used as inclusion criteria.

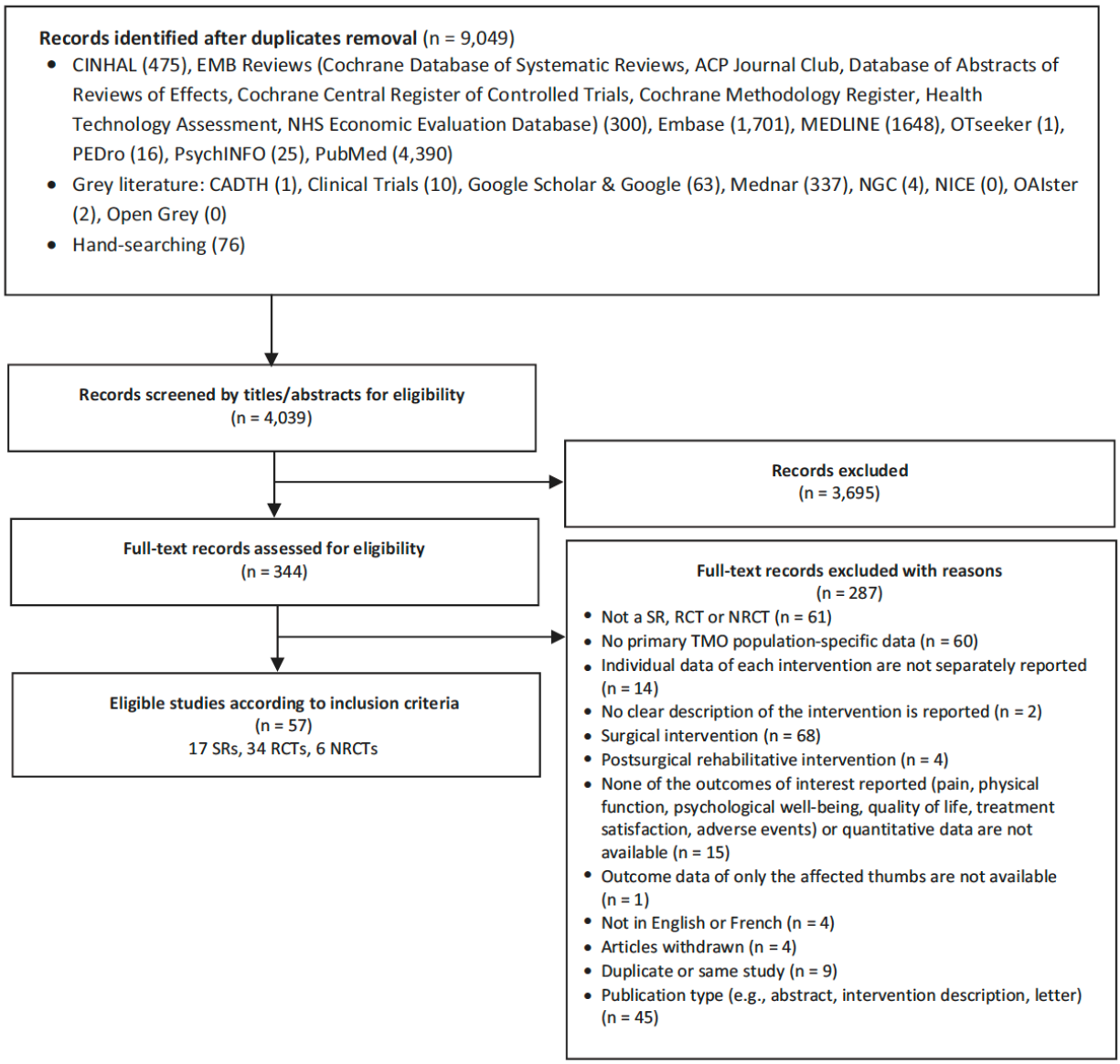


Figure 8. – Flow chart of study identification

Notes: ACP, American College of Physicians; CADTH, Canadian Agency for Drugs and Technologies in Health; CINAHL, Cumulative Index to Nursing and Allied Health Literature; EMB, Evidence-Based Medicine; NGC, National Guideline Clearing House; NHS, National Health Service; NICE, National Institute for Health and Care Excellence; NRCT, non-randomized controlled trial; OAI, Open Archives Initiative; OT, Occupational Therapy Systematic Evaluation of Evidence; PED, Physiotherapy Evidence Database; RCT, randomized controlled trial; SR, systematic review.

5.1.3.3 Data extraction and risk of bias assessment

Two authors (TH, SL) independently extracted data from the selected studies using the *Cochrane Effective Practice and Organization of Care Group* (EPOC) *Data Abstraction Form*.[485] The following data were extracted: study identification (first author, year of publication, title, publication type, funding source,

possible conflict of interest), study characteristics (type of study, participants, types of intervention, outcome measure), study population and setting (inclusion/exclusion criteria, methods of recruitment), methods (aims of study, design, unit of allocation, duration of participation), participants (total number of participants, withdrawals and exclusion, severity of illness, comorbidities, co-interventions, relevant sociodemographic data), intervention group (description of intervention, duration of treatment), outcomes (outcome name, time points measured, outcome definition, person measured, unit of measurement, scales), results (baseline data, results, missing data, statistical methods), and other relevant information (key conclusion, correspondence). Risk of bias was assessed by TH and SL using the *Assessment of Multiple Systematic Reviews* (AMSTAR) checklist[522] for the identified systematic reviews and the *Cochrane* EPOC *Risk of Bias Tool*[523] for the RCTs/NRCTs. The AMSTAR is composed of 11 items, examining the methodological quality of a systematic review including double review, exhaustive research strategy, heterogenic analysis and publication bias. The EPOC *Risk of Bias Tool* includes seven domains of bias, namely, selection (random sequence generation and allocation concealment), performance, attrition (method addressing incomplete outcome), detection, reporting (selective outcome reporting), 'similarity of baseline outcome measurements between experimental and control groups' and 'similarity of baseline characteristics between experimental and control groups'.[523] The results of risk of bias assessments reported in the included systematic reviews were considered to support our judgement.[521] To determine the *Risk of Bias Tool* criterion for RCTs/NRCTs regarding 'similarity of baseline characteristics between groups', age, sex, occupation, dominance, affected side, radiographic stage, and symptom duration were considered. When ≥ 80% of these factors were balanced between groups, the risk of bias was considered low; 60-79%, unclear; and < 60%, high.[491] Blinding participant, performer, and assessor were separately evaluated. Any disagreement between TH and SL was discussed to reach a consensus; otherwise, MC was consulted. We attempted to obtain missing data by contacting the authors by email. When not possible, the best available data (e.g., mean difference, mean) were extracted. When medians and (interquartile) ranges were available, means and standard deviations were estimated using an approximation method.[524] When graphic data were available, the software *Plot Digitizer*[525] was used to digitize these data.

5.1.3.4 Data analysis and synthesis

Effect estimates of a given intervention—standardized mean difference for continuous outcomes and risk ratio for dichotomous ones—were first searched in the included systematic reviews. When unavailable, we estimated them using RCT data with the software *RevMan 5.3*.[526] If no RCTs were available, NRCTs were consulted. Treatment effect is considered trivial when SMD < 0.2, small when SMD = 0.2 or RR = 1.22

(or 0.82), moderate when SMD = 0.5 or RR = 1.82 (or 0.55), large when SMD = 0.8 or RR = 3.0 (or 0.33).[527,528] When heterogeneity among studies was demonstrated during meta-analysis, i.e., $I^2 \geq 50\%$, random-effect analysis was performed; otherwise, fixed-effect approach was used.[485] Publication bias analysis by funnel plot was not feasible since the numbers of pooled studies were less than 10.[485]

Finally, evidence quality of effect estimates was rated with the software *GRADEPro*[514] considering the following factors: study design (randomized or non-randomized studies), limitation in study designs or execution (risk of bias), inconsistency of results, indirectness of evidence, imprecision, publication bias, and other factors. The evidence quality reported in the included systematic reviews was also considered to strengthen our judgement.[521] The level of quality evidence is interpreted as follows: high quality, 'further research is very unlikely to change our confidence in the estimate of effect'; moderate quality, 'further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate'; low quality, 'further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate'; and very low quality, 'we are very uncertain about the estimate'.[514]

5.1.4 Results

5.1.4.1 Study selection

We identified 57 eligible studies (17 systematic reviews,[60,61,359,455,529-541] 34 RCTs,[38,542-574] 6 NRCTs[575-580]) examining non-surgical intervention efficacy (Figure 8), including 1826 thumbs (1763 participants). The characteristics of the eligible studies are presented in Table 9 (systematic reviews) and Table 10 (RCTs/NRCTs). A total of 287 full-text articles did not meet inclusion criteria (Table 11).

5.1.4.2 Types of identified non-surgical intervention

Pharmacological interventions included naproxen, transdermal steroid delivery, diclofenac gel, saline intra-articular or subcutaneous injection, steroid/hyaluronate intra-articular injection, and dextrose prolotherapy (Supplementary material). Rehabilitative interventions comprised orthoses, exercises, laser/shockwave therapy, joint/nerve mobilization, joint protection, and combinations of these modalities. Alternative medicine interventions included acupuncture, urtica dioica, and hirudotherapy.

Table 9. – Characteristics of the identified systematic reviews

Study ID (study design)	Conflict of interest	Included intervention(s)	The Agency for Healthcare Research and Quality (AHRQ) inclusion criteria					AMSTAR score (0-11) higher is better
			1. Search of multiple data sources	2. Application of pre-defined eligibility criteria to select studies	3. Risk of bias assessment	4. Body of evidence consideration	Meet all the AHRQ criteria	
Aebischer 2016 (SR, MA)	None	Occupational and physical therapy	Yes	Yes	Yes	No	**No**	6
Ahern 2018 (SR, MA)	None	Any physical therapy treatment	Yes	Yes	Yes	No	**No**	6
Bertozzi 2015 (SR, MA)	None	Rehabilitative interventions	Yes	Yes	Yes	Yes	**Yes**	7
Cameron 2013 (SR, MA)	None	Topical herbal intervention	Yes	Yes	Yes	Yes	**Yes**	11
Colen 2012 (SR)	A pharmaceutical company paid an article processing charge. The company had no role for the review.	Hyaluronate injection	Yes	No (outcomes)	No	No	**No**	2
Egan 2007 (SR)	Unreported	Orthoses	Yes	No (outcomes)	Yes	No	**No**	5
Ernst 1997 (SR)	Unreported	Acupuncture	Yes	No (outcomes)	No	No	**No**	3
Fowler 2015 (SR)	None	Steroid injections	Yes	Yes	Yes	No	**No**	3
Kjeken 2011 (SR, MA)	Unreported	Orthoses, exercises	Yes	No (outcomes)	Yes	No	**No**	6
Kroon 2016 (SR, MA)	One of the authors received financial support from several pharmaceutical companies, all of which were paid to the institution.	Intraarticular therapies	Yes	Yes	Yes	No	**No**	6
Kwon 2006 (SR)	None	Acupuncture	Yes	No	Yes	No	**No**	4
Long 2001 (SR)	Unreported	Herbal medicine	Yes	Yes	Yes	No	**No**	4
Mahendira 2009 (SR, MA)	None	Non-surgical therapies	Yes	No (outcomes)	Yes	No	**No**	3
NICE 2014 (SR, MA)	Some committee members have declared their conflicts of interest.	Education/self-management, pharmacological and non-pharmacological management, intra-articular injections	Yes	Yes	Yes	Yes	**Yes**	9
Spaans 2015 (SR)	None	Non-surgical conservative interventions	Yes	No (outcomes)	No	No	**No**	2
Trellu 2015 (SR, MA)	Two of the authors have received speaking and/or consulting fees from pharmaceutical companies.	Hyaluronate injection, steroid injection	Yes	Yes	Yes	No	**No**	5
Ye 2011 (SR)	None	Rehabilitative interventions	Yes	Yes	Yes	No	**No**	6

Notes: AMSTAR, Assessment of Multiple Systematic Reviews; MA, meta-analysis; NICE, National Institute for Health and Care Excellence; SR, systematic review.

Table 10. – Characteristics of the included randomized controlled trials (RCTs) and non-randomized controlled trials (NRCTs)

Study ID (study design, country, # of thumbs included)	Conflict of interest	Mean age (years ± SD or years (range)) (female %); TMO stage (classification used)	Interventions	Comments
Arazpour 2018 (RCT, Iran, 25)	None declared	Gr 1 50.18 ± 5.7 (87%); Gr 2 52.33 ± 6.4 (88%); 1-2 (unreported)	• Wearing a custom-made thermoplastic hand-based TM joint (CT-TM) orthosis during daily activities for 4 weeks • No intervention	The SMDs of pain were not computed due to insufficient data. The authors could not be contacted.
Bahadir 2009 (RCT, Turkey, 40)	None declared	61.8 ± 8.2 (100%); 2-3 (unreported)	• An injection of 20 mg/0.5ml triamcinolone acetonide (steroid). • Three weekly injections of 5 mg/0.5ml of Ostenil® (sodium hyaluronate)	
Bani 2013 (Crossover RCT, Iran, 35)	None declared	Gr 1 53.42 (66.7%), Gr 2 54.91 (75%), Gr 3 58.64 (72.7%); 1-2 (unreported)	• Wearing a PST during daily activities for 4 weeks • Wearing a CTT during daily activities for 4 weeks • No intervention	
Basford 1987 (RCT, USA, 81)	Unreported	Gr 1 56.5 (unreported), Gr 2 62.8 (unreported); 1-2 (unreported)	• Laser therapy: 3 sessions/week for 3 weeks • No irradiation: 3 sessions/week for 3 weeks	
Becker 2013 (RCT, USA, 62)	None declared	63.0 ± 8.1 (77.4%); Unreported	• Wearing a PST orthosis for 5-15 weeks • Wearing a CT-TM orthosis for 5-15 weeks	
Boustedt 2009 (NRCT, Sweden, 42)	None declared	Gr 1 61 (40-76) (100%), Gr 2 61 (50-76) (100%); Unreported	• Five-week joint protection programme (education, pain education, assistive devices, paraffin, hand/thumb mobility and strengthening exercises, and elastic thumb orthoses) • Joint protection programme + wearing a wrist-based custom-made thermoplastic thumb orthosis at night and elastic thumb orthoses or a CTT orthosis during day + a hot pack before exercises	To compute SMDs, we estimated the means and SDs presented in medians and ranges.
Buurke 1999 (Crossover NRCT, Netherlands, 10)	Unreported	67.2 (37-90) (100%); Unreported	• Wearing Uriel 25 for 4 weeks • Wearing Gibortho ref. 6302 for 4 weeks • Wearing Sporlastic 07051 for 4 weeks	
Cantero-Tellez 2018 (NRCT, Spain, 84)	None declared	60.1 ± 9.6 (91.7%); Unreported	• Wearing a CTT orthosis for 3 months • Wearing a CT-TM orthosis for 3 months	
Cantero-Tellez 2017 (RCT, Spain, 66)	None declared	63.7 ± 9.6 (83.3%); 2-3 (Eaton-Littler)	• Wearing a CTT orthosis for 1 week • Wearing a CT-TM orthosis for 1 week	
Davenport 2012 (RCT, UK, 38)	None declared	Gr 1 58 ± 11 (88%), Gr 2 61 ± 10 (76%); 1-4 (Eaton-Littler)	• Specific TM-joint stabilizing exercises • General thumb exercises	To compute SMDs, we estimated the means and SDs presented in median changes and interquartiles.
Dickens 1989 (RCT, UK, 12)	Funded by Arthritis & Rheumatism Council. The	Gr 1 59 ± 8.91 (57.1%), Gr 2 59.2 ± 6.46 (60.0%);	• Acupuncture for 6 sessions over a 2-week period	The SMDs of pain and physical function were not computed due to insufficient

	equipment was provided by RCG Medical.	Unreported	• Mock transcutaneous neural stimulation for 6 sessions over a 2-week period	data. The authors could not be contacted.
Figen Ayhan 2009 (RCT, Turkey, 58)	None declared	62.6 ± 6.4 (100%); 1-4 (Eaton)	• An injection of 1-ml Synvisc® (Hylan G-F 20) in one hand • An injection of 1-ml saline in the other hand	We used the Plot Digitizer.
Fuchs 2006 (RCT, Germany, 56)	Funded by TRB Chemedica AG. This company was not involved in treatment and assessment of patients.	60.25 (75%); Mean 2.1 (Kellgren-Lawrence)	• Three weekly 1- ml injections of 10 mg/1 ml triamcinolone acetonide (steroid) • Three weekly 1-ml injections of 10 mg/1 ml Ostenil® (sodium hyaluronate)	The SMDs of pain were not computed due to insufficient data. The authors could not be contacted.
Gomes-Carreira 2010 (RCT, Brazil, 40)	Funded by Fundacao de Amparo a Pesquisa do Estado de Sao Paulo.	Gr 1 median 64.8 (100%), Gr 2 median 65.5 (90%); 2-3 (Eaton-Glickel)	• Wearing CTT orthosis during daily activities for 180 days • Wearing CTT orthosis for evaluation only from Day 1 to Day 90 and during daily activities from Day 90 to Day 180	
Hamann 2014 (Crossover NRCT, Germany, 18)	None declared	63 ± 3 (100%); 2-3 (Eaton-Littler)	• Actimove® Rhizo Forte wearing during performance test. • Push® wearing during performance test • Rhizo-Hit® wearing during performance test • Rhizomed® during performance test	We used the Plot Digitizer. To compute SMDs, we estimated SDs from SEs. Divided data of the 1st and 2nd periods of this crossover trial were not provided; thus, the combined data was extracted.
Heyworth 2008 (RCT, USA, 60)	Funded by Genzyme Corporation and Wyeth Pharmaceuticals.	63 ± 1 (87%); Unreported	• A saline injection (1 ml), followed by 1 injection of 1 ml sodium betamethasone 1 week after • Two weekly injections of 1-ml Synvisc® (Hylan G-F 20). • Two weekly 1-ml saline injections	SMD was not computed due to insufficient data. The author could not be contacted.)
Ioppolo 2018 (RCT, Italy, 58)	None declared	Gr 1 68.03 ± 9.04 (57.1%), Gr 2 66.67 ± 8.06 (64.3%); 2-3 (Eaton)	• Three weekly intraarticular injections of 0.5 cm^3 hyaluronic acid (Sinovial® Mini) under ultrasound guidance • Extracorporeal shockwave therapy once a week for 3 weeks	SMD was not computed due to insufficient data. The author could not be contacted.
Jahangiri 2014 (RCT, Iran, 60)	None declared	63.6 ± 9.7 (73.3%); 2-3 (Eaton)	• Two monthly 1-ml injections of 0.9 % saline, followed by a 1 ml injection (0.5 ml of 40 mg methylprednisolone acetate mixed with 0.5 ml of 2 % lidocaine) at Month 3 • Three monthly 1-ml injections (0.5 ml of 20 % dextrose mixed with 0.5 ml of 2 % lidocaine)	We used the Plot Digitizer to digitize the graphic data.
Jain 2010 (RCT, USA, 84)	None declared	Unreported (unreported); 1-2 (Eaton)	• Transdermal steroids delivery twice a week for 3 weeks • Placebo delivery twice a week for 3 weeks	We used the Plot Digitizer. SMD was not computed due to insufficient data. The authors could not be contacted.
Meenagh 2004 (RCT, UK, 40)	Unreported	59.9 (41–71) (90%); All (unreported)	• An injection of triamcinolone acetonide (steroid) (5 mg/0.25 ml) • An injection of 0.9% saline 0.25 ml	To compute SMDs, we estimated the means and SDs presented in median changes and interquartiles.
Merritt 2012 (RCT, USA, 35)	Unreported	66.9 (45-86) (95.6%); Unreported	• Two orthoses (Hey Weber Controller®, i.e., neoprene TM joint orthosis and CT-TM orthosis) + heat + thumb exercises + joint protection (assistive devices, alternative methods) for 4 weeks • Sham cream for 4 weeks	
Michalsen 2008 (RCT, Germany, 32)	None declared	Gr 1 64.1 ± 6.4 (100%), Gr 2 64.3 ± 9.1 (100%); Unreported	• Leech therapy (hirudotherapy) once • Diclofenac gel (10 mg/1 g gel) twice daily for 30 days	

Monfort 2015 (RCT, Spain, 88)	None declared	62.8 ± 8.7 (87.5%); 2-3 (Kellgren-Lawrence)	• Three weekly injections of 0.5 ml of betamethasone disodium phosphate (1.5 mg) and betamethasone acetate (1.5mg) (at Day 0, Day 7, Day 14) • Three weekly injections of 0.5 ml of Suplasyn® (5 mg) (at Day 0, Day 7, Day 14)	The interquartile range of the outcome, physical function in the steroid group at day180 in Table 1 was (-3, -1), rather than (-3, -3), according to the personal communication of Dr Jone Llorente-Onaindia. To compute SMDs, we estimated the means and SDs presented in medians and ranges.
Randall 2000 (Crossover RCT, UK, 27)	Unreported	60 (45-82) (85.1%); Unreported	• Urtica dioica (stinging nettle) for 1 week • Placebo Lamium album (white dead nettle) for 1 week	Divided data of the 1st and 2nd periods of this crossover trial were not provided; thus, the combined data was extracted.
Rannou 2009 (RCT, France, 112)	None declared	63 ± 8 (84.2%); 0-10 (Kallman)	• Wearing CTT orthosis only at night and usual care provided by their physician • Usual care provided by their physician	The SDs of the outcomes (pain and physical function) were computed from SEs.
Rocchi 2017 (NRCT, Italy, 50)	Unreported	44-76 (82.0%); 1-2 (Eaton-Littler)	• Intraarticular injection of methylprednisolone acetate (40 mg/1 mL) and lidocaine (10 mg) solution + a CTT splint • Physiotherapy (5 days/week for 2 weeks) + a CT-TM orthosis with metacarpal-phalangeal extension bloc	
Roux 2007 (RCT, France, 42)	Unreported	64.8 ± 8.0 (90.5%); 2-4 (unreported)	• One weekly 1-ml injection of Sinovial® • Two weekly 1-ml injections of Sinovial® • Three weekly 1-ml injections of Sinovial®	
Sanders 2015 (Crossover RCT, UK, 19)	Funded by Pfizer. Two authors have financial relationships with Pfizer. Two authors were supported by Development and/or the Medical Research Council, the National Institute for Health Research Biomedical, Research Centre for Mental Health and Maudsley NHS Trust, or the Welcome Trust.	60.72 ± 6.44 (94.7%); Unreported	• Naproxen 500mg twice/day for 7 days • Placebo twice/day for 7 days	Divided data of the 1st and 2nd period of the crossover trial were not provided; thus, the combined data was extracted.
Sillem 2011 (Crossover RCT, Canada, 56)	Unreported	64 ± 8.61 (91.1%); Unreported	• Wearing PST orthosis whenever needed for 4 weeks • Wearing custom-made hybrid (thermoplastic/soft) TM joint orthosis whenever needed for 4 weeks	Divided data of the 1st and 2nd periods of this crossover trial were not provided; thus, the combined data was extracted. At week 10, all of them received the 2 orthoses. At month 3, 4 patients (9% of 44 contacted) no longer used orthosis and 7 (13%) using both orthoses. Due to these co-interventions, the data at 3 months were not analysed.
Smith 2010 (RCT, UK, 40)	None declared	Gr 1 65.2 (50-86) (90%), Gr 2 68.6 (49-80) (85%); Unreported	• An injection of up to 20 ml 0.5% sodium salicylate in tender sub-cutaneous area in the extensor region of the forearm on the same side as the TMO at 1st week and upper scapular region at 2nd week • Sham injections (a pressure by a blunt 23-gauge probe without penetration)	We used the Plot Digitizer to digitize the graphic data.

Stahl 2005 (RCT, Israel, 52)	Orthoisc® was supplied by the RAFA Laboratories.	62 (37-91) (88.4%); 2 (Eaton-Littler)	• An injection of 40-mg methylprednisolone acetate (steroid) • An injection of 15-mg Orthovisc® (sodium hyaluronate)	
Tenti 2017 (NRCT, Italy, 100)	None declared	67 (69%); 2-3 (Kellgren-Lawrence)	• Two injections of 1 ml of Sinovial H-L® (15 days apart) without radiographic guidance • Two injections of 0.5 ml of triamcinolone acetonide (15 days apart) without radiographic guidance	
Van der Vegt 2017 (Crossover RCT, Netherlands, 59)	None declared (supported by Nea Company who offered the Push® Braces)	60.1 ± 8.2 (70%); 1-4 (Eaton-Glickel)	• Wearing CTT for 2 weeks • Wearing Push®, rigid orthosis, includes only TM joint for 2 weeks	
Villafane 2011 (RCT, Italy, 29)	None declared	80.83 ± 7.44 (100%); 3-4 (Eaton-Littler-Burton)	• Kaltenborn mobilisation of posterior-anterior gliding with distraction of the TM joint of the dominant hand for 6 sessions over 2 weeks • Sham ultrasound for 6 sessions over 2 weeks	To compute SMDs, we estimated SDs from SEs.
Villafane 2012a (RCT, Italy, 28)	None declared	82.57 ± 1.06 (71.43%); 3-4 (Eaton-Littler-Burton)	• Maitland's passive accessory mobilisation known as mobilisation of posterior-anterior gliding of the TM joint during 4 sessions over 2 weeks • Sham ultrasound for 6 sessions over 2 weeks	
Villafane 2012b (RCT, Italy, 60)	None declared	Gr 1 80.87 (SE 2.93) (93%), Gr 2 81.73 (SE 2.93) (87%); 3-4 (Eaton-Littler-Burton)	• Radial nerve passive gliding, 6 sessions over 4 weeks • Sham ultrasound, 6 sessions over 4 weeks	We used the Plot Digitizer. To compute SMDs, we estimated SDs from SEs. The authors could not be contacted.
Villafane 2013 (RCT, Italy, 60)	Unreported	82 ± 6 (90%); 3-4 (Eaton-Littler-Burton)	• Multimodal treatment (12 sessions over 4 weeks) including Kaltenborn TM joint mobilisation, nerve gliding and hand exercises • Sham ultrasounds	
Wajon 2005 (RCT, Australia, 40)	Unreported	Gr 1 59.7 ± 9.0 (73.7%), Gr 2 61.2 ± 12.5 (81.0%); 1-3 (Eaton-Glickel)	• Wearing thumb strap orthosis for 2 weeks followed by wearing the orthosis & abduction exercise regimen for 4 weeks • Wearing short opponens thumb orthosis for 2 weeks, followed by wearing the orthosis & pinch exercise for 4 weeks	
Weiss 2000 (Crossover RCT USA, 26)	Unreported	57 (36-88) (80.8%); 1-4 (Eaton-Littler)	• Wearing short CT-TM orthosis for 1 week • Wearing long CTT orthosis for 1 week	Divided data of the 1st and 2nd periods of this crossover trial were not provided; thus, the combined data was extracted. We used the Plot Digitizer.
Weiss 2004 (Crossover RCT USA, 25)	Funded by the American Association of Hand Surgery.	Unreported (84.0%); 1-2 (Eaton-Littler)	• Wearing PST orthosis for 1 week • Wearing CTT orthosis for 1 week	Divided data of the 1st and 2nd periods of this crossover trial were not provided; thus, the combined data was extracted. To compute SMDs, we estimated SDs from SEs.

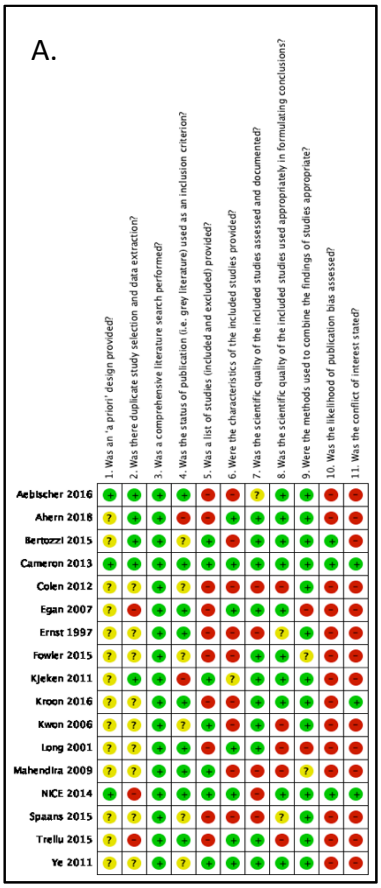
Notes: #, number; CTT, custom-made thermoplastic thumb-based; CT-TM, custom-made thermoplastic hand-based TM joint; Gr, group; NRCT, non-randomized controlled trial; PST, prefabricated soft thumb-based; RCT, randomized controlled trial; SD, standard deviation; SE, standard error; SMD, standard mean difference; TM, trapeziometacarpal; UK, United Kingdom; USA, United States of America.

Table 11. – Excluded studies with reasons

Reason of exclusion	Number of excluded references
Not a SR, RCT or NRCT	61[57,91,477,478,525,526,581-635]
No primary TMO adults or no TMO population-specific data	60[636-695]
Individual data of each intervention are not separately reported	14[24,696-708]
No clear description of the intervention is reported	2[709,710]
Surgical intervention	68[63-67,711-773]
Post-surgical rehabilitative intervention	4[774-777]
None of the outcomes of interest reported (pain, physical function, psychologic well-being, quality of life, treatment satisfaction, adverse events), specific data of affected side are not available or quantitative data are not available	15[51,778-791]
Outcome data of only the affected thumbs are not available	1[792]
Not in English or French	4[793-796]
Articles withdrawn	4[797-800]
Duplicate or same study	9[560,801-808]
Publication type (e.g., abstract, intervention description, letter)	45[809-853]

5.1.4.3 Risk of bias in the eligible studies

The AMSTAR scores of the systematic reviews ranged from 2 to 11 (where 11 being the best) (Table 9) with a mean and standard deviation of 5.2 ± 2.4. Only three systematic reviews[359,455,529] met all the *Agency for Healthcare Research and Quality*'s criteria (Table 9) which were thus included in our systematic review. More than half of the identified systematic reviews had unclear or high risk of bias for Criteria 1, 2, 5, 6, 10 and 11 (Figure 9A).



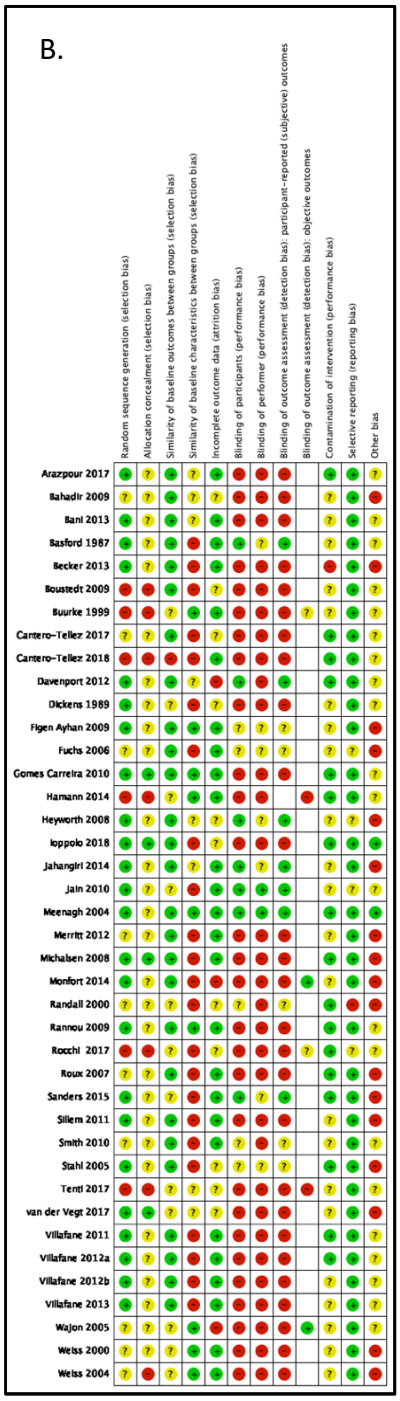


Figure 9. – Risk of bias assessment

A. Results on each *Assessment of Multiple Systematic Reviews* (AMSTAR) risk of bias items of the identified systematic reviews.
B. Results on each item of the *Cochrane Effective Practice and Organization of Care Group (EPOC) Risk of Bias Tool* of the included randomized controlled trials (RCTs) and non-RCTs.

Note: +, low risk of bias; ?, unclear risk of bias; -, high risk of bias

Figure 9B shows that more than half of the RCTs/NRCTs had high risk of bias on the following criteria: similar baseline characteristics between groups, and blinding participants/performers. Blinding participants/performers was compromised in all rehabilitative and alternative medicine interventions due to their visible nature except for two trials in which the compared interventions (exercises) were similar[546] or used a sham with the same device (laser therapy).[544] Regarding pharmacological trials, three did not blind participants,[542,560,854] five did not report,[548,549,552,561,564] and one[563] attempted to blind, yet its success of blinding is doubtful due to the nature of intervention (real injection vs. sham pressure). Pertaining to blinding performers, two trials did,[553,554] five did not report,[548,549,552,561,564] and one attempted to blind yet blinding was likely compromised due to the viscosity difference between steroid/saline and hyaluronate substances.[855] Non-blinding of participants consequently compromised detection bias for subjective outcomes. Other biases included absence of radiographic confirmation of TMO,[545,555,558,562] unknown inclusion/exclusion criteria,[564] comorbidity,[570] absence of radiographic confirmation of the injection site,[542,548,549,552,564,855] co-interventions (e.g., prolotherapy combined with lidocaine),[545,552,556,560-562,854,855] carryover effect in crossover trials,[570,571,574] and potential conflict of interest.[549,561,564,574,855]

5.1.4.4 Efficacy of non-surgical interventions and evidence quality

The majority of the evidence was of low or very low quality. Due to treatment heterogeneity, pooling data from different trials was not possible for most of the interventions. When possible, the results were expressed with forest plots (Figure 10). Efficacy of non-surgical interventions based on the results of studies with low quality and the one[554] with moderate quality is as follows (see Table 12):

1. There was little effect difference between *transdermal steroid delivery* and *transdermal sham delivery* for reducing tenderness (Table 12, Section 2).[553]
2. *Saline injection in tender subcutaneous thickening area in the extensor regions of the forearm at Week 1 and in the upper scapular region at Week 2* had moderate to large effects on reducing pain and tenderness and improving physical function at 3-, 7-, and 13-week follow-up, compared to *sham injections* (i.e., a 23-gauge probe was pressed on to the skin without penetration) (Table 12, Section 4).[563]
3. *Saline intra-articular injection confirmed by radiography* had small to large effects on alleviating pain and tenderness at 4-, 12- and 24-week follow-up, compared to *triamcinolone acetonide (steroid) injection* (Table 12, Section 5).[554]

4. There was little effect difference between *three-weekly Sinovial® Mini (hyaluronate) intra-articular injections* and *shockwave therapy* for relieving pain and ameliorating physical function at 3-week and 3-month follow-up, but *shockwave therapy* was superior for pain reduction and physical function improvement at 6-month follow-up (Table 12, Section 16).[573]
5. *Custom-made thermoplastic thumb (CTT) orthosis worn at daytime* during 3 months had a large effect on pain relief compared to *no intervention*; yet, the effect difference between these modalities for physical function improvement was trivial (Table 12, Section 17).[550]
6. *CTT orthosis worn at night coupled to usual care given by a physician* had small to moderate effects on pain reduction at rest, pain during pinching, physical function amelioration at 12 months compared to *usual care alone*, but at 1 month, the effect differences were trivial (Table 12, Section 18).[559]
7. *CTT orthosis* had a small pain-reducing effect at one week compared to *custom-made thermoplastic hand-based TM joint (CT-TM) orthosis;* however, there was little effect difference between two modalities on physical function improvement (Table 12, Section 19).[856]
8. *Prefabricated soft thumb-based orthosis* had a large effect on pain alleviation at 2- and 4-week follow-up compared to *no intervention* while the latter was superior for physical function improvement (Table 12, Section 21).[543]
9. *CT-TM orthosis* had small to large effects on pain reduction and physical function improvement at 4 weeks compared to *no intervention;* yet for treatment satisfaction, the effect difference was trivial (Table 12, Section 26).[572]
10. *Laser therapy* compared to *sham laser therapy* had no impact on pain reduction (Table 12, Section 29).[544]
11. *TM-joint passive mobilization* had small effects on pain reduction compared to *sham ultrasound* after 2 weeks and at 2-week follow-up, but not at 1-week follow-up (Table 12, Section 30; Figures 8A, 8B, 8C).[566,857]
12. *Radial nerve mobilization* had small to large pain-reducing effects compared to *sham ultrasound* at 4 weeks and 2-month follow-up (Table 12, Section 31).[567]
13. *Thumb general exercises done* during 3 or 6 months had moderate to large effects on pain relief at rest and physical function amelioration at 3 and 6 months and on pain during pinching at 3 months, but not at 6 months, compared to *TM-joint specific exercises focusing on strengthening abductor pollicis longus tendon* (Table 12, Section 32).[546]

14. *A combination of hand exercises and TM joint/median/radial nerve mobilization* had a large pain-reducing effect compared to *sham ultrasound* at 4 weeks and 2-month follow-up (Table 12, Section 36).[455,568]

The evidence on the efficacy of the following interventions was very low (Table 12), thus we are very uncertain about their usefulness: *naproxen, diclofenac gel, hyaluronate intra-articular injection, dextrose prolotherapy, joint protection, acupuncture, urtica dioica,* and *hirudotherapy.*

Table 12. – Summary of findings regarding the efficacy of non-surgical interventions for trapeziometacarpal osteoarthritis

SUMMARY OF FINDINGS			EVIDENCE QUALITY LEVEL (GRADE)	
Outcomes: pain, physical function (PF), psychological well-being, quality of life, treatment satisfaction, adverse events	**Type of study, first author**	**Effect estimate**	**Evidence level**	**Reasons, down-graded level**
PHARMACOLOGICAL INTERVENTIONS				
1. NAPROXEN VS. PLACEBO				
Pain (McGill Pain Questionnaire VAS) at 7d (end of treatment)	RCT Sanders 2015	SMD -0.94 [-1.62, -0.27]	Very low	RoB -2, imp -1
PF (Patient-Report Wrist Hand Evaluation) at 7d (end of treatment)		SMD -0.42 [-1.06, 0.23]	Very low	RoB -2, imp -1
Psychologic well-being (Beck Depression Inventory-II) at 7d (end of treatment)		SMD -0.16 [-0.79, 0.48]	Very low	RoB -2, imp -1
Psychologic well-being (Spielberger state anxiety) at 7d (end of treatment)		SMD -0.28 [-0.92, 0.36]	Very low	RoB -2, imp -1
2. TRANSDERMAL STEROID DELIVERY VS. PLACEBO DELIVERY				
Pain (# of patients with tenderness) at 1w FU	RCT Jain 2010	RR 0.97 [0.84, 1.11]	Low	RoB -1, imp -1
Pain (# of patients with tenderness) at 3m FU		RR 1.04 [0.89, 1.22]	Low	RoB -1, imp -1
Pain (# of patients with tenderness) at 6m FU		RR 0.94 [0.80, 1.11]	Low	RoB -1, imp -1
3. DICLOFENAC GEL VS. HIRUDOTHERAPY (LEECH THERAPY)				
Rest pain (VAS) at 7d FU	RCT Michalsen 2008	SMD 0.93 [0.19, 1.66]	Very low	RoB -2, imp -1
Rest pain (VAS) at 30d FU		SMD 1.11 [0.36, 1.86]	Very low	RoB -2, imp -1
Rest pain (VAS) at 60d FU		SMD 1.39 [0.60, 2.17]	Very low	RoB -2, imp -1
Motion pain (VAS) at 7d FU		SMD 0.69 [-0.02, 1.41]	Very low	RoB -2, imp -1
Motion pain (VAS) at 30d FU		SMD 0.67 [-0.05, 1.38]	Very low	RoB -2, imp -1
Motion pain (VAS) at 60d FU		SMD 1.02 [0.28, 1.76]	Very low	RoB -2, imp -1
Grip pain (VAS) at 7d FU		SMD 1.02 [0.28, 1.77]	Very low	RoB -2, imp -1
Grip pain (VAS) at 30d FU		SMD 0.68 [-0.04, 1.40]	Very low	RoB -2, imp -1
Grip pain (VAS) at 60d FU		SMD 0.91 [0.17, 1.64]	Very low	RoB -2, imp -1
PF (Disabilities of the Arm, Shoulder and Hand) at 7d FU		SMD 0.89 [0.16, 1.62]	Very low	RoB -2, imp -1
PF (Disabilities of the Arm, Shoulder and Hand) at 30d FU		SMD 0.66 [-0.05, 1.38]	Very low	RoB -2, imp -1
PF (Disabilities of the Arm, Shoulder and Hand) at 60d FU		SMD 0.93 [0.19, 1.66]	Very low	RoB -2, imp -1
Quality of life (physical component) at 7d FU		SMD 0.03 [-0.66, 0.72]	Very low	RoB -2, imp -1
Quality of life (physical component) at 30d FU		SMD 0.50 [-0.20, 1.21]	Very low	RoB -2, imp -1
Quality of life (physical component) at 60d FU		SMD 0.26 [-0.43, 0.96]	Very low	RoB -2, imp -1
Adverse events (# of patients with local skin reactions)		RR 2.60 [1.21, 5.58]	Very low	RoB -2, imp -1
4. SALINE INJECTIONS VS. SHAM INJECTIONS IN TENDER SUBCUTANEOUS THICKENING AREA IN THE EXTENSOR REGIONS OF THE FOREARM AT 1ST WEEK AND IN THE UPPER SCAPULAR REGION AT 2ND WEEK				
Pain (VAS) at 3w FU	RCT Smith 2010	SMD-1.79 [-2.54, -1.05]	Low	RoB -1, imp -1
Pain (VAS) at 7w FU		SMD-1.33 [-2.02, -0.64]	Low	RoB -1, imp -1

Pain (VAS) at 13w FU		SMD-1.68 [-2.41, -0.95]	Low	RoB -1, imp -1
Pain (tenderness) at 3w FU		SMD-0.65 [-1.29, -0.01]	Low	RoB -1, imp -1
Pain (tenderness) at 7w FU		SMD-0.71 [-1.35, -0.06]	Low	RoB -1, imp -1
Pain (tenderness) at 13w FU		SMD -0.77 [-1.41, -0.12]	Low	RoB -1, imp -1
PF (VAS) at 3w FU		SMD -0.86 [-1.51, -0.21]	Low	RoB -1, imp -1
PF (VAS) at 7w FU		SMD -0.75 [-1.40, -0.11]	Low	RoB -1, imp -1
PF (VAS) at 13w FU		SMD -1.16 [-1.84, -0.49]	Low	RoB -1, imp -1
5. SALINE INTRA-ARTICULAR INJECTION VS. TRIAMCINOLONE ACETONIDE (STEROID) INTRA-ARTICULAR INJECTION				
Pain change (VAS) at 4w FU	RCT Meenagh 2004	SMD -0.59 [-1.23, 0.04]	Moderate	Imp -1
Pain change (VAS) at 12w FU		SMD -1.26 [-1.94, -0.58]	Moderate	Imp -1
Pain change (VAS) at 24w FU		SMD -0.50 [-1.13, 0.13]	Moderate	Imp -1
Pain change (tenderness) at 4w FU		SMD -0.62 [-1.25, 0.02]	Moderate	Imp -1
Pain change (tenderness) at 12w FU		SMD -0.34 [-0.97, 0.28]	Moderate	Imp -1
Pain change (tenderness) at 24w FU		SMD -0.46 [-1.09, 0.16]	Moderate	Imp -1
Adverse events		Not estimable (no adverse events were reported in either of the groups.)		
6. SALINE INTRA-ARTICULAR INJECTION VS. SODIUM BETAMETHASONE (STEROID) INTRA-ARTICULAR INJECTION				
Pain (VAS 0-10 lower is better) at 2w after the 1st injection.	RCT Heyworth 2008	*Mean 3.3 in the saline group; 3.1 in the steroid group		
Pain (VAS 0-10 lower is better) at 4w after the 1st injection.		*Mean 3.1 in the saline group; 2.6 in the steroid group		
Pain (VAS 0-10 lower is better) at 12w after the 1st injection.		*Mean 3.7 in the saline group; 3.7 in the steroid group		
Pain (VAS 0-10 lower is better) at 26w after the 1st injection.		*Mean 3.9 in the saline group; 3.8 in the steroid group		
Adverse events		Not estimable (no adverse events were reported in either of the groups.)		
7. SALINE INTRA-ARTICULAR INJECTION(S) VS. SYNVISC® (HYALURONATE) INTRA-ARTICULAR INJECTION(S)				
Pain (VAS 0-10 lower is better) at 2w after the 1st injection.	RCT Heyworth 2008	*Mean 3.3 in the saline group; 3.1 in the hyaluronate group		
Pain (VAS 0-10 lower is better) at 4w after the 1st injection.		*Mean 3.1 in the saline group; 4.0 in the hyaluronate group		
Pain (VAS) at 6w FU	RCT Figen Ayhan 2009	SMD 0.75 [0.22, 1.28]	Very low	RoB -2, imp -1
Pain (VAS 0-10 lower is better) at 12w after the 1st injection.	RCT Heyworth 2008	*Mean 3.7 in the saline group; 3.3 in the hyaluronate group		
Pain (VAS) at 24w FU	RCT Figen Ayhan 2009	SMD 1.50 [0.91, 2.08]	Very low	RoB -2, imp -1
Pain (VAS 0-10 lower is better) at 26w after the 1st injection.	RCT Heyworth 2008	*Mean 3.9 in the saline group; 3.4 in the hyaluronate group		
PF (Dreiser's Functional Index) at 6w FU	RCT Figen Ayhan 2009	SMD 0.12 [-0.39, 0.64]	Very low	RoB -2, imp -1
PF (Dreiser's Functional Index) at 24w FU		SMD 0.82 [0.29, 1.36]	Very low	RoB -2, imp -1
Adverse events	2 RCTs Figen Ayhan 2009, Heyworth 2008	Not estimable (no adverse events were reported in either of the groups.)		
8. TRIAMCINOLONE ACETONIDE (STEROID) INTRA-ARTICULAR INJECTION VS. OSTENIL® (HYALURONATE) INTRA-ARTICULAR INJECTION				
Pain (VAS) at 1w FU (after the 1st injection)	RCT Fuchs 2006	*Median pain 46.0 in the steroid group; 54.0 in the hyaluronate group		
Pain (VAS) at 2w FU (after the 1st injection, i.e., 1w FU after the 2nd injection)		*Median pain 33.0 in the steroid group; 41.0 in the hyaluronate group		
Pain (VAS) at 3w FU (after the 1st injection, i.e., 2w FU after the 2nd injection, i.e., 1w FU after the 3rd injection)		*Median pain 20.0 in the steroid group; 34.0 in the hyaluronate group		
Pain (VAS) at 1m FU	RCT Bahadir 2009	SMD -0.60 [-1.24, 0.03]	Very low	RoB -2, imp -1
Pain (VAS) at 3m FU		SMD -0.58 [-1.21, 0.06]	Very low	RoB -2, imp -1

Pain (VAS 0-100 lower is better) at 14w FU (after the 1st injection, i.e., 15w FU after the 2nd injection or 16w FU after the 3rd injection)	RCT Fuchs 2006	*Median pain 22.0 in the steroid group; 35.0 in the hyaluronate group		
Pain (VAS) at 6m FU	RCT Bahadir 2009	SMD -1.07 [-1.74, -0.41]	Very low	RoB -2, imp -1
Pain (VAS) at 26w FU (after the 1st injection, i.e., 27w FU after the 2nd injection or 28w FU after the 3rd injection)	RCT Fuchs 2006	*Median pain 45.5 in the steroid group; 30.0 in the hyaluronate group		
Pain (VAS) at 12m FU	RCT Bahadir 2009	SMD -0.53 [-1.16, 0.11]	Very low	RoB -2, imp -1
PH (Duruōz Hand Index) at 1m FU		SMD -0.88 [-1.53, -0.23]	Very low	RoB -2, imp -1
PH (Duruōz Hand Index) at 3m FU		SMD -0.97 [-1.63, -0.23]	Very low	RoB -2, imp -1
PH (Duruōz Hand Index) at 6m FU		SMD -0.92 [-1.57, -0.26]	Very low	RoB -2, imp -1
PH (Duruōz Hand Index) at 12m FU		SMD -0.30 [-0.92, 0.33]	Very low	RoB -2, imp -1
Adverse events		Not estimable (no adverse events were reported in either of the groups.)		
9. TRIAMCINOLONE ACETONIDE (STEROID) INTRA-ARTICULAR INJECTIONS VS. SINOVIAL H-L® (HYBRID HYALURONATE) INTRA-ARTICULAR INJECTIONS				
Pain change (VAS) at 6m FU	NRCT Tenti 2017	SMD 1.81 [1.34, 2.28]	Very low	Design -2, RoB -1, imp -1
PF change (Functional Index for Hand Osteoarthritis) at 6m FU		SMD 1.41 [0.97, 1.86]	Very low	Design -2, RoB -1, imp -1
PF change (Hand Assessment Questionnaire) at 6m FU		SMD 0.74 [0.34, 1.15]	Very low	Design -2, RoB -1, imp -1
Quality of life change (SF-36, physical component) at 6m FU		SMD 1.19 [0.76, 1.62]	Very low	Design -2, RoB -1, imp -1
Quality of life change (SF-36, mental component) at 6m FU		SMD 0.19 [-0.21, 0.58]	Very low	Design -2, RoB -1, imp -1
Adverse events (temporary pain, swelling, haematoma) at 6m FU		RR 2.44 [0.47, 12.74]	Very low	Design -2, RoB -1, imp -1
10. BETAMETHASONE DISODIUM PHOSPHATE AND BETAMETHASONE ACETATE (STEROID) INTRA-ARTICULAR INJECTIONS VS. SUPLASYN® (HYALURONATE) INTRA-ARTICULAR INJECTIONS				
Pain (VAS) at 7d FU (after 1st injection)	RCT Monfort 2015	SMD -0.15 [-0.57, 0.27]	Very low	RoB -2, imp -1
Pain (VAS) at 14d FU (after 1st injection; 7d FU after 2nd injection)		SMD -0.28 [-0.71, 0.14]	Very low	RoB -2, imp -1
Pain (VAS) at 30d FU (after 1st injection)		SMD -0.23 [-0.65, 0.20]	Very low	RoB -2, imp -1
Pain (VAS) at 90d FU (after 1st injection)		SMD 0.03 [-0.39, 0.44]	Very low	RoB -2, imp -1
Pain (VAS) at 180d FU (after 1st injection)		SMD 0.21 [-0.21, 0.63]	Very low	RoB -2, imp -1
PF (Functional Index for Hand Osteoarthritis) at 7d FU (after 1st injection)		SMD 0.00 [-0.42, 0.42]	Very low	RoB -2, imp -1
PF (Functional Index for Hand Osteoarthritis) at 14d FU (after 1st injection, i.e., 7d FU after 2nd injection)		SMD 0.17 [-0.25, 0.59]	Very low	RoB -2, imp -1
PF (Functional Index for Hand Osteoarthritis) at 30d FU (after 1st injection)		SMD -0.05 [-0.47, 0.36]	Very low	RoB -2, imp -1
PF (Functional Index for Hand Osteoarthritis) at 90d FU (after 1st injection)		SMD 0.64 [0.21, 1.07]	Very low	RoB -2, imp -1
PF (Functional Index for Hand Osteoarthritis) at 180d FU (after 1st injection)		SMD 0.55 [0.13, 0.98]	Very low	RoB -2, imp -1
Quality of life (SF-36 physical component) at 90d FU (after 1st injection)		SMD 0.00 [-0.42, 0.42]	Very low	RoB -2, imp -1
Quality of life (SF-36 physical component) at 180d FU (after 1st injection)		SMD 0.17 [-0.25, 0.59]	Very low	RoB -2, imp -1
Quality of life (SF-36 mental component) at 90d FU (after 1st injection)		SMD -0.25 [-0.67, 0.17]	Very low	RoB -2, imp -1

Quality of life (SF-36 mental component) at 180d FU (after 1st injection)		SMD 0.06 [-0.36, 0.48]	Very low	RoB -2, imp -1
Adverse events (mild to moderate pain)		RR 1.20 [0.37, 3.85]	Very low	RoB -2, imp -1
Adverse events (swelling)		RR 0.80 [0.14, 4.55]	Very low	RoB -2, imp -1
11. BETAMETHASONE (STEROID) INTRA-ARTICULAR INJECTIONS VS. SYNVISC® (HYALURONATE) INTRA-ARTICULAR INJECTIONS				
Pain (VAS 0-10 lower is better) at 2w after the 1st injection.	RCT Heyworth 2008	*Mean 3.3 in the steroid group; 3.1 in the hyaluronate group		
Pain (VAS 0-10 lower is better) at 4w after the 1st injection.		*Mean 2.6 in the steroid group; 4.0 in the hyaluronate group		
Pain (VAS 0-10 lower is better) at 12w after the 1st injection.		*Mean 3.7 in the steroid group; 3.3 in the hyaluronate group		
Pain (VAS 0-10 lower is better) at 26w after the 1st injection.		*Mean 3.8 in the steroid group; 3.4 in the hyaluronate group		
Adverse events		Not estimable (no adverse events were reported in either of the groups.)		
12. METHYLPREDNISOLONE (STEROID) INTRA-ARTICULAR INJECTION VS. ORTHOVISC® (HYALURONATE) INTRA-ARTICULAR INJECTION				
Pain at rest (VAS) at 1m FU (after 1st injection)	RCT Stahl 2005	SMD 0.20 [-0.35, 0.74]	Very low	RoB -2, imp -1
Pain at rest (VAS) at 3m FU (after 1st injection)		SMD 0.05 [-0.49, 0.60]	Very low	RoB -2, imp -1
Pain at rest (VAS) at 6m FU (after 1st injection)		SMD 0.00 [-0.54, 0.54]	Very low	RoB -2, imp -1
Pain after activity (VAS) at 1m FU (after 1st injection)		SMD -0.05 [-0.59, 0.50]	Very low	RoB -2, imp -1
Pain after activity (VAS) at 3m FU (after 1st injection)		SMD -0.16 [-0.7, 0.39]	Very low	RoB -2, imp -1
Pain after activity (VAS) at 6m FU (after 1st injection)		SMD -0.24 [-0.79, 0.31]	Very low	RoB -2, imp -1
Adverse events		Not estimable (no adverse events were reported in either of the groups.)		
13. METHYLPREDNISOLONE (STEROID) INTRA-ARTICULAR INJECTION VS. DEXTROSE PROLOTHERAPY				
Pain (VAS) 1m FU (after 3rd monthly injection)	RCT Jahangiri 2014	SMD -0.84 [-1.37, -0.30]	Very low	RoB -2, imp -1
Pain (VAS) 2m FU (after 3rd injection)		SMD 0.13 [-0.38, 0.65]	Very low	RoB -2, imp -1
Pain (VAS) 6m FU (after 3rd injection)		SMD 1.11 [0.54, 1.68]	Very low	RoB -2, imp -1
Pain on movement (VAS) 6m FU (after 3rd injection)		SMD 0.70 [0.15, 1.24]	Very low	RoB -2, imp -1
PF (Health Assessment Questionnaire) 6m FU (after 3rd injection)		SMD 0.70 [0.16, 1.25]	Very low	RoB -2, imp -1
14. METHYLPREDNISOLONE (STEROID) INTRA-ARTICULAR INJECTION VS. 2-WEEK PROGRAMME OF REHABILITATIONVE INTERVENTION (5 days/week, 30-40 minutes/session, CUSTOM-MADE THERMOPLASTIC THUMB-BASED (CTT) ORTHOSIS, HEAT, EXERCISES)				
Pain (# of patients without pain/functional restriction) at 2m FU	NRCT Rocchi 2017	RR 1.25 [0.88, 1.78]	Very low	Design -2, RoB -1, imp -1
Pain (# of patients without pain/functional restriction) at 6m FU		RR 0.88 [0.56, 1.38]	Very low	Design -2, RoB -1, imp -1
Pain (# of patients without pain/functional restriction) at 12m FU		RR 0.20 [0.05, 0.82]	Very low	Design -2, RoB -1, imp -1
PF (Disabilities of the Arm, Shoulder and Hand) at 2mFU		SMD -2.66 [-3.43, -1.88]	Very low	Design -2, RoB -1, imp -1
PF (Disabilities of the Arm, Shoulder and Hand) at 6m FU		SMD 1.10 [0.50, 1.69]	Very low	Design -2, RoB -1, imp -1
PF (Disabilities of the Arm, Shoulder and Hand) at 12m FU		SMD 0.68 [0.11, 1.25]	Very low	Design -2, RoB -1, imp -1
Treatment satisfaction (Numeric Rating Scale) at 12m FU		SMD 0.85 [0.27, 1.44]	Very low	Design -2, RoB -1, imp -1

Adverse events (temporary acute local pain and inflammation)		RR 13.00 [0.77, 219.11]	Very low	Design -2, RoB -1, imp -1
15. a. 1 VS. 2 WEEKLY SINOVIAL® (HYALURONATE) INTRA-ARTICULAR INJECTION(S)				
Pain (VAS) at 1m FU	RCT Roux 2007	SMD -0.07 [-0.81, 0.67]	Very low	RoB -2, imp -1
Pain (VAS) at 3m FU		SMD -0.14 [-0.61, 0.88]	Very low	RoB -2, imp -1
PF (Dreiser's Functional Index) at 1mFU		SMD -0.21 [-0.96, 0.53]	Very low	RoB -2, imp -1
PF (Dreiser's Functional Index) at 3m FU		SMD -0.06 [-0.80, 0.68]	Very low	RoB -2, imp -1
b. 2 VS. 3 WEEKLY SINOVIAL® (HYALURONATE) INTRA-ARTICULAR INJECTION(S)				
Pain (VAS) at 1m FU	RCT Roux 2007	SMD 0.78 [0.00, 1.55]	Very low	RoB -2, imp -1
Pain (VAS) at 3mFU		SMD 0.37 [-0.38, 1.12]	Very low	RoB -2, imp -1
PF (Dreiser's Functional Index) at 1m FU		SMD 0.63 [-0.13, 1.40]	Very low	RoB -2, imp -1
PF (Dreiser's Functional Index) at 3m FU		SMD 0.45 [-0.30, 1.20]	Very low	RoB -2, imp -1
c. 1 VS. 3 WEEKLY SINOVIAL® (HYALURONATE) INTRA-ARTICULAR INJECTION(S)				
Pain (VAS) at 1m FU	RCT Roux 2007	SMD 0.81 [0.03, 1.58]	Very low	RoB -2, imp -1
Pain (VAS) at 3m FU		SMD 0.58 [-0.18, 1.34]	Very low	RoB -2, imp -1
PF (Dreiser's Functional Index) at 1m FU		SMD 0.68 [-0.09, 1.44]	Very low	RoB -2, imp -1
PF (Dreiser's Functional Index) at 3m FU		SMD 0.53 [-0.22, 1.29]	Very low	RoB -2, imp -1
16. 3-WEEKLY SINOVIAL® MINI (HYALURONATE) INTRA-ARTICULAR INJECTIONS VS. SHOCKWAVE THERAPY				
Pain change (VAS 0-10) at 3w (at 3rd weekly injection)	RCT Ioppolo 2018	Mean difference 0.17 [-0.99, 1.34]	Low	RoB -1, imp -1
Pain change (VAS 0-10) at 3m FU		Mean difference -0.07 [-1.16, 1.02]	Low	RoB -1, imp -1
Pain change (VAS 0-10) at 6m FU		Mean difference 2.60 [1.52, 3.68]	Low	RoB -1, imp -1
PF change (Duruōz Hand Index, 0-90, lower is better) at 3w (at 3rd weekly injection)		Mean difference 1.63 [-8.0, 11.32]	Low	RoB -1, imp -1
PF change (Duruōz Hand Index, 0-90, lower is better)) at 3m FU		Mean difference -0.49 [-8.68, 7.69]	Low	RoB -1, imp -1
PF change (Duruōz Hand Index, 0-90, lower is better) at 6m FU		Mean difference 3.66 [-6.61, 8.08]	Low	RoB -1, imp -1
Adverse events		Not estimable (no adverse events were reported in either of the groups.)		
REHABILITATIVE INTERVENTIONS				
17. CUSTOM-MADE THERMOPLASTIC THUMB (CTT) ORTHOSIS (daytime wearing) VS. NO INTERVENTION				
Pain (VAS) at 30-45d (end of intervention)	2 RCTs Bani 2013, Gomes-Carreira 2010	SMD -1.94 [-4.25, 0.37], I^2=90%, random-effect analysis	Very low	RoB -1, inc -1, imp -1
Pain (VAS) at 90d (end of intervention)	RCT Gomes-Carreira 2010	SMD -1.07 [-1.74, -0.40]	Low	RoB -1, imp -1
PF (Disabilities of the Arm, Shoulder and Hand) at 30-45d (end of intervention)	2 RCTs Bani 2013, Gomes-Carreira 2010	SMD 0.07 [-0.42, 0.57], I^2=33%, fixed-effect analysis	Very low	RoB -1, inc -1, imp -1
PF (Disabilities of the Arm, Shoulder and Hand) at 90d (end of intervention)	RCT Gomes-Carreira 2010	SMD -0.42 [-1.04, 0.21]	Low	RoB -1, imp -1
18. CTT ORTHOSIS (night-time wearing) and USUAL CARE PROVIDED BY A PHYSICIAN VS. USUAL CARE PROVIDED BY A PHYSICIAN				

Pain change (VAS) at 1m (end of intervention)	RCT Rannou 2009	SMD 0.03 [-0.36, 0.42]	Low	RoB -1, imp -1
Pain change (VAS) at 12m (end of intervention)		SMD -0.61 [-1.02, -0.20]	Low	RoB -1, imp -1
Change in pain during pinching (VAS) at 1m (end of intervention)		SMD -0.03 [-0.42, 0.36]	Low	RoB -1, imp -1
Change in pain during pinching (VAS) at 12m (end of intervention)		SMD -0.23 [-0.64, 0.17]	Low	RoB -1, imp -1
PF change (Cochin Hand Function Scale) at 1m (end of intervention)		SMD 0.15 [-0.24, 0.55]	Low	RoB -1, imp -1
PF change Cochin Hand Function Scale) at 12m (end of intervention)		SMD -0.54 [-0.95, -0.13]	Low	RoB -1, imp -1
PF change (VAS) at 1m (end of intervention)		SMD -0.03 [-0.42, 0.36]	Low	RoB -1, imp -1
PF change (VAS) at 12m (end of intervention)		SMD -0.58 [-0.98, -0.18]	Low	RoB -1, imp -1
Adverse events (skin erosion, allergy, increased pain)		Not estimable (no adverse events were reported in either of the groups.)		
19. CTT ORTHOSIS VS. CUSTOM-MADE THERMOPLASTIC HAND-BASED TM JOINT (CT-TM) ORTHOSIS				
Pain change (VAS) at 1w (end of intervention)	RCT Cantero-Tellez 2017	SMD-1.10 [-1.62, -0.58]	Low	RoB -1, imp -1
Pain change (VAS) at 3m (end of intervention)	NRCT Cantero-Tellez 2018	SMD -0.40 [-0.83, 0.04]	Very low	Design -2, RoB -2, imp -1
PF change (Disabilities of the Arm, Shoulder and Hand) at 1w (end of intervention)	RCT Cantero-Tellez 2017	SMD 2.35 [1.71, 2.98]	Low	RoB -1, imp -1
PF change (Disabilities of the Arm, Shoulder and Hand) at 3m (end of intervention)	NRCT Cantero-Tellez 2018	SMD 1.68 [1.18, 2.19]	Very low	Design -2, RoB -2, imp -1
20. CTT ORTHOSIS VS. PUSH ORTHO CMC® (PREFABRICATED RIGID HAND-BASED TM-JOINT ORTHOSIS)				
Pain (VAS) at 2w	RCT van der Vegt 2017	SMD 0.19 [-0.17, 0.56]	Very low	RoB -2, imp -1
PF (Functional Index for Hand Osteoarthritis) at 2w		SMD 0.13 [-0.25, 0.52]	Very low	RoB -2, imp -1
Treatment satisfaction (D-Quebec User Evaluation of Satisfaction with Assistive Technology) at the end of study		SMD 0.83 [0.45, 1.21]	Very low	RoB -2, imp -1
21. PREFABRICATED SOFT THUMB-BASED (PST) ORTHOSIS (TM/metacarpalphalangeal joints) VS. NO INTERVENTION				
Pain (VAS) at 4w (end of intervention)	RCT Bani 2013	SMD -1.90 [-2.92, -0.88]	Low	RoB -1, imp -1
Pain (VAS) at 2w FU		SMD -0.88 [-1.74, -0.01]	Low	RoB -1, imp -1
PF (Disabilities of the Arm, Shoulder and Hand) at 4 w (end of intervention)		SMD 1.03 [0.15, 1.91]	Low	RoB -1, imp -1
PF (Disabilities of the Arm, Shoulder and Hand) at 2w FU		SMD 0.87 [0.00, 1.73]	Low	RoB -1, imp -1
22. PST ORTHOSIS VS. CTT ORTHOSIS				
Pain at rest (VAS or Numeric Rating Scale) at 4w (end of treatment) (Bani 2013); at FU of mean 9.8w for the PST group and of 7.5 w (end of treatment) (Becker 2013)	2 RCTs Bani 2013, Becker 2013	SMD 0.18 [-0.25, 0.60]; I^2=0%; fixed-effect analysis	Very low	RoB -2, imp -1
PF (Disabilities of the Arm, Shoulder and Hand) at 4w (end of treatment) (Bani 2013); at FU of mean 9.8w for the PST group and of 7.5 w (end of treatment) (Becker 2013)		SMD 0.23 [-0.43, 0.90]; I^2=50%; random-effect analysis	Very low	RoB -2, inc -1, imp -1
Treatment satisfaction (Numeric Rating Scale) at FU of mean 9.8w for the PST group and of 7.5 w (end of treatment)	RCT Becker 2013	SMD -0.28 [-0.78, 0.22]	Very low	RoB -2, imp -1
23. PST ORTHOSIS VS. CT-TM ORTHOSIS				
Pain at rest (VAS) at 1w (end of treatment)	Crossover RCT Weiss 2004	SMD -0.66 [-1.23, -0.99]	Very low	RoB -2, imp -1
Pain during pinching (VAS) at 1w (end of treatment)		SMD -0.46 [-1.02, 0.11]	Very low	RoB -2, imp -1

PF (# of patients perceived easier with orthosis to perform activities) at 1w (end of treatment)		RR 2.00 [0.89, 4.49]	Very low	RoB -2, imp -1
Treatment satisfaction (VAS) at 1w (end of treatment)		SMD -1.16 [-1.77, -0.56]	Very low	RoB -2, imp -1
24. PST ORTHOSIS VS. CUSTOM-MADE HYBRID (THERMOPLASTIC/SOFT) HAND-BASED TM JOINT ORTHOSIS				
Pain (AUStralian CANadian Hand Osteoarthritis Hand Index) at 4w (end of treatment)	Crossover RCT Sillem 2011	SMD 0.35 [-0.18, 0.88]	Very low	RoB -2, imp -1
PF (AUStralian CANadian Hand Osteoarthritis Hand Index) at 4w (end of treatment)		SMD 0.17 [-0.36, 0.70]	Very low	RoB -2, imp -1
25. a. SPORLASTIC 07051® (PREFABRICATED SEMI-RIGID WRIST-BASED THUMB ORTHOSIS) VS. URIEL 25® (PREFABRICATED SOFT WRIST-BASED TM JOINT ORTHOSIS)				
Pain (VAS) at 4 weeks (end of treatment)	Crossover NRCT Buurke 2013	SMD 0.22 [-0.66, 1.10]	Very low	Design -2, RoB -1, imp -1
PF (VAS) at 4 weeks (end of treatment)		SMD 0.89 [-0.04, 1.82]	Very low	Design -2, RoB -1, imp -1
PF (Green Test) at 4 weeks (end of treatment)		SMD 0.31 [-0.58, 1.19]	Very low	Design -2, RoB -1, imp -1
b. GIBORTHO 6302® (PREFABRICATED SEMI-RIGID WRIST-BASED THUMB ORTHOSIS) VS. URIEL 25®				
Pain (VAS) at 4w (end of treatment)	Crossover NRCT Buurke 2013	SMD 0.03 [-0.85, 0.91]	Very low	Design -2, RoB -1, imp -1
PF (VAS) at 4w (end of treatment)		SMD 1.04 [0.09, 1.99]	Very low	Design -2, RoB -1, imp -1
PF (Green Test) at 4w (end of treatment)		SMD 0.41 [-0.48, 1.30]	Very low	Design -2, RoB -1, imp -1
c. GIBORTHO 6302® VS. SPORLASTIC 07051®				
Pain (VAS) at 4w (end of treatment)	Crossover NRCT Buurke 2013	SMD -0.20 [-1.08, 0.68]	Very low	Design -2, RoB -1, imp -1
PF (VAS) at 4w (end of treatment)		SMD 0.04 [-0.84, 0.91]	Very low	Design -2, RoB -1, imp -1
PF (Green Test) at 4w (end of treatment)		SMD 0.08 [-0.79, 0.96]	Very low	Design -2, RoB -1, imp -1
26. CT-TM ORTHOSIS VS. NO INTERVENTION				
Pain change (VAS) at 4w (end of treatment)	RCT Arazpour 2017	SMD -1.71 (IC not reported)	Low	RoB -1, imp -1
Pain change (Michigan Hand Questionnaire pain) at 4w (end of treatment)		SMD -1.11 (IC not reported)	Low	RoB -1, imp -1
PF change (Michigan Hand Questionnaire function) at 4w (end of treatment)		SMD -0.299 (IC not reported)	Low	RoB -1, imp -1
PF change (Michigan Hand Questionnaire ADL) at 4w (end of treatment)		SMD -2.105 (IC not reported)	Low	RoB -1, imp -1
Treatment satisfaction change (Michigan Hand Questionnaire satisfaction) at 4w (end of treatment)		SMD -0.044 (IC not reported)	Low	RoB -1, imp -1
27. CT-TM ORTHOSIS VS. CUSTOM-MADE THERMOPLASTIC WRIST-BASED THUMB ORTHOSIS				
Pain at rest (VAS) at 1w (end of treatment)		SMD 0.14 [-0.40, 0.69]	Very low	RoB -2, imp -1

Pain during pinching (VAS) at 1w (end of treatment)	Crossover RCT Weiss 2000	SMD -0.02 [-0.56, 0.53]	Very low	RoB -2, imp -1
PF (# of patients perceived easier with orthosis to perform activities) at 1w (end of treatment)		RR 2.75 [1.00, 7.53]	Very low	RoB -2, imp -1
28. a. RHIZO FORTE V/2013® (PREFABRICATED RIGID THUMB-BASED ORTHOSIS) VS. PUSH ORTHO CMC® (PREFABRICATED RIGID HAND-BASED TM -JOINT ORTHOSIS)				
PF (Solleman Test) while wearing orthosis	NRCT Hamann 2014	SMD 1.51 [0.76, 2.26]	Very low	Design -2, RoB -1, imp -1
b. RHIZO FORTE V/2013® VS. RHIZO-HIT® (PREFABRICATED RIGID WRIST-BASED THUMB ORTHOSIS)				
PF (Solleman Test) while wearing orthosis	NRCT Hamann 2014	SMD 0.59 [-0.08, 1.26]	Very low	Design -2, RoB -1, imp -1
c. RHIZO FORTE V/2013® VS. RHIZOMED® (PREFABRICATED SEMI-RIGID WRIST-BASED THUMB ORTHOSIS)				
PF (Solleman Test) while wearing orthosis	NRCT Hamann 2014	SMD -3.75 [-4.87, -2.62]	Very low	Design -2, RoB -1, imp -1
d. PUSH ORTHO CMC® VS. RHIZO-HIT®				
PF (Solleman Test) while wearing orthosis	NRCT Hamann 2014	SMD -3.08 [-4.07, -2.08]	Very low	Design -2, RoB -1, imp -1
e. PUSH ORTHO CMC® VS. RHIZOMED®				
PF (Solleman Test) while wearing orthosis	NRCT Hamann 2014	SMD -4.73 [-6.06, -3.40]	Very low	Design -2, RoB -1, imp -1
f. RHIZO-HIT® VS. RHIZOMED®				
PF (Solleman Test) while wearing orthosis	NRCT Hamann 2014	SMD -4.00 [-5.18, -2.82]	Very low	Design -2, RoB -1, imp -1
29. LOWER-LEVEL HELIUM NEON LASER THERAPY VS. SHAM LASER THERAPY				
Pain (tenderness) at 3w (end of intervention)	RCT Basford 1987	SMD 0.00 [-0.44, 0.44]	Low	RoB -1, imp -1
30. TRAPEZIO-METACARPAL (TM) JOINT PASSIVE MOBILISATION VS. SHAM ULTRASOUND				
Pain (Pressure point threshold) at 2w (end of treatment)	2 RCTs Villafane 2011, Villafane 2012a	SMD -0.30 [-0.82, 0.22], I^2=0%; fixed-effect analysis (Figure 10A)	Low	RoB -1, imp -1
Pain (Pressure point threshold) at 1w FU		SMD 0.02 [-0.49, 0.54], I^2=0%; fixed-effect analysis (Figure 10B)	Low	RoB -1, imp -1
Pain (Pressure point threshold) at 2w FU		SMD -0.27 [-0.80, 0.25], I^2=0%; fixed-effect analysis (Figure 10C)	Low	RoB -1, imp -1
31. RADIAL NERVE PASSIVE MOBILISATION VS. SHAM ULTRASOUND				
Pain (Pressure point threshold) at 4w (end of treatment)	RCT Villafane 2012b	SMD -1.26 [-1.81, -0.70]	Low	RoB -1, imp -1
Pain (Pressure point threshold) at 1m FU		SMD -0.18 [-0.68, 0.33]	Low	RoB -1, imp -1
Pain (Pressure point threshold) at 2m FU		SMD -0.26 [-0.77, 0.25]	Low	RoB -1, imp -1
32. TM-JOINT SPECIFIC EXERCISES VS. THUMB GENERAL EXERCISES				

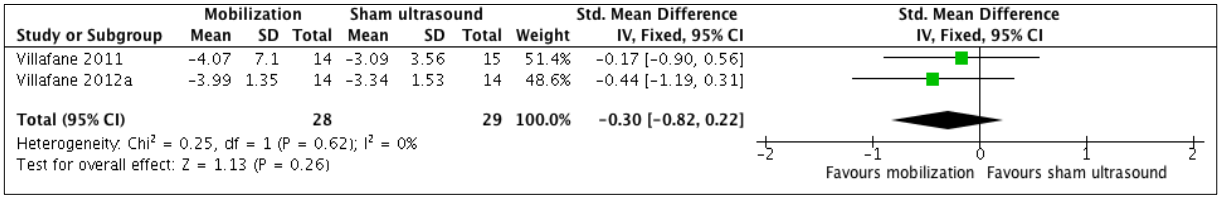
Pain at rest (VAS) at 3m (end of treatment)	RCT Davenport 2012	SMD 0.55 [-0.33, 1.44]	Low	RoB -1, imp -1
Pain at rest (VAS) at 6m (end of treatment)		SMD 0.29 [-0.59, 1.16]	Low	RoB -1, imp -1
Pain during pinching (VAS) at 3m (end of treatment)		SMD 0.31 [-0.57, 1.18]	Low	RoB -1, imp -1
Pain during pinching (VAS) at 6m (end of treatment)		SMD -0.05 [-0.92, 0.82]	Low	RoB -1, imp -1
PF (Disabilities of the Arm, Shoulder and Hand) at 3m (end of treatment)		SMD 1.08 [0.14, 2.02]	Low	RoB -1, imp -1
PF (Disabilities of the Arm, Shoulder and Hand) at 6m (end of treatment)		SMD 0.55 [-0.33, 1.44]	Low	RoB -1, imp -1
33. THUMB STRAP ORTHOSIS - ABDUCTION EXERCISE VS. CTT ORTHOSIS - PINCH EXERCISE				
Pain (VAS) at 2w (end of treatment of orthosis)	RCT Wajon 2005	SMD 0.16 [-0.47, 0.79]	Very low	RoB -2, imp -1
Pain (VAS) at 6w (end of treatment of orthosis and exercise)		SMD 0.22 [-0.46, 0.89]	Very low	RoB -2, imp -1
PF (Sollerman Test) at 2w (end of treatment of orthosis)		SMD -0.07 [-0.70, 0.56]	Very low	RoB -2, imp -1
PF (Sollerman Test) at 6w (end of treatment of orthosis and exercise)		SMD 0.16 [-0.52, 0.83]	Very low	RoB -2, imp -1
34. ORTHOSES - EXERCISE - JOINT PROTECTION VS. SHAM CREAM				
Pain (AUStralian CANadian Hand Osteoarthritis Hand Index pain) at 4w (end of treatment)	RCT Merritt 2012	SMD -1.29 [-2.02, -0.55]	Very low	RoB -2, imp -1
Pain during pinching (VAS) at 4w (end of treatment)		SMD -0.79 [-1.48, -0.10]	Very low	RoB -2, imp -1
PF (AUStralian CANadian Hand Osteoarthritis Hand Index function) at 4w (end of treatment)		SMD -0.63 [-1.31, 0.05]	Very low	RoB -2, imp -1
35. A 5-WEEK JOINT PROTECTION (JP) PROGRAMME (2x/week, 4-8 participants, including joint protection education, pain education, assistive devices, paraffin, hand/thumb exercises, elastic thumb orthosis/day) - ORTHOSES (day & night) - HOT PACK - EXERCISES VS. A 5-WEEK JOINT PROTECTION PROGRAMME				
Pain at night (VAS) at 1w FU	NCRT Boustedt 2009	SMD -0.25 [-0.87, 0.37]	Very low	Design -2, RoB -2, imp -1
Pain at night (VAS) at 1y FU		SMD -0.07 [-0.60, 0.73]	Very low	Design -2, RoB -2, imp -1
Pain on motion (VAS) at 1w FU		SMD -0.56 [-1.19, 0.07]	Very low	Design -2, RoB -2, imp -1
Pain on motion (VAS) at 1y FU		SMD -0.29 [-0.96, 0.38]	Very low	Design -2, RoB -2, imp -1
PF (Disabilities of the Arm, Shoulder and Hand) at 1w FU		SMD -0.65 [-1.29, -0.01]	Very low	Design -2, RoB -2, imp -1
PF (Disabilities of the Arm, Shoulder and Hand) at 1y FU		SMD -1.14 [-1.86, -0.42]	Very low	Design -2, RoB -2, imp -1
36. HAND EXERCISES AND TM JOINT/MEDIAN/RADIAL NERVE MOBILISATION VS. SHAM ULTRASOUND				
Pain (VAS) at 4w	SR Bertozzi 2015 including RCT Villafane 2013	SMD -2.00 [-2.62, -1.38]	Low	RoB -1, imp -1
Pain (VAS) at 2m FU		SMD -11.23 [-13.30, -9.16]	Low	RoB -1, imp -1
ALTERNATIVE MEDICINE				
37. ACUPUNCTURE VS. MOCK TRANSCUTANEOUS NEURAL STIMULATION				
Pain (VAS) at 2w FU	RCT Dickens 1989	*Mean pain reduction of 76.10% in the acupuncture group, 20.01% in the mock group		

PF at 2w FU		*All patients (7) recorded improvement in the acupuncture group, three patients out of five recorded improvement in the mock group		
38. URTICA DIOICA (STINGING NETTLE) VS. LAMIUM ALBUM (WHITE DEAD NETTLE)				
Pain (VAS) at 1w (end of intervention)	**SR Cameron 2013** including **RCT Randall 2000**	MD -13.37 [95%CI not available]	Very low	RoB -2, imp -1
PF (Health Assessment Questionnaire 0-3) at 1w (end of intervention)	**RCT Randall 2000**	MD -0.07 [95%CI not available]	Very low	RoB -2, imp -1

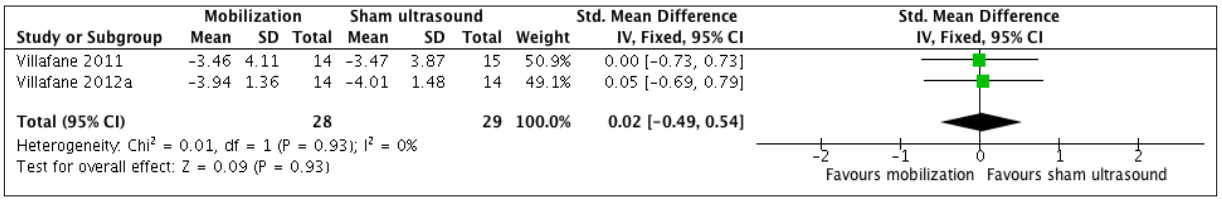
*The effect estimate was not computed due to insufficient data.

Notes: [ ], 95% confidence interval; d, day(s); FU, follow-up; m, month(s); inc, inconsistency; ind, indirectness; imp, imprecision; pub, publication bias; NRCT, non-randomized controlled trial; RCT, randomized controlled trial; RoB, risk of bias; RR, risk ratio; SMD, standardized mean difference; TM, trapeziometacarpal; VAS, Visual Analog Scale; y, year(s); w, week(s)

A.



B.



C.

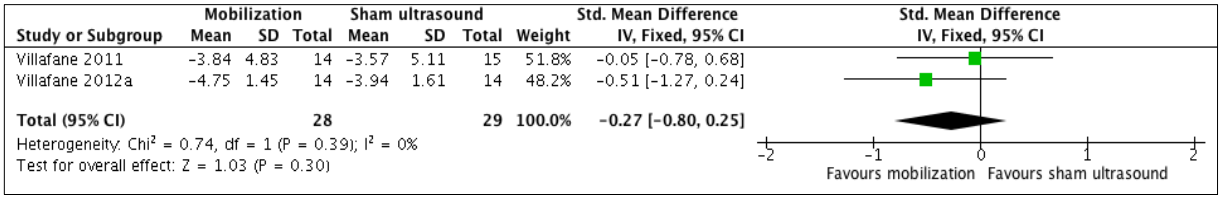


Figure 10. – Results of the conducted meta-analyses

A. Trapeziometacarpal-joint mobilization vs. sham ultrasound for pain at 2 weeks.
B. Trapeziometacarpal-joint mobilization vs. sham ultrasound for pain at 1-week follow-up.
C. Trapeziometacarpal-joint mobilization vs. sham ultrasound for pain at 2-week follow-up.

5.1.5 Discussion

This systematic review identified non-surgical interventions for TMO and reviewed their efficacy. The results of a study with moderate quality evidence suggest that *steroid intra-articular injections confirmed by radiography* would not be more effective for TMO pain than *saline injections*.[554] Studies with low quality evidence supports the superiority of the following interventions for reducing pain and/or improving physical function: 1) *saline* over *sham subcutaneous injections*[563]*;* 2) *custom-made thermoplastic thumb (CTT) orthosis* over *no intervention*[550] or *a control*[559]; 3) *custom-made thermoplastic hand-based TM joint*

(CT-TM) orthosis over *no intervention*[572]*;* 4) *radial nerve mobilization* over *sham ultrasound*[567]; and 5) *a combination of hand exercises and TM joint/median/radial nerve mobilization* over *sham ultrasound*.[455,568] Some of these findings are consistent with those of previous systematic reviews regarding the efficacy of *saline vs. corticosteroid injections* (*National Institute for Health and Care Excellence*)[359] and *a combination of hand exercises and TM-joint/nerve mobilization* (Bertozzi et al.)[455] Our conclusions about the efficacy of *CTT orthosis* diverged from Bertozzi et al.'s systematic review.[455] These authors included data from patients with hand osteoarthritis other than TMO.

5.1.5.1 Implications for clinical practice

Although *steroid intra-articular injections* are commonly used for osteoarthritis, this practice may be "*based purely on anecdotal evidence*".[554] Due to the absence of solid evidence and potential harm, the *American College of Rheumatology* conditionally recommends not using intra-articular therapies.[477] According to the *European League Against Rheumatism* (EULAR), *steroid injections* "*should not generally be used*" unless "*clear joint inflammation is present*".[52] In this systematic review, we reported the results of an RCT whose moderate quality evidence supports the superiority of *intra-articular saline injections* over *steroids* for reducing pain and tenderness in the short and long term[554]—a surprising finding considering that *saline* is generally viewed as an inactive agent. Whether *saline injections* could represent a treatment option for TMO merits further investigation considering another trial whose results support to some extent the efficacy of *subcutaneous saline injections*.[563]

This systematic review demonstrates that different types of *orthosis* could be helpful for TMO.[543,550,559,572,856] The orthosis including the metacarpal-phalangeal joint, that is, *custom-made thermoplastic thumb orthosis* (CTT), appears to be slightly superior for alleviating pain.[856] However, the type of orthosis should be chosen according to each patient's needs (e.g., activities, preference).[94] Regarding exercises, *thumb general exercises* may be more effective than *TM-joint exercises focusing on strengthening abductor pollicis longus tendon* for pain reduction and physical function improvement.[546] *A combination of hand exercises and TM-joint/nerve mobilization* showed a very large treatment effect (SMD -11.23) on pain at 2-month follow-up.[455,568] This clientele should therefore benefit from a combination of the aforementioned interventions.

5.1.5.2 Implications for research

An important finding of this systematic review is the poor quality of evidence supporting the efficacy of many non-surgical TMO treatments. For the non-drug interventions, their visible nature often renders

blinding impossible thereby contributing to downgrading the evidence quality of the trials. The legitimacy of this quasi systematic downgrading of non-drug research may be questionable but one must consider that treatment effects on subjective outcomes such as pain tend to be overestimated when blinding participants is lacking.[858] Facing with this inevitable bias, trialists must minimize other possible biases so that evidence quality downgrading will be limited to one aspect only. For example, the diagnosis of TMO must be confirmed by radiography; intra-articular injections must be guided by radiography to ensure the accuracy of injection site; when co-interventions (e.g., drugs, orthosis) are used, the equivalency of their use between groups must be properly measured to ensure that the group effect difference is attributed solely to the targeted interventions.

The measured outcomes found in this systematic review were mainly pain and physical function. As pointed out by the internationally recognized *Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials* (IMMPACT) group of expert trialists, pain is a highly complex phenomenon involving various dimensions that are important to assess (e.g., psychological well-being, quality of life, treatment satisfaction).[10] Considering that the association between radiographic severity of TMO and clinical symptoms is weak to moderate[21] and that some psychosocial factors such as pain catastrophization and fear of pain impact on pain severity on the other hand,[133] assessment of these modifiable factors is essential to fully capture TMO patients' pain experience.

Pertaining to future research avenues in the field of TMO, this systematic review revealed that well-designed studies are needed to assess the efficacy of those interventions with very low-quality evidence—i.e., *naproxen, diclofenac gel, hyaluronate injection, dextrose prolotherapy, joint protection, acupuncture, urtica dioica,* and *hirudotherapy*. Efficacy of medications used for other osteoarthritis (e.g., paracetamol, nonsteroidal anti-inflammatory drugs, tramadol, nutraceuticals)[52] need to be demonstrated in TMO population as well. Moreover, chronically underfunded research fields such as rehabilitation and alternative medicine must be sufficiently funded.[859]

5.1.5.3 Strength and limitations of this systematic review

One of the strengths of this systematic review is its rigorous methodology based on the *Cochrane* recommendations. As shown in this review, the majority of earlier systematic reviews in the field were of mediocre quality, not meeting the *Agency for Healthcare Research and Quality*'s minimum set of criteria. In addition, this systematic review is the most comprehensive one so far in terms of the type of TMO non-surgical interventions covered (pharmacology, rehabilitation, alternative medicine). Information contained in this review would prove helpful for clinicians to make evidence-based decisions regarding

the choice of the best therapeutic options adapted to patients' needs. Finally, we included a valid body of evidence from some earlier systematic reviews which leveraged *"the work completed by the prior* systematic review *authors*"[521] and vice versa.

Despite its strengths, this systematic review has some limitations. Firstly, our literature search was limited to English and French. However, some evidence suggests that the effect estimates of English-language restricted meta-analyses differ little from those which included other languages.[860] Thus, bias related to languages in our findings might be negligible. Secondly, two trials have included patients with TMO of Stage 4 classified by Eaton or Eaton-Glickel approach which includes scapho-trapezial or pantrapezial osteoarthritis.[548,574] Many other studies did not report TMO radiographic stages and/or used classification of their sample,[542-545,547,549,554-556,558,560-563,572,575,576,578,855,861] thus, they may have included patients with pantrapezial osteoarthritis. Although this may threaten the validity of some of our findings, all our efforts when searching the literature were concentrated first and foremost on targeting TMO.

5.1.6 Conclusion

This systematic review allowed collating comprehensive information on the efficacy of non-surgical interventions for TMO. Some studies provide low to moderate level of scientific evidence which may, to some extent, support the benefits of some interventions. Carrying out rigorous high-quality RCT in this field of research is a challenge for various reasons but there is certainly room for significant improvement by reducing risk of bias sources and using relevant outcome measures which would fully capture patients' TMO experience.

5.2 Volet I : Efficacité des interventions chirurgicales pour l'OTM (Article 5 - Efficacy of surgical interventions for trapeziometacarpal (thumb base) osteoarthritis: A systematic review)

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En tant qu'auteure principale, je confirme mon apport majeur à la conception du protocole, la recherche des références, l'extraction les données, l'évaluation des risques de biais des études incluses et la rédaction du manuscrit sous la supervision de ma directrice de recherche, D[re] Manon Choinière. La bibliothécaire-informationniste M[me] Daniela Ziegler a exécuté la recherche de la littérature. D[rs] Patrick

Harris, Nathalie Bureau et Nathaly Gaudreault ont révisé le protocole, apporté des clarifications sur certains types d'intervention ou la méthodologie. Tous les auteurs ont révisé le manuscrit et approuvé la version finale.

5.2.1 Abstract

Purpose. This systematic review (SR) aimed at identifying the surgical interventions available for trapeziometacarpal osteoarthritis and documenting their efficacy on pain, physical function, psychological well-being, quality of life, treatment satisfaction, and/or adverse events.

Methods. The protocol of this PROSPERO-registered SR was developed based on the *Cochrane* intervention review methodology and *the PRISMA* guidelines.

Results. Among 9049 potential studies identified, an SR, 18 randomised controlled trials (RCTs), and 40 nonRCTs were included. We identified 11 categories of surgical techniques: first metacarpal osteotomy, first metacarpal and trapezium partial resection, arthrodesis, trapeziectomy (T), T+ligament reconstruction (LR), T+tendon interposition (TI), T+*ligament reconstruction and tendon interposition* (LRTI), hematoma distraction arthroplasty (HDA), chondrocostal graft interposition, autologous fat injection, and the manufactured implants. Findings supported by low-quality evidence revealed moderate or large superior effects of the following interventions: (1) trapeziectomy over T+LRTI using ½flexor carpi radialis (FCR) and metacarpal tunnel (MT) or abductor pollicis longus (APL) and FCR for adverse events; (2) trapeziectomy over T+TI using palmaris longus (PL) for pain; (3) T+LR with ½FCR-MT over T+LRTI with ½FCR-MT for physical function; (4) trapeziectomy by anterior over posterior approach for treatment satisfaction and adverse events; (5) T+LRTI using ½FCR-MT over T+TI with PL for pain; and (6) T+HDA over T+LR using APL-MT-FCR for pain, physical function and adverse events. Using GraftJacket®, Swanson® and Permacol® implants and hardware (plate/screw) would have higher complications than autograft. The effect estimates of other surgical procedures were supported by evidence of very low quality.

Conclusions. This SR has established the state of knowledge of the efficacy of various surgical interventions for trapeziometacarpal osteoarthritis. Some interventions showed a moderate to large superior effect on given outcome(s) compared with others. However, these findings must be interpreted with caution due to low-quality evidence. To provide stronger evidence, more RCTs and methodological uniformization are needed.

5.2.2 Introduction

Trapeziometacarpal osteoarthritis (TMO) is one of the most prevalent and painful forms of hand osteoarthritis.[21,115,863] It not only reduces thumb mobility[23] but also limits hand functions needed for daily activities.[21] TMO care pathway usually begins with nonsurgical interventions and when they are unsuccessful, patients may undergo surgery.[52]

Among numerous surgical techniques available for TMO, trapeziectomy with ligament reconstruction and tendon interposition (T+LRTI) is the most popular among the surgeons in the United States[460,461,864] despite its higher costs compared to other procedures such as simple complete trapeziectomy.[463] Moreover, the choice of a given surgical procedure can impact the length of the patients' sick leave period.[62] Therefore, surgical procedures must be judiciously chosen taking into account their benefits, adverse effects, and costs. Unfortunately, the evidence-based efficacy of surgical interventions for this pathology is lacking, leaving surgeons and patients unsupported in their decision-making process ('efficacy' is here defined as performance of a treatment under ideal and controlled circumstances such as randomised controlled trials as opposed to 'effectiveness' as performance of a treatment under usual or 'real world' circumstances[865]). Although some systematic reviews (SR) examining the efficacy of surgical interventions exist, they are not exhaustive (including solely particular surgical techniques),[63,64] methodologically sub-optimal (e.g., omitting critical appraisal[65,66]) or methodologically sound yet needs to be updated since their included articles were published before 2013.[67] Therefore, we have carried out a comprehensive SR in terms of surgical procedures using a rigorous methodology. Our explicit questions to be answered by this SR were as follows: 1) What are the surgical interventions available for TMO whose efficacy has been documented? 2) What are the effects of these surgical interventions on pain, physical function, psychological well-being, quality of life, treatment satisfaction, and/or adverse events?

5.2.3 Materials and methods

The protocol of this PROSPERO-registered SR was developed based on the *Cochrane* intervention review guidelines[485] and the *Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)* guidelines[866] and has been published elsewhere.[465]

5.2.3.1 Search Strategy and Criteria

As seen in Figure 11, a literature search was conducted by an experienced medical librarian in 16 bibliographic databases up to July 4th, 2018. The following search terms were combined: thumb, trapeziometacarpal (TM) joint, carpometacarpal joint, osteoarthritis, intervention, pain (our search strategy, Annexe 1). Languages were restricted to English and French. Hand-searching was also performed from the reference lists of the included studies.

5.2.3.2 Inclusion/Exclusion Criteria

Two reviewers independently screened the titles/abstracts of studies against the eligibility criteria, then the full-text copies of potentially relevant studies. Any disagreement was discussed to reach a consensus. The eligibility criteria were as follows:

- Study designs: systematic review (SR), randomised controlled trials (RCTs) and nonRCTs (NRCTs). The inclusion of SR was considered necessary to avoid redundant works if already done. NRCTs were also included in the case where there was no SR/RCT for a given intervention or for a given outcome.
- Population: adults with primary TMO.
- Interventions: any types of interventions were first included. Due to the tremendous volume of data, surgical and nonsurgical interventions were separated, and only surgical ones were included in this SR. The SR for nonsurgical interventions has been published elsewhere.[519]
- Outcomes: pain, physical function, psychological well-being, quality of life, treatment satisfaction, and adverse events were included. These outcomes are considered as core outcomes for chronic pain trials.[9,10]

5.2.3.3 Risk of Bias Assessment

Among 9049 potential studies identified after the bibliographic database search, 68 were eligible (Figure 11), composed of 10 SRs,[63-67,711-713,715,867] 18 RCTs,[716-733] and 40 NRCTs[734-741,743-751,753,756-760,763,764,766-773,868-874] which represented a total of 3878 thumbs in 3658 participants. The characteristics of the included studies are presented in Tables 13 (SRs) and 14 (RCTs/NRCTs). A total of 276 full-text articles did not meet the selection criteria (Table 15).

Two reviewers independently assessed the risk of bias (RoB) in the 10 identified SRs with the *Assessment of Multiple Systematic Reviews* (AMSTAR) checklist.[489] Any disagreement between the reviewers was discussed to reach a consensus; otherwise, the third reviewer was consulted. The mean total score of the

10 SRs on the AMSTAR checklist was relatively low, 4.4 ± 2.6 (0 = worst score, 11 = best score) (Table 13). More than half of the SRs had unclear or high RoB against Criteria 1, 2, 4, 5, 6, 10 and 11 (Figure 12A). Due to the sub-optimal methodological quality of the majority of the SRs, we questioned the validity of these SRs' findings. Therefore, to integrate only a valid body of evidence from previous SRs into our SR, we decided to apply the minimum set of criteria of the *Agency for Healthcare Research and Quality* guidance[521] against the 10 identified SRs —i.e., (1) multiple data source search, (2) application of pre-defining eligibility criteria for study selection, (3) performing RoB assessment, and (4) considering evidence quality. Only one SR[67] met these criteria (Table 13).

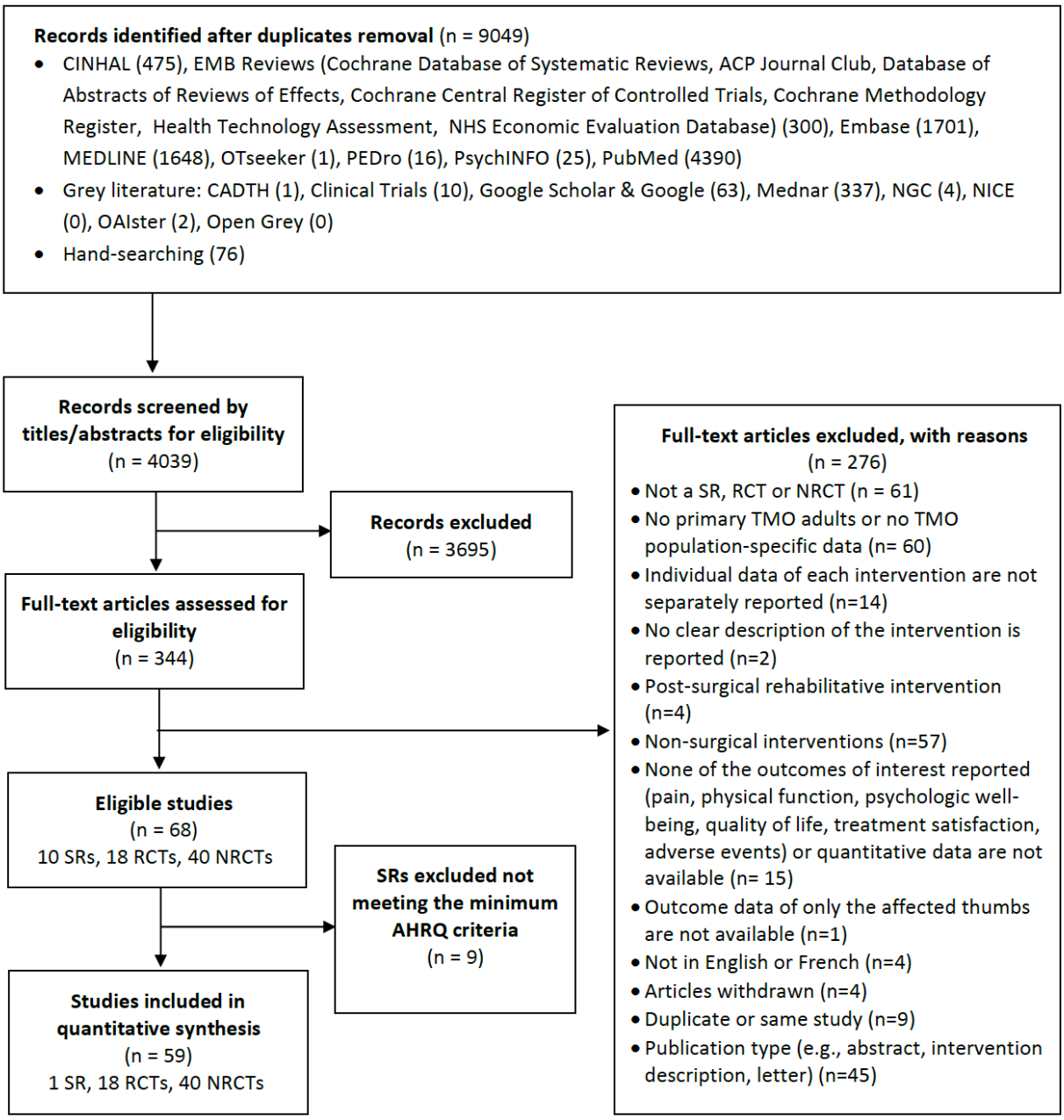


Figure 11. – Flow chart of study identification.

ACP, American College of Physicians; AHRQ, Agency for Healthcare Research and Quality; CADTH, Canadian Agency for Drugs and Technologies in Health; CINAHL, Cumulative Index to Nursing and Allied Health Literature; EMB, Evidence-Based Medicine; NGC, National Guideline Clearing House; NHS, National Health Service; NICE, National Institute for Health and Care Excellence; NRCT, nonrandomised controlled trial; OAI, Open Archives Initiative; OT, Occupational Therapy Systematic Evaluation of Evidence; PED, Physiotherapy Evidence Database; RCT, randomised controlled trial; SR, systematic review

Table 13. – Characteristics of the identified systematic reviews

Study ID, study design, # of primary studies included	Conflict of interest	Included study designs	Included population	Included intervention(s)	The *Agency for Healthcare Research and Quality* inclusion criteria					AMSTAR score (0-11) higher is better
					1.Search of multiple data sources	2. Application of pre-defined eligibility criteria to select studies (study designs, population, interventions, outcomes)	3. Risk of bias assessment (used tool)	4. Body of evidence consideration (used tool)	Meet all the AHRQ criteria	
Adams 2014, SR, 22	The author has financial relation with some industries.	Observational study, review, RCT	Patients with TMO	Partial trapeziectomy, debridement with or without interposition arthroplasty	Yes	No (outcomes)	No	No	**No**	1
Huang 2015, SR/MA, 32	None declared	MA of RCT, RCT, non-RCT prospective trials	Patients with TMO	Total joint replacement	Yes	Yes	Yes	No	**No**	5
Li 2011, SR/MA, 8	None declared	SR, RCT	Patients with TMO	Trapeziectomy, LRTI	Yes	Yes	Yes	No	**No**	5
Lin 2014, SR, 52	None declared	MA, RCT, non-RCT, case series	Patients with TMO	Metacarpal extension osteotomy, LR, ligament imbrication	Yes	No (outcomes)	No	No	**No**	3
Martou 2004, SR, 31	Unreported	Review, comparative study including RCT, prospective/ retrospective study	Patients with TMO	Surgical techniques for TMO	Yes	No (outcomes)	Yes	No	**No**	4
Papalia 2015, SR, 22	None declared	RCT, cohort, cross-sectional study	Patients with hand osteo-arthritis	Joint replacement	Yes	Yes	Yes	No	**No**	2
Smeraglia 2018, SR, 11	None declared	RCT, cohort, case series	Patients with TMO	Artelon resurfacing	Yes	Yes	Yes	No	**No**	4
Vermeulen 2011, SR, 35	None declared	RCT	Patients with TMO	Metacarpal osteotomy, arthrodesis, joint replacement, trapeziectomy, TI, LR, LRTI	Yes	Yes	No	No	**No**	1
Wajon 2015, SR/MA, 11	None declared	RCT, quasi-RCT	Patients with TMO	TM-joint surgery	Yes	Yes	Yes	Yes	**Yes**	10
Wilkens 2018, SR/MA, 10	None declared	RCT, non-RCT	Patients with TMO	Arthroscopic assisted techniques (debridement, cartilage or bone, synovectomy and trapeziectomy, TI, implant biomaterial)	Yes	Yes	Yes	No	**No**	5

AMED, Allied and Complementary Medicine Database; AMSTAR, Assessment of Multiple Systematic Reviews; CDSR, Cochrane Database of Systematic Reviews; CENTRAL, Cochrane Central Register of Controlled Trials; CINAHL, Cumulative Index to Nursing and Allied Health Literature; HaPI, Health and Psychosocial Instruments; LR, ligament reconstruction; MA, meta-analysis; RCT, randomized controlled trial; SR, systematic review; TI, tendon interposition; TM, trapeziometacarpal; TMO, trapeziometacarpal osteoarthritis; TRIP, Turning Research Into Practice; TS, treatment satisfaction; WHO ICTRP, World Health Organization International Clinical Trials Registry Platform.

Table 14. – Characteristics of the included RCTs and NRCTs

Study ID, Study design, country, # of thumbs included (# of participants included)	Conflict of interest	Mean age: years (SD or SE) or years (range); female %; TMO stage (classification used)	Interventions	Comments
Alligand-Perrin 2010, NRCT, France, 64 (64)	None declared	63 (45-83); 89.1%; 3-4 (Dell)	• Partial trapeziectomy (T) with Pi2 Pyrocarbon Spacer + 15d immobilisation + rehabilitation upon request • Total T with LR and interposition by Gore-tex slip + 4w immobilisation + 12 sessions of rehabilitation	To compute SMDs, we estimated the SDs from ranges by using the approximation formulae [524].
Alnot 1998, NRCT, France, 105 (105)	Unreported	60.5 (55-70); 91.5%; 2-4 (Dell), 1-3 (Crosby)	• First metacarpal and trapezium partial resection with Guepar prosthesis + 8d total wrist immobilisation, then rehabilitation with night immobilisation for 8d. • T with LRTI (PL passing through a 1st metacarpal hole, then interpositioned) + 4w total thumb immobilisation, then rehabilitation and night immobilisation for 4w	
Atroshi 1998, NRCT, Sweden, 17 (17)	Unreported	Gr 1 58 (53-70), Gr 2 58 (44-67); 88.2%; 1-3 (Eaton)	• First metacarpal osteotomy fixed with a cerclage and/or K-wires + thumb cast for 4w • T with LR (an APL strip introduced through a longitudinal cut in a half FCR, then around APL) + thumb cast for 5w	
Avant 2015, NRCT, USA, 60 (60)	None declared	62; 73.3%; 3-4 (Eaton)	• T with LR (an APL slip passed through the 1st and 2nd metacarpals, then weaved into ECRL) + 4w complete immobilisation & 4w partial immobilisation + hand therapy at 4w post-arthroplasty • T with LR (a suture button, Mini-Tightrope® (Arthrex, Naples, Florida, USA), suspended from the 1st metacarpal to the 2nd one) + 6w immobilisation + hand therapy at 2w post-arthroplasty	
Barthel 2018, NRCT, France, 46 (35)	One of the authors has conflicts of interest with industrial bodies.	69 (45-90); 77.1%; 2-4 (Dell) 0-1 (Crosby)	• T + a 1-month immobilisation by a commissural orthosis • T with LR (APL wrapped around FCR) + 1-month immobilisation by a commissural orthosis	
Belcher 2000, RCT, UK, 42 (36)	Unreported	Gr 1 63 (SE 2); Gr 2 58 (SE 1); 88.1%; 2-4 (Eaton-Littler)	• T + an 6w immobilisation except for heavier tasks (2w by cast, 4w by an orthosis) + gentle mobilisation at 4w after surgery. • T with LRTI (an APL slip looped around FCR, then sutured back onto itself. The remaining APL was interpositioned in the trapezial void)) + 6w immobilisation except for heavier tasks (2w by cast, 4w by an orthosis) + gentle mobilisation at 4w after surgery.	To compute SMDs, we estimated the SDs from the SEs.
Belcher 2001, RCT, UK, 26 (26)	Unreported	Gr 1 59 (SD 8); Gr 2 59 (SD 9); 76.9%; 3-4 (Eaton-Littler)	• T + 8w immobilisation except for heavier tasks (2w by cast, 6w by an orthosis) + gentle mobilisation at 4w after surgery. • T with interposition of Permacol® porcine dermal collagen xenograft (Tissue Science Laboratories, Aldershot, UK) + an 8w immobilisation except for heavier tasks (2w by cast, 6w by an orthosis) + gentle mobilisation at post-op 4w.	This study was prematurely terminated due to the high rate of complications in the Permacol group. To compute SMDs, we estimated the means and SDs from the medians and ranges [524].

Blount 2013, NRCT, USA, 33 (30)	None declared	Unreported; Unreported; Unreported	• Partial T with Artelon spacer + 5-6w immobilisation • T with LRTI (an FCR slip passed through a 1st metacarpal hole, then interpositioned in the trapezoid void) + 6w immobilisation	SD of pain/Michigan Hand Questionnaire were unreported. The authors could not be contacted.
Cheval 2013, NRCT, France, 46 (46)	None declared	62(49-77); 87.0%; 1-4 (Dell), 0-3 (Crosby)	• T with LR (a Gore-tex® slip passed through a 1st metacarpal tunnel, then looped around the FCR) + Pi2 Pyrocarbon Spacer + a 5w immobilisation • T with LR (a Gore-tex® slip passed through a 1st metacarpal tunnel, then looped around FCR) + 5w immobilisation	To compute SMDs, we estimated the SDs from the ranges provided by using the approximation formulae [524].
Cobb 2015, NCRT, USA, 125 (125)	None declared (the first author has financial relationship with industrial body outside the study).	60(35-83); 77.6%; Unreported.	• Arthroscopic first metacarpal and trapezium partial resection with human acellular dermal matrix GraftJacket® (Wright Medical, Memphis, Tennessee, USA) interposition • First metacarpal and trapezium partial resection with OrthADAPT® bioimplant (Pegasus Biologics, Irvine, California, USA)* • First metacarpal and trapezium partial resection with Artelon® spacer (Small Bone Innovations LLC, New York, USA)* • First metacarpal and trapezium partial resection	* The authors ceased to use the OrthoADAPT and Artelon implants due to unfavourable outcomes.
Coessens 1991, NRCT, Belgium, 19 (17)	Unreported	45-68; 94.1%; 1-4 (Eaton-Littler)	• Swanson® silicone trapezium implant • T	
Colegate-Stone 2011, NRCT, UK, 38 (38)	Unreported	59 (38-81); 89.5%; unreported	• T with Pi2 pyrocarbon® interposition (PI2, Tornier, San Diego, California, USA) • T	
Corain 2016, RCT, Italy, 120 (120)	Unreported	63(45-77); 78.3%; 3-4 (Eaton)	• T with LR (an APL strip passed through a 1st metacarpal tunnel and the FCR, then anchored to the U-shaped capsular flap) • T with haematoma distraction arthroplasty (K-wire for 4 weeks) + a 3-week immobilisation by a thumb orthosis	
Craik 2017, NRCT, UK, 129	Unreported	Gr 1 69; Gr 2 65; 72%; 1-2 (Eaton)	• T with an absorbable gelatine sponge (Spongostan®, Johnson & Johnson, Norderstedt, Germany) • First metacarpal and trapezium partial resection with ARPE® implant (Biomet UK Ltd, Bridgend, UK) + 2-w immobilisation in an orthosis	
De Smet 2004, RCT, Belgium, 56 (56)	Unreported	Gr 1 61.5 (SD 10.2); Gr 2 58 (SD 6.3); 100%; Unreported	• T + mobilisation started immediately • T with LRTI (the entire FCR routed through a 1st metacarpal tunnel, interpositioned in the trapezial void) + mobilisation started within 1w	
De Smet 2007, NRCT, Belgium, 96 (96)	Unreported	Gr 1 61.5 (44–79); Gr 2 58 (46–68); Gr 3 54 (43–66); 94.8%; Unreported	• T + immediate mobilisation • T with LRTI (FCR routed through a 1st metacarpal hole, interpositioned in the trapezial void) + mobilisation as soon as tolerated (usually within 1 w) • De la Caffinière implant + immediate mobilisation	
Economou 1979, NRCT, Greek, 30 (30)	Unreported	Gr 1 53; Gr 2 49; 53.3%; unreported	• Arthrodesis with metal wire + 6-8w immobilisation • T with Swanson silicone implant + 4-5w of immobilisation, then physiotherapy	
Erne 2018a, NRCT, Germany, 21 (21)	None declared	Gr 1 63.3; Gr 2 62.1; 81.0%; 3-4 (Eaton-Littler)	• T with an APL pedicle woven around the FCR and sutured to itself + 6-7w immobilisation • Autologous fat injection + a 6-7w immobilisation	To compute SMDs, we estimated the SDs from the SEs.

Erne 2018b, NRCT, Germany, 71 (71)	None declared	Gr 1 56.2; Gr 2 54.3; 77.5%; 3 (Eaton-Littler)	• T with an APL pedicle woven around FCR and sutured to itself + 6-7w immobilisation • First metacarpal and trapezium partial resection with Ivory® prosthesis (Stryker Corporate, Kalamazoo, Michigan, USA) + 6-7w immobilisation	To compute SMDs, we estimated the SDs from the ranges by using the approximation formulae [524].
Elvebakk 2015, NRCT, Norway, 104 (92)	Unreported	Gr 1 65 (48-77); Gr 2 unreported; unreported; unreported	• T + an immobilisation by plaster of Paris and brace of a median time of 29 (11-44) days • T with LRTI (an APL strip and the FCR twisted together, then secured the volar and ulnar aspects of the first metacarpal + an immobilisation by plaster of Paris of a median time of 37 (21-51) days	The data were compared with Saehle et al. 2002 [875]. To compute SMDs, we estimated mean/SDs from medians/ranges [524].
Field 2007, RCT, UK, 65 (65)	Unreported	55 (49-75); 86.2%; 3-4 (Eaton-Glickel)	• T + thumb cast for 4w; at Week 5 physical therapy • T with LR (a half FCR) TI (half FCR) with K-wire + thumb cast for 4w; at Week 5 physical therapy	The missing data for pain were extracted from the systematic review[67] whose authors had obtained further data from the trial authors.
Forseth 2003, NRCT, USA, 85 (73)	None declared	Gr 1 52; Gr 2 54; 79.5%; unreported	• Arthrodesis by plate and screw fixation with or without bone graft (distal radius) + a 4w immobilisation • Arthrodesis by K-wire fixation with or without bone graft (distal radius) + a 6w immobilisation	The data were compared with Fulton & Stern 2001 [876].
Gallinet 2011, NRCT, France, 28 (28)	None declared	69; 0%; 3-4 (Dell)	• T • Partial T with a chondrocostal autograft interposition • Partial T with resurfacing Avanta® implant (Laboratoire SBI)*	*This intervention was not included in our systematic review due to its small sample size (n=2). The SDs of the DASH scores were personally obtained from Dr Gallinet.
Gangopadhyay 2012, RCT, UK, 174 (153)	None declared	Median age 57 (40-75); 100%; 2-4 (Eaton-Littler)	• T with K-wire for 4w + a cast for 6w + mobilisation • T with TI (PL tendon) with K-wire + a cast for 6w + mobilisation • T with LRTI (a half FCR slip passed through a 1st metacarpal tunnel, then interpositioned) fixed by K-wire + a cast for 6w + mobilisation	To compute the SMD of pain, their mean and SD were estimated from the median and IQR by using the approximation formulae [524].
Garcia-Mas 2009, NRCT, Spain, 112 (95)	Unreported	58 (18-75); 87.4%; 2-4 (Eaton)	• Total T with LRTI (FCR passed through a 1st metacarpal tunnel and FCR interposition) + 1m immobilisation by a cast, then 2m partial immobilisation by an orthosis • partial T with LRTI (FCR passed through a 1st metacarpal tunnel and interpositioned in the trapezial void) + a 1m immobilisation by a cast, then a 2m partial immobilisation by an orthosis	
Gerwin 1997, RCT, USA, 20 (20)	Unreported	Gr 1 62.1; Gr 2 60.9; unreported; unreported	• T with LR (a half FCR strip passed through a 1st metacarpal tunnel, sutured to a Minimitek® anchor (GII Mini Anchor Mitek Surgical Products Inc., Westwood, Maine, USA) • T with LRTI (a half FCR strip passed through a 1st metacarpal tunnel, then interpositioned)	This trial was included in the SR.
Hansen 2013, RCT, Denmark, 28 (28)	None declared	58 (40-77); 85.7%; 2-3 (Eaton-Glickel)	• First metacarpal and trapezium partial resection with an Elektra® screw cup and an Elektra® metacarpal stem (Small Bone Innovations Inc., France) + a 3w immobilisation • First metacarpal and trapezium partial resection with a cemented DLC all-polyethylene cup and an Elektra® metacarpal stem (Small Bone Innovations Inc., France) + a 3w immobilisation	Divided data of pain and DASH for each group was not presented. The author could not be contacted.

Hart 2006, RCT, Czech Republic, 40 (37)	Unreported	59 (49-75); 60%; 4 (Eaton-Littler)	• T with LRTI (a half FCR drawn through a 1st metacarpal tunnel, secured within the canal by the trapezium graft and interpositioned in the trapezial void, stabilized by a K-wire) + a cast for 6w • Arthrodesis by K-wire fixation + a cast for 6w	The SMD of pain, PF and TS were not computed due to the insufficient data. The trial authors could not be contacted.
Hippensteel 2017, NRCT, USA, 52 (50)	Some of the authors have financial relationship with industrial bodies, outside the study.	Gr 1 56 (SD 8); Gr 2 62 (SD 5); 56%; 2-4 (Eaton)	• Arthrodesis with distal radius autograft by a locking plate and screws + 4-6w immobilisation in a thumb orthosis, followed by a removable thumb brace and hand therapy • T with LRTI (an FCR strip passed through a 1st metacarpal tunnel, then interpositioned in the trapezial void) + 4-6w immobilisation in a thumb orthosis, followed by a removable thumb brace and hand therapy	
Hollevoet 1996, NRCT, Belgium, 86 (83)	Unreported	58.5 (37-78); 94.0%; 2-4 (Dell)	• T + 3w immobilisation • T with shortening APL + 3w immobilisation	
Jager 2013, NRCT, France, 74 (74)	None declared	Unreported; 100%; unreported	• T with Polylactic Acid Arex® Implant (Arex, Palaiseau, France) + 1m immobilisation + rehabilitation • Maia® prosthesis (Groupe Lepine, Genay, France) + 3w immobilisation + rehabilitation	Pain/the Moineau's score presented by graphs were digitized with the *Plot digitizer*. Data regarding QuickDASH and global satisfaction were not reported. The author could not be contacted.
Kazmers 2017, NRCT, USA, 37 (36)	Some of the authors have financial relationship with industrial bodies, outside the study.	Gr 1 56.9 (SD 6.9); Gr 2 61.5 (SD 7.2); 80.5%; 2-4 (Eaton)	• Arthrodesis with distal radius autograft by a locking plate and screws + a 4-6w immobilisation in a thumb orthosis, followed by a removable thumb brace and hand therapy • T with LRTI (an FCR strip passed through a 1st metacarpal tunnel, then interpositioned in the trapezial void) + 4-6w immobilisation in a thumb orthosis, followed by a removable thumb brace and hand therapy	The QuickDASH scores presented by graphs were digitized with *Plot Digitizer*.
Kriegs-Au 2004, RCT, Austria, 31 (31)	None declared	59(42-75); 80.6%; 2-4 (Eaton-Glickel)	• T with LRTI (a half FCR strip routed through a 1st metacarpal tunnel, interpositioned in the trapezial void) + a 3w total immobilisation followed by 3w partial immobilisation, then mobilisation at 6w • T with LR (a half FCR strip passed through a 1st metacarpal tunnel) + 3w total immobilisation + 3w partial immobilisation + mobilisation at 6w	
Lehmann 1998, NRCT, Switzerland, 102 (102)	Unreported	Gr 1 64.8 (SD 7.4); Gr 2 65.4 (SD 6.7); unreported; unreported	• T with Swanson® trapezium implant • T with LRTI (an FCR strip drawn through a 1st metacarpal tunnel, interpositioned in the trapezial void)	
Livesey 1996, NRCT, UK, 19 (17)	Unreported	59; 88.2%; 1-4 (not reported)	• T with LR (ECRL drawn through a 1st metacarpal tunnel) and TI (an FCR slip interpositioned in the trapezial void) + 6w immobilisation by orthosis • T with TI (PL interpositioned) + 6w immobilisation by a K-wire & orthosis	
Lovell 1999, NRCT, UK, 87 (75)	Unreported	Unreported; unreported; unreported	• T with Swanson® trapezium implant with FCR slip or EI transfer and reinforcement of the capsule + Immobilisation in a cast for 6w. • T with LRTI (an FCR slip with a loop placed at the base of the metacarpal, then interpositioned in the trapezial void) + Immobilisation in a cast for 6w.	SMD not computed for pain, physical function, and satisfaction since SDs were not reported. The author could not be contacted.
Marks 2017, RCT, Switzerland, 60	Supported by an unspecific research	Gr 1 64 (SD 8); Gr 2 65 (SD 8);	• T with LRTI (a half FCR strip wrapped around the APL once, then several times around the remaining FCR for interposition in the trapezial void) + a 6w removal	

	grant from Surgical Device GmbH (Cham). GraftJacket® was purchased at a reduced price.	85%; 2-4 (Eaton)	orthosis; 3 weeks post-surgery active mobilisation; 8 weeks after surgery, strengthening. • T with GraftJacket® (Wright Medical Group, Inc., Memphis, Tennessee, USA) wrapped around the APL once, then several times around the remaining FCR for interposition in the trapezial void) + a 6w removal orthosis; 8 weeks after surgery, strengthening.	
Maru 2012, NRCT, UK, 36 (33)	None declared	61 (45–75); 90.9%; 3-4 (Eaton-Glickel)	• T with porcine gelatine sponge (Spongostan®, Johnson & Johnson, Norderstedt, Germany) + 3-4w total immobilisation + 2-3w partial immobilisation, then rehabilitation • T with Pi2 Pyrocarbon® Spacer (Bioprofile, Grenoble, France) + 6w total immobilisation + rehabilitation	
Nilsson 2005, NRCT, Sweden, 15 (15)	The authors have financial relationship with a commercial party.	Gr 1 59 (51-72); Gr 2 60 (22-66); 93.3%; 3 (Eaton-Glickel)	• T with LRTI (an APL strip passed through a cut in FCR and then pulled around the remaining part of APL, twisted with FCR) + 5w immobilisation by thumb orthosis • Partial T with Artelon® spacer (Artimplant AB, Sweden) + 5w immobilisation by thumb orthosis	To compute SMD, the means and the SDs of pain were computed from the raw data presented in Table1.
Nordback 2012, NRCT, Switzerland, 55 (52)	None declared	Gr 1 65 (51–77); Gr 2 63 (49–75); 82.7%; 1-4 (Dell), 0-3 (Crosby)	• T with TILR (an APL strip placed in the trapezoid void, then wrapped around FCR) + 3w total immobilisation + 4w partial immobilisation + orthosis on demand • T with LR (an APL strip placed in the trapezoid void, then wrapped around FCR, secured by a Mitek® (Mitek Products Inc., Westwood, Mass) on the 2nd metacarpal) + 3w total immobilisation + 4w partial immobilisation + torthosis on demand	
Odella 2014, NRCT, Italy, 61 (59)	Unreported	Gr 1 62 (51-70); Gr 2 55 (50-65); unreported; 1-3 (Eaton)	• First metacarpal and trapezium partial resection with pyrocarbon (PyroDisk®, Integra Life Sciences, Plainsboro, New Jersey, USA) interposition • First metacarpal and trapezium partial resection with Pyrocardan® (Tornier, Montbonnot Saint Martin, France) interposition	Updated data were received from the first author.
Park 2008, NRCT, USA, 60 (60)	Unreported	Gr 1 57.06 (SD 12.98); Gr 2 55.50 (SD 13.33); Gr 3 59.70 (SD 7.07); unreported; unreported	• Costochondral allograft interposition arthroplasty + 4w total immobilisation + gentle ROM ex at 4w/removable orthosis + unrestricted thumb motion at 8w. • T with LRTI (a half FCR passed through a 1st metacarpal tunnel, around the APL, and back around the intact half of the FCR in a figure of 8 fashion) + with APL advancement) + 5w total immobilisation + ROM at 5w. • T with haematoma distraction arthroplasty with K-wire + 5w total immobilisation + ROM at 5w.	The number of participants for each intervention nor the FU times were not reported. SMDs were not computed due to insufficient data. The author could not be contacted.
Parvex 2001, NRCT, Switzerland, 250 (200)	Unreported	36-85; unreported; unreported	• Arthrodesis by plate and screws • T with Swanson silicone trapezium implant • T with LR (an APL slip passed through a 2nd metacarpal tunnel, then interpositioned in the trapezial void)	
Pereira 2015, NRCT, France, 25	One of the authors has financial relationship with industrial bodies.	60.1 (SD 10.0); 72.0%; 1-4 (Dell)	• T with arthroscopic tendon interposition (PL tendon) • T with arthroscopic interposition Polylactic Acid Arex® Implant (Arex®, Palaiseau, France)	To compute SMD, the means and the SDs of pain were computed from the raw data presented in Table1. Patient #5 was not included in the analyses since a half FCR tendon was used instead of the PL tendon.
Pomares 2016, NRCT, France, 67	None declared	58.1 (SD 8.1); 94.0%; 1-4 (Eaton-Littler)	• T with LR (an APL slip laced around FCR) + 3w immobilisation with orthosis supporting the wrist/thumb	

			• T with TI (PL tendon) + 3w immobilisation with a resting orthosis supporting the wrist/thumb	
Raven 2007, NRCT, Netherlands, 63 (54)	Unreported	Gr 1 58 (38-76), Gr 2 65 (47-80); Gr 3 61 (46-78); 90.7%; 1-4 (Eaton)	• First metacarpal and trapezium partial resection + forearm orthosis for 2w, followed by functional treatment • T with TI (FCR) + 6w plaster fixation • Arthrodesis with or without use of corticospongeous iliac crest bone fixed by a plate and screws + removable splint	We could not compute SMDs of pain/TS due to insufficient data and the trial author could not be contacted. To compute SMDs of PF, we estimated the SDs from the ranges provided by using the approximation method [524].
Ritchie 2008, RCT, UK, 40 (40)	Unreported	Gr 1 59±7; Gr 2 64±9; 72.5%; unreported	• T by posterior approach + immobilisation cast for 2w; at Week 2 gentle immobilisation + orthosis for day and night; at Week 6 orthosis only for heavier tasks • T by anterior approach + an immobilisation cast for 2w; at Week 2 gentle immobilisation + orthosis for day and night; at Week 6 orthosis only for heavier tasks	To compute SMDs, we estimated the means and SDs from the medians and ranges by using the approximation formula [524].
Robles-Molina 2017, NRCT, Spain, 65	None declared	Gr 1 60.48 (SD 7.42); Gr 2 56.37 (SD 6.94); 83.1%; 3 (Eaton)	• T with LRTI (FCR passing through a 1st metacarpal and interpositioned + K-wire) + 4w immobilisation by a cast splint, followed by a 2w intermittent orthosis, then rehabilitation. • First metacarpal and trapezium surface osteotomy with ARPE® implant (Biomet, Valence, France) + 4w immobilisation by a cast splint, followed by 2w intermittent orthosis, then rehabilitation.	
Rossi 2005, NRCT, Italy, 119 (95)	Unreported	53; 77.9%; 2-4 (Eaton-Glickel)	• T with LRTI (a half APL passed through FCR and a 2nd metacarpal hole, and interpositioned in the trapezial void) + thumb orthosis for 6w • Arthrodesis with K-wires + a thumb orthosis for 6w	
Salem 2012, RCT, UK, 114 (99)	None declared	Gr 1 61; Gr 2 60; 85.1%; unreported	• T with soft bandage for 3-4w; followed by night orthosis for 2w + physiotherapy • T with LRTI (a half FCR passed through a 1st metacarpal tunnel, then interpositioned in the trapezial void) + K-wire for 4w + a cast; then thumb orthosis for 2w; at Week 6 physiotherapy	To compute SMD, we estimated the mean/SD of pain from the median/range with the approximation formulae [524]. The missing data for PF were extracted from the systematic review [67] whose authors had obtained further data from the trial authors.
Tagil 2002, RCT, Sweden, 26 (26)	Unreported	62(48-75); 92.3%; unreported	• T with Swanson implant + cast immobilisation for 5w. • T with LRTI (a distally based strip of the APL was prepared and tunneled through the capsular flap and into the trapezial void. The strip was passed palmarly around or through FCR and back through the capsule and the remaining APL) + cast immobilisation for 5w.	
Taylor 2005, NRCT, UK, 83 (83)	Unreported	Gr 1 64 (48-80); Gr 2 63 (39-79); Gr 3 66 (55-76); 84.3%; 1-4 (Eaton-Littler)	• Arthrodesis by screws + a cast for 6w • T with Swanson silicone implant • T with or without LRTI*	To compute SMDs, the SDs were estimated from the CIs. *Due to inclusion of the two distinct interventions (T and T with LRTI), the data of this group was not included in this SR.
Ulrich-Vinther 2008, NRCT,	None declared	Gr 1 62 (SD 1); Gr 2 58 (SD 2); 85.7%; 2-3 (Eaton-Littler)	• Elektra® prosthesis *(Small Bone Innovations Inc., Péronas, France) + a cast for 3w	We digitized the graphic data with the *Plot Digitizer*.

Denmark, 112 (112)			• T with LRTI (an APL strip passed around FCR and wound around the remaining APL, then interpositioned in the trapezial void) + a cast for 4w + hand therapy.	
Vermeulen 2014a/ Spekreijse 2016 (same cohort), RCT, Netherlands, 38 (38)	None declared	Gr1 59.5 (SD 6.3); Gr 2 59.7 (SD 6.0); 100%; 2-3 (Eaton-Glickel)	• Arthrodesis with plate and screws + standardized hand therapy • T with LRTI (an FCR strip intertwined in a figure of 8 around APL and the remaining FCR which is interpositioned in the trapezial void) + a thumb orthosis for 4w, then a removal orthosis for 2w + standardized hand therapy	This study was prematurely terminated due to the high rate of complications in the arthrodesis group. To compute SMDs, the SDs were estimated from SEs.
Vermeulen 2014b /Spekreijse 2015 (same cohort), RCT, Netherlands, 72 (72)	None declared	Gr 1 64.7 (SD 9.1); Gr 2 63.5 (SD 8.5); 100%; 4 (Eaton-Glickel)	• T with LRTI (an FCR slip drawn through a 1st metacarpal tunnel and interpositioned in the trapezial void) + thumb orthosis for 4w + a removal orthosis and standardized hand therapy • T with LRTI (an FCR slip intertwined around APL and the remaining FCR, then interpositioned in the trapezial void) + thumb orthosis for 4w + a removal orthosis and standardized hand therapy	
Wachtl 1998, NRCT, Switzerland, 88 (84)	None declared	61(37-81); 82.1%; 2-4 (Kellgren-Lawrence)	• Metacarpal osteotomy, T with De la Caffinière® implant (Benoist Girard et Cye S.A., Baguaux, France) + 2w immobilisation • Metacarpal osteotomy, T with Ledoux® implant (DIMSO S.A., Marmande, France) + 2w immobilisation	

APL, abductor pollicis longus tendon; d = day(s); FCR, flexor carpi radialis tendon; Gr, group; LR, ligament reconstruction; m, month(s); MP, metacarpal-phalangeal; NRCT, non-randomised controlled trial; PF, physical function; PL, palmaris longus tendon; RCT, randomised controlled trial; SD, standard deviation; SE, standard error; SMD, standard mean difference; TM, trapeziometacarpal; T, trapeziectomy; TI, tendon interposition; TS, treatment satisfaction; UK, United Kingdom; USA, United States of America; w, week(s).

Figure 12. – Risk of bias assessment

A. Results on each *Assessment of Multiple Systematic Reviews* (AMSTAR) risk of bias items of the identified systematic reviews.
B. Results on each item of the *Cochrane Effective Practice and Organization of Care Group (EPOC) Risk of Bias Tool* of the included randomized controlled trials (RCTs) and non-RCTs.

Note: +, low risk of bias; ?, unclear risk of bias; -, high risk of bia

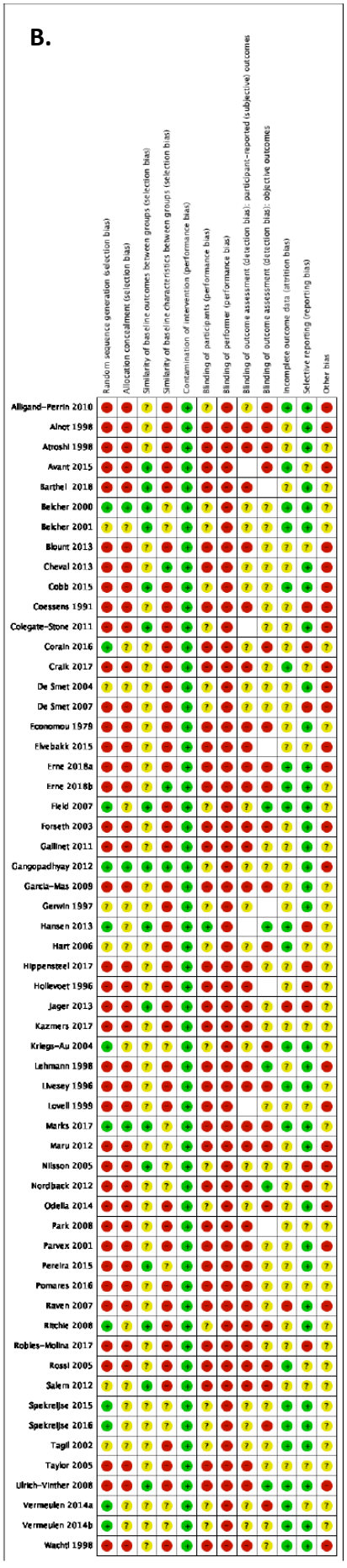


Table 15. – Excluded studies with reasons

Reason of exclusion	Number of excluded studies (references)
Not a SR, RCT or NRCT	61 [57,91,478,487,525,526,581-588,590-630,632-635,877,878]
No primary TMO adults or no TMO population-specific data	60 [636-664,667-695,879,880]
Individual data of each intervention are not separately reported	14 [24,696,697,699-703,705-708,881,882]
No clear description of the intervention is reported	2 [709,710]
Post-surgical rehabilitative intervention	4 [774-777]
Non-surgical intervention	57 [60,61,359,455,529-550,552-556,558-564,566-576,578-580,854-857,861]
None of the outcomes of interest reported (pain, physical function, psychologic well-being, quality of life, treatment satisfaction, adverse events), specific data of affected side are not available or quantitative data are not available	15 [51,779,781-791,883,884]
Outcome data of only the affected thumbs are not available	1 [792]
Not in English or French	4 [793-796]
Articles withdrawn	4 [797-800]
Duplicate or same study	9 [801-803,805-807,885-887]

To assess the RoB in the RCTs/NRCTs, the *Cochrane Effective Practice and Organization of Practice Risk of Bias Tool*[888] was used. The criterion, "Similarity of baseline characteristics between experimental and control groups", was assessed by considering the following confounders: age, sex, occupation, hand dominance, affected side, radiographic stage, and symptom duration. When ≥ 80% of these factors were balanced between groups, the RoB was considered low; 60-79%, unclear; and < 60%, high.[491] Blinding was considered for the three parties: participant, performer (surgeon), and assessor. The results of RoB assessments reported in the included SR[67] were taken into account to deepen our judgement.[521] Figure 12B showed the results on each item of the *Risk of Bias Tool*: 40 trials suffered from selection bias due to nonrandomised design. More than half did not assess similarity of baseline outcomes and characteristics between groups. When reported, it was mainly limited to age and sex. Except for one RCT,[722] all the trials had unclear or high RoB regarding blinding participants, either due to the presence of K-wire(s) which had likely informed the participants of the type of surgery[726,730,736,751] or the retrospective nature of the studies.[735,737-739,741,745-748,750,751,753,757-760,763,764,766,767,771,772,869,871,872] Blinding the performer—i.e., the surgeon, was obviously not feasible. Unblinding of participants consequently compromised detection bias for subjective (patient-reported) outcomes (e.g., pain). For assessment of objective outcomes (e.g., infection), one third of the trials had high RoB due to a visible scar which would have informed the assessor of the allocated intervention[723-725,728,730,732,734,736,751,753,756,768] or inability to blind the assessors who conducted chart review in the retrospective studies.[735,737,760] Other sources of biases included co-

treatment (e.g., metacarpal-phalangeal arthrodesis),[720,741] recall bias,[738] data exclusion from analyses (e.g., dissatisfied patients),[591,869] potential conflict of interest,[870] inclusion of traumatic TMO,[735,745] comorbidity (e.g., De Quervain tendinitis),[735] and substantial group differences in anaesthetic procedures or tourniquet time,[720,740] postoperative care,[734,740,744,759,868,873] follow-up time,[591,735,737-739,743,745,750,756,758,759,763,766,768,874] and radiographic severity at baseline.[747]

5.2.3.4 Data Collection

Two reviewers independently extracted data from the identified studies using the *Cochrane Effective Practice and Organization of Practice Data Abstraction Form.*[889] Missing data was first sought to be obtained by contacting the authors via email. When medians and (interquartile) ranges were available, means and standard deviations were estimated using an approximation method.[524] When graphic data were available, the software Plot Digitizer[890] was used to digitize these data.

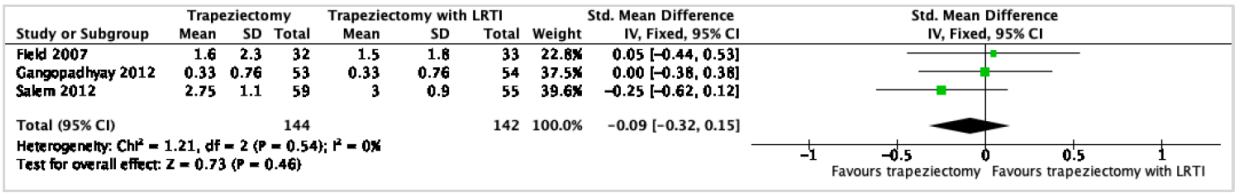
5.2.3.5 Meta-Analysis Methodology

Effect estimates of a given intervention—standardized mean difference (SMD) for continuous outcomes and risk ratio (RR) for dichotomous ones—were first searched for in the included SR.[67] When unavailable, we computed them using RCT data. If no RCTs were available, NRCTs were consulted. When a given outcome was measured at different time points, the only effect estimate of the last measured point was included. It was not possible to use a meta-analytic approach due to significant treatment heterogeneity in most of the cases; but when possible, the results were expressed with forest plots (Figures 13A, 13B, and 13C). Publication bias analysis by funnel plot was not feasible since the numbers of pooled studies were < 10.[891]

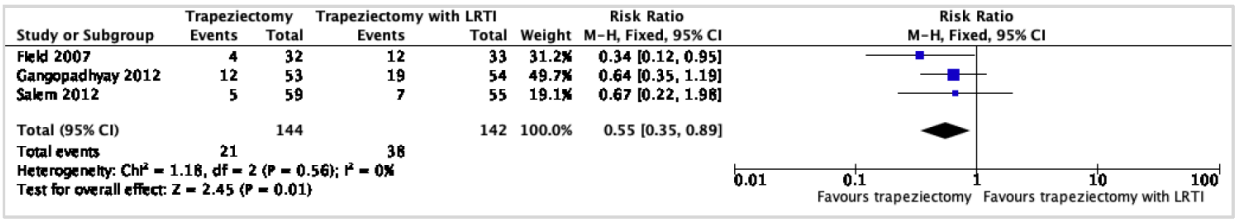
5.2.3.6 Rating the Quality of Evidence

The quality of evidence of effect estimates was rated using the GRADE system.[500] The evidence quality reported in the included SR[67] was also taken into consideration to support our judgement.[521]

A.



B.



C.

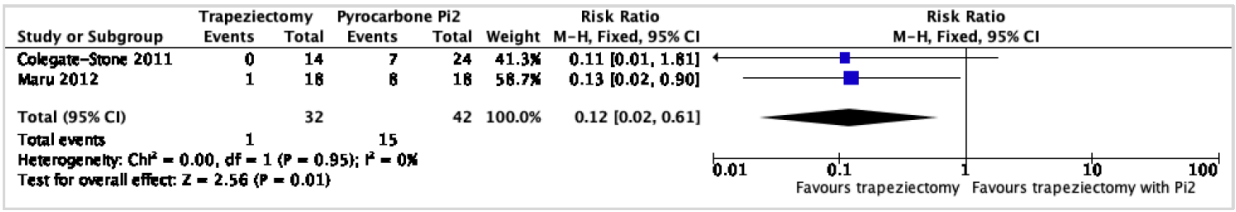


Figure 13. – Results of the conducted meta-analyses.

A. Trapeziectomy (T) vs. T+LRTI using ½FCR strip and metacarpal tunnel for pain.
B. T vs. T+LRTI using ½FCR strip and metacarpal tunnel for adverse events.
C. T vs. T+Pyrocarpon Pi2 spacer for adverse events.

LRTI, ligament reconstruction and tendon interposition.

5.2.4 Results

5.2.4.1 Question 1 What are the surgical interventions available for TMO whose efficacy has been documented?

We identified the 11 following TMO surgical techniques: first metacarpal osteotomy,[736] first metacarpal and trapezium partial resection,[740,759] arthrodesis,[723,728,732,744,745,758-760,769,770,872] trapeziectomy,[716-720,725,726,741,743,746,748,753,764,766,868,874] trapeziectomy with haematoma distraction arthroplasty (HDA),[730,757] trapeziectomy and ligament reconstruction (T+LR),[67,721,724,730,736,737,739,764,772] trapeziectomy and tendon interposition (T+TI),[720,751,759,771,772] trapeziectomy with ligament reconstruction and tendon interposition (T+LRTI),[67,717-721,723,724,726-729,731-735,738,743,747,750,751,757,758,760,766,768-770,773,869-871,873] chondrocostal graft interposition,[746,757] autologous fat injection,[768] and the following manufactured implants: Arex®,[749,771] ARPE®,[773,874] Artelon®,[738,870] De la Caffinière®,[743,763] Elektra®,[722,873] GraftJacket®,[731,740] Guepar,[735] Ivory®,[767] Ledoux®,[763] Maia®,[749] Permacol®,[716] Pi_2®,[734,739,753,868] PyroDisk®,[756] Pyrocardan®,[756] and Swanson®.[727,741,744,750,758,869,872]

5.2.4.2 Question 2 What is the efficacy of the identified surgical interventions?

Effect estimates of each TMO surgical procedures are presented in Table 16 for studies with evidence of low quality (due to risk of bias and imprecision) —yet the best available one. We can summarize the efficacy of TMO surgeries whose effect estimates are moderate or large as follows.

5.2.4.2.1 T+LRTI

T+LRTI with ½FCR-MT was moderately inferior to **trapeziectomy by posterior approach** for reducing adverse events (Table 16, Section 3,[719,720,726] Figure 13B), largely inferior to **T+LR with ½FCR-MT** for physical function (Table 16, Section 4[724]), and moderately superior to **T+TI using palmaris longus** for pain (Table 16, Section 5[720]). **T+LRTI (½FCR-APL-½FCR)** was largely superior to **arthrodesis by plate-screw fixation** for pain, physical function, and adverse events (Table 16, Section 8[728,732]) and moderately superior to **T+GraftJacket® allograft** for adverse events (Table 16, Section 9[731]). **T+LRTI using APL-FCR-APL** was moderately inferior to **trapeziectomy by posterior approach** (Table 16, Section 10[717]) and largely superior to **T+Swanson® implant** for adverse events (Table 16, Section 11[727]).

5.2.4.2.2 T+LR

T+LR using ½FCR-MT was largely superior to **T+LRTI with ½FCR-MT** for physical function improvement (Table 16, Section 4[724]). **T+LR using APL-MT-FCR** was moderately to largely inferior to **HDA** for pain, physical function, and adverse events (Table 16, Section 12[730]).

5.2.4.2.3 T+TI

T+TI using palmaris longus tendon was moderately inferior to **T+LRTI with ½FCR-MT** and **trapeziectomy by posterior approach** for pain (Table 16, Sections 5 and 13[720]).

5.2.4.2.4 Trapeziectomy

Trapeziectomy by posterior *(dorsolateral)* approach was largely inferior to **trapeziectomy by anterior approach** (Table 16, Section 14[725]) for treatment satisfaction and adverse events. However, this technique was moderately to largely superior to **T+LRTI with ½FCR-MT** and **T+LRTI with APL strip-FCR-APL strip** in terms of adverse events (Table 16, Section 3,[719,720,726] Figure 13B; Section 10[717]); **T+TI using palmaris longus** for relieving pain (Table 16, Section 13[720]); and **T+Permacol® xenograft** for pain, physical function, treatment satisfaction, and complication prevention (Table 16, Section 15[716]).

5.2.4.2.5 Arthrodesis

Arthrodesis by plate-screw fixation was largely inferior to **T+LRTI with ½FCR-APL-½FCR** for pain, physical function, and adverse events (Table 16, Section 8[728,732]).

5.2.4.2.6 HDA

HDA demonstrated moderate to large superiority compared to **T+LR performed with APL-MT-FCR** for pain, physical function, and adverse events (Table 16, Section 12[730]).

5.2.4.2.7 Manufactured implants

GraftJacket® allograft, Permacol® xenograft and Swanson® implant were moderately to largely inferior to their comparators (**T+LRTI with ½FCR-APL-½FCR**, Table 16, Section 9[731]; **T+LRTI with APL-FCR-APL**, Table 16, Section 11[727]; and **trapeziectomy by posterior approach**, Table 16, Section 15[716] respectively**)** for pain, physical function, treatment satisfaction, and/or adverse events.

Effect estimates of other surgical interventions supported by the evidence of very low quality are presented in Table 17.

Table 16. – Summary of findings supported by evidence of low quality

COMPARED SURGICAL INTERVENTIONS	OUTCOME(S): pain, physical function (PF), psychological well-being, quality of life (QoL), treatment satisfaction (TS), adverse events (AE)	STUDY DESIGN, FIRST AUTHOR, YEAR OF PUBLICATION (mean follow-up time)	EFFECT ESTIMATE†: standardised mean difference (SMD) or risk ratio (RR) [95% CI] (# of thumbs included)	MAGNITUDE OF EFFECT ESTIMATE	FAVORED INTERVENTION
1. Trapeziectomy (T) vs. T + ligament reconstruction and tendon interposition (LRTI) (FCR-metacarpal tunnel (MT))	**Pain** (VAS)	**RCT De Smet 2004** (T group 34m; T+LRTI group 26m)	SMD 0.39 [-0.16, 0.94] (55)	Small	T+LRTI (FCR- MT)
	PF (DASH)		SMD 0.23 [-0.31, 0.78] (55)	Small	T+LRTI (FCR- MT)
2. T+LRTI (½FCR-MT) vs. T+LRTI (½FCR-APL-½FCR)	**Pain** (PRWHE Pain)	**RCT Spekreijse 2015** (mean 5.3y)	SMD 0.05 [-0.41, 0.52] (72)	Trivial	T+LRTI (½FCR-APL-½FCR)
	PF (PRWHE Activities)		SMD -0.05 [-0.52, 0.41] (72)	Trivial	T+LRTI (½FCR-MT)
	PF (DASH)		SMD -0.41 [-0.88, 0.05] (72)	Small	T+LRTI (½FCR-MT)
	TS (# of patients with good/excellent satisfaction)		RR 1.07 [0.85, 1.35] (72)	Trivial	T+LRTI (½FCR-MT)
	AE (scar tenderness, sensory changes, infection, tendinitis, neuroma, carpal tunnel syndrome, worsening scaphotrapezoidal osteoarthritis)	**RCT Spekreijse 2015** (1-5y)	RR 1.18 [0.75, 1.85] (72)	Trivial	T+LRTI (½FCR-MT)
3. T BY POSTERIOR APPROACH vs. T+LRTI (½FCR-MT)	**Pain** (VAS, 0-6, the Patient Evaluating Measure Pain score)	**3 RCTs Field 2007** (12m), **Gangopadhyay 2012** (median 6y), **Salem 2012** (6y)	SMD -0.09 [-0.32, 0.15] (142)(Figure 13A)	Trivial	T BY POSTERIOR APPROACH
	PF (DASH)	**RCT Salem 2012** (6y)	SMD 0.14 [-0.23, 0.51] (114)	Trivial	T+LRTI (½FCR-MT)
	AE (nerve dysfunction, tendon pulling sensation, tender scars, CRPS, De Quervain's disease)	**3 RCTs Field 2007** (12m), **Gangopadhyay 2012** (median 6y), **Salem 2012** (6y)	RR 0.55 [0.35, 0.89] (286) (Figure 13B)	**Moderate**	**T BY POSTERIOR APPROACH**
4. T+LR (½FCR-MT vs. T+LRTI (½FCR-MT)	**Pain** (# of patients with occasional to constant pain)	**RCT Kriegs-Au 2004** (48.2m)	RR 0.85 [0.47, 1.57] (31)	Trivial	T+LR (½FCR-MT)
	PF (# of patients with mild to severe difficulty)		RR 0.30 [0.07, 1.24] (31)	**Large**	**T+LR (½FCR-MT)**
	TS (# of satisfied patients)		RR 1.32 [0.98, 1.78] (31)	Small	T+LRTI (½FCR-MT)
	AE (radial nerve irritation, CRPS)	**SR Wajon 2015 including RCT Kriegs-Au 2004** (48.2m)	RR 0.71 [0.14, 3.68] (31)	Small	T+LR (½FCR-MT)
5. T+LRTI (½FCR-MT) vs. T+TI (PL)	**Pain** (0-6)	**RCT Gangopadhyay 2012** (median 6y)	SMD -0.56 [-0.97, -0.16] (100)	**Moderate**	**T+LRTI (½FCR-MT)**
	AE (nerve dysfunction, tendon pulling sensation, tender scar, CRPS)		RR 0.90 [0.54, 1.50] (100)	Trivial	T+LRTI (½FCR-MT)

6. ARTHRODESIS (K-wire) vs. T+LRTI (½FCR-MT -K-wire)	**AE** (CRPS)	**RCT Hart 2006** (early after surgery)	RR 1.00 [0.16, 6.42] (40)	No effect difference	ARTHRODESIS (K-wire) = T+LRTI (½FCR-MT -K-wire)
7. T+LR (½FCR-MT - Minimitek®) vs. T+LRTI (½FCR-MT - Minimitek®)	**PF** (# of patients capable to do six ADLs)	**RCT Gerwin 1997** (23m)	RR 1.00 [0.83, 1.20] (20)	No effect difference	T+LR (½FCR-MT -Minimitek®) = T+LRTI (½FCR-MT - Minimitek®)
	TS (# of satisfied patients)		RR 0.92 [0.51, 1.65] (20)	Trivial	T+LRTI (½FCR-MT - Minimitek®)
8. ARTHRODESIS (plate/screws) vs. T+LRTI (½FCR-APL-½FCR)	**Pain** (PRWHE pain)	**RCT Spekreijse 2016** (5y)	SMD 0.85 [0.18, 1.52] (38)	**Large**	**T+LRTI (½FCR-APL-½FCR)**
	PF (DASH)		SMD 1.46 [0.73, 2.18] (38)	**Large**	**T+LRTI (½FCR-APL-½FCR)**
	TS (# of satisfied patients)	**RCT Vermeulen 2014a** (12m)	RR 0.62 [0.38, 1.00] (38)	Small	T+LRTI (½FCR-APL-½FCR)
	AE (tendinitis/neuroma/nonunion requiring surgery, CRPS)	**Spekreijse 2016** (5y)	RR 6.18 [0.80, 47.96] (38)	**Large**	**T+LRTI (½FCR-APL-½FCR)**
9. T+LRTI (½FCR-APL-½FCR) vs. T+GRAFTJACKET® ALLOGRAFT	**Pain** (Michigan Hand Questionnaire pain)	**RCT Marks 2017** (12m)	SMD -0.33 [-0.85, 0.19] (58)	Small	T+LRTI (½FCR-APL-½FCR)
	PF (DASH)		SMD -0.26 [-0.78, 0.26] (58)	Small	T+LRTI (½FCR-APL-½FCR)
	QoL (SF-12 physical component)		SMD 0.11 [-0.41, 0.62] (58)	Trivial	T+GRAFTJACKET® ALLOGRAFT
	QoL (SF-12 mental component)		SMD -0.24 [-0.76, 0.27] (58)	Small	T+LRTI (½FCR-APL-½FCR)
	AE (CRPS, trigger thumb, persistent FCR pain, tendinitis, thenar atrophy, FCR partial rupture)		RR 0.50 [0.19, 1.28] (60)	**Moderate**	**T+LRTI (½FCR-APL-½FCR)**
10. T BY POSTERIOR APPROACH vs. T+LRTI (APL-FCR-APL)	**Pain** (VAS)	**RCT Belcher 2000** (14m)	SMD -0.11 [-0.71, 0.50] (42)	Trivial	T BY POSTERIOR APPROACH
	PF (VAS)		SMD -0.41 [-1.03, 0.20] (42)	Small	T BY POSTERIOR APPROACH
	AE (recurrent pain, instability, neuroma, sensory loss, FCR rupture)		RR 0.40 [0.09, 1.77] (42)	**Moderate**	**T BY POSTERIOR APPROACH**
11. T+LRTI (APL-FCR-APL) vs. T+SWANSON® SILASTIC IMPLANT	**Pain** (VAS)	**RCT Tagil 2002** (2-4y)	SMD 0.30 [-0.47, 1.07] (26)	Small	T+SWANSON® SILASTIC IMPLANT
	TS (# of satisfied patients)		RR 0.85 [0.65, 1.11] (26)	Trivial	T+SWANSON® SILASTIC IMPLANT
	AE (implant dislocation)		RR 0.20 [0.01, 3.80] (26)	**Large**	**T+LRTI (APL-FCR-APL)**
12. T+HAEMATOMA DISTRACTION ARTHROPLASTY (HDA) vs. T+LR (APL-MT-FCR)	**Pain** (VAS)	**RCT Corain 2016** (T+HDA group 6.6y; T+LR group 7y)	SMD -3.06 [-3.60, -2.53] (120)	**Large**	**T+HDA**
	PF (DASH)		SMD -0.76 [-1.13, -0.39] (120)	**Moderate**	**T+HDA**
	AE (FCR tendinitis)		RR 0.06 [0.00, 1.01] (120)	**Large**	**T+HDA**
13. T BY POSTERIOR APPROACH vs.	**Pain** (0-6)	**RCT Gangopadhyay 2012** (median 6y)	SMD -0.56 [-0.97, -0.16] (99)	**Moderate**	**T BY POSTERIOR APPROACH**
	AE (nerve dysfunction, tendon pulling sensation, tender scar, CRPS)		RR 0.58 [0.31, 1.07] (99)	Small	T BY POSTERIOR APPROACH

T+TI (PL)					
14. T BY ANTERIOR APPROACH vs. T BY POSTERIOR APPROACH	**Pain** (VAS)	**RCT Ritchie 2008** (33m)	SMD -0.28 [-0.90, 0.34] (40)	Small	T BY ANTERIOR APPROACH
	PF (VAS)		SMD -0.11 [-0.73, 0.51] (40)	Trivial	T BY ANTERIOR APPROACH
	TS (VAS)		SMD -0.94 [-1.60, -0.29] (40)	**Large**	**T BY ANTERIOR APPROACH**
	AE (sensory alteration around scar)		RR 0.33 [0.08, 1.46] (40)	**Large**	**T BY ANTERIOR APPROACH**
	AE (numbness around scar)		RR 0.25 [0.03, 2.05] (40)	**Large**	**T BY ANTERIOR APPROACH**
	AE (tenderness in scar)		RR 0.33 [0.01, 7.72] (40)	**Large**	**T BY ANTERIOR APPROACH**
	AE (infection)		RR 1.00 [0.07, 14.90] (40)	No effect difference	T BY ANTERIOR APPROACH = T BY POSTERIOR APPROACH
15. T BY POSTERIOR APPROACH vs. T+PERMACOL® PORCINE XENOGRAFT	**Pain** (VAS)	**RCT Belcher 2001** (median 6 m)	SMD -0.94 [-1.75, -0.12] (26)	**Large**	**T BY POSTERIOR APPROACH**
	PF (VAS)		SMD -0.51 [-1.30, 0.27] (26)	**Moderate**	**T BY POSTERIOR APPROACH**
	TS (VAS)		SMD-1.27 [-2.12, -0.41] (26)	**Large**	**T BY POSTERIOR APPROACH**
	AE (neuroma, sensory change, erythema, pain, instability)		RR 0.38 [0.13, 1.11] (26)	**Moderate**	**T BY POSTERIOR APPROACH**
16. ELEKTRA® UNCEMENTED CUP vs. ELEKTRA® CEMENTED CUP	**AE** (cementing failure, trapezium fracture, cup loosening and migration)	**RCT Hansen 2013** (2y)	RR 1.08 [0.18, 6.57] (28)	Trivial	ELEKTRA® UNCEMENTED CUP

#, number; ADL, activities of daily living; AE, adverse events; APL, abductor pollicis longus; CRPS, complex regional pain syndrome; DASH, Disabilities of the Arm, Shoulder and Hand; FCR, flexor carpi radialis; m, month(s); FU, follow-up; HDA, haematoma distraction arthroplasty; imp, imprecision; LRTI, ligament reconstruction and tendon interposition; MT, metacarpal tunnel; NRCT, non-randomised controlled trial; NRS, numeric rating scale; PF, physical function; PL, palmaris longus; PRWHE, Patient-Report Wrist Hand Evaluation; QoL, quality of life; RCT, randomised controlled trial; RoB, risk of bias; SF, short-form; T, trapeziectomy; TI, tendon interposition; TM, trapeziometacarpal; TS, treatment satisfaction; VAS, visual analog scale; y, year(s); w, week(s).

†Interpretation of effect size: Standardized mean difference (SMD) for continuous outcomes and risk ratio (RR) for dichotomous outcomes were used to establish relative effect of each intervention. Relative effect is considered trivial when SMD < |±0.2| or 0.82 < RR < 1.22; small when SMD = |± 0.2| or RR = 1.22 (or 0.82); moderate when SMD = |± 0.5| or RR = 1.82 (or 0.55); large when SMD = |± 0.8| or RR = 3.0 (or 0.33) [527,528,892]. The null values, that is, SMD = 0 and RR = 1 indicate no difference in treatment effect between the two compared interventions [893]. SMD < 0 indicates the superiority of the first interventions; SMD > 0 indicated that the second intervention is superior. For dichotomous outcomes, when the outcome is non-desirable (e.g., number of painful patients, adverse events), RR < 1 indicates the superiority of the first interventions; RR > 1 indicated that the second intervention is superior. When the outcome is desirable (e.g., number of satisfied patients), RR > 1 indicates the superiority of the first interventions and RR < 1, the superiority of the second intervention.

Table 17. – Summary of findings supported by evidence of very low quality

COMPARED SURGICAL INTERVENTIONS	OUTCOME(S): pain, physical function (PF), psychological well-being, quality of life (QoL), treatment satisfaction (TS), adverse events (AE)	STUDY DESIGN, FIRST AUTHOR, YEAR OF PUBLICATION (mean follow-up time)	EFFECT ESTIMATE†: standardised mean difference (SMD) or risk ratio (RR) [95% CI] (# of thumbs)	MAGNITUDE OF EFFECT ESTIMATE	REASONS AND DOWNGRADED EVIDENCE QUALITY LEVEL: Design, risk of bias (RoB), imprecision (Imp)
1. **First metacarpal osteotomy vs. Trapeziectomy (T) + ligament reconstruction (LR)** (APL-½FCR-APL)	**Pain** (# of patients with pain)	**NRCT Atroshi 1998** (1y)	RR 1.19 [0.60, 2.37] (17)	Trivial	Design -2, RoB -2, Imp -1
	TS (# of satisfied patients)		RR 0.46 [0.21, 1.02] (17)	Moderate	Design -2, RoB -2, Imp -1
2. **First metacarpal + trapezium partial resection vs. arthrodesis by plate/screw fixation**	**Pain** (# of patients with continuous pain)	**NRCT Raven 2007** (resection group 13y; arthrodesis group 9y)	RR 0.22 [0.03, 1.66] (46)	Large	Design -2, RoB -2, Imp -1
	PF (DASH)		SMD 0.05 [-0.54, 0.64] (46)	Trivial	Design -2, RoB -2, Imp -1
	AE (CRPS, radial nerve sensory deficit, nonunion, reoperation)		RR 0.14 [0.04, 0.53] (46)	Large	Design -2, RoB -2, Imp -1
3. **First metacarpal + trapezium partial resection vs. T + tendon interposition (TI)** (FCR)	**Pain** (# of patients with continuous pain)	**NRCT Raven 2007** (resection group 13y; TI group 8y)	RR 2.84 [0.12, 65.34] (35)	Moderate	Design -2, RoB -2, Imp -1
	PF (DASH)		SMD -0.05 [-0.71, 0.61] (35)	Trivial	Design -2, RoB -2, Imp -1
	AE (CRPS, radial nerve sensory deficit, nonunion, reoperation)		RR 0.57 [0.16, 2.02] (35)	Small	Design -2, RoB -2, Imp -1
4. **Arthroscopic first metacarpal + trapezium partial resection vs. Arthroscopic first metacarpal + trapezium partial resection + Graftjacket® allograft**	**Pain** (NRS 0-10)	**NRCT Cobb 2015** (6.5y)	SMD 0.45 [0.09, 0.81] (125)	Small	Design -2, RoB -2, Imp -1
	TS (0-5, higher is better)		SMD 0.39 [0.00, 0.77] (125)	Small	Design -2, RoB -2, Imp -1
	AE (operation failure)		RR 0.36 [0.07, 1.87] (125)	Moderate	Design -2, RoB -2, Imp -1
5. **Arthrodesis by plate/screw fixation vs.**	**TS** (# of satisfied patients)	**NRCT Forseth 2003** (plate/screw group 40m; K-wire group 84m)	RR 0.82 [0.68, 0.99] (85)	Trivial	Design -2, RoB -2, Imp -1
	AE (reoperation)		RR 7.94 [1.77, 35.67] (85)	Large	Design -2, RoB -2, Imp -1

Arthrodesis by k-wire fixation					
6. Arthrodesis by plate/screw fixation vs. T+LRTI (APL-2nd MC)	**Pain** (# of patients with the Alnot pain score ≥ 1)	**NRCT Parvex 2001** (arthrodesis group 42m; LR group 20m)	RR 0.95 [0.59, 1.52] (39)	Trivial	Design -2, RoB -1, Imp -1
	AE (reoperation)		RR 1.56 [0.24, 10.01] (41)	Small	Design -2, RoB -1, Imp -1
7. Arthrodesis by locking cage plate fixation vs. T+LRTI (FCR-1st MC)	**PF** (QuickDASH)	**NRCT Kazmers 2017** (arthrodesis group 15.6m; LRTI group 14.8m)	SMD 2.09 [1.25, 2.93] (36)	Large	Design -2, RoB -1, Imp -1
	AE (reoperation)	**2 NRCTs Hippensteel 2017** (arthrodesis group 13.3m; LRTI group 12.1m) & **Kazmers 2017** (arthrodesis group 15.6m; LRTI group 14.8m)	RR 8.88 [1.12, 70.53] (89)	Large	Design -2, RoB -2, Imp -1
8. Arthrodesis by k-wire fixation vs. T+LRTI (APL-2nd MC)	**Pain** (# of patients with pain)	**NRCT Rossi 2005** (36m)	RR 0.70 [0.32, 1.52] (89)	Small	Design -2, RoB -1, Imp -1
	AE (delayed unions or nonunions, paraesthesia)		RR 16.48 [1.01, 268.64] (119)	Large	Design -2, RoB -1, Imp -1
9. Arthrodesis by plate/screw fixation vs. T+TI (FCR)	**Pain** (# of patients with continuous pain)	**NRCT Raven 2007** (arthrodesis group 9y; TI group 8y)	RR 9.31 [0.57, 153.36] (45)	Large	Design -2, RoB -2, Imp -1
	PF (DASH)		SMD -0.10 [-0.70, 0.51] (45)	Trivial	Design -2, RoB -2, Imp -1
	AE (CRPS, radial nerve sensory deficit, nonunion, reoperation)		RR 2.67 [1.25, 5.72] (45)	Moderate	Design -2, RoB -2, Imp -1
10. Arthrodesis by plate/screw fixation vs. T+Swanson® silastic implant	**Pain** (# of patients with the Alnot pain score ≥1)	**NRCT Parvex 2001** (arthrodesis group 42m; silastic group 64m)	RR 1.86 [1.21, 2.86] (225)	Moderate	Design -2, RoB -2, Imp -1
	AE (implant instability, pseudoarthritis)		RR 1.51 [0.70, 3.30] (205)	Small	Design -2, RoB -2, Imp -1
	AE (reoperation)		RR 1.10 [0.28, 4.24] (225)	Trivial	Design -2, RoB -2, Imp -1
11. Arthrodesis by screw fixation vs. T+Swanson® silastic implant	**Pain** (VAS)	**NRCT Taylor 2005** (arthrodesis group 39m; silastic group 42m)	SMD -0.20 [-0.74, 0.33] (57)	Small	Design -2, RoB -2, Imp -1
	PF (VAS)		SMD -0.04 [-0.57, 0.49] (57)	Trivial	Design -2, RoB -2, Imp -1
	TS (VAS)		SMD -0.11 [-0.64, 0.42] (57)	Trivial	Design -2, RoB -2, Imp -1
	AE (reoperation/revision)		RR 1.43 [0.41, 4.95] (58)	Small	Design -2, RoB -2, Imp -1
12. Arthrodesis by k-wire fixation vs. T+Swanson® silastic implant	**Pain** (# of painful patients)	**NRCT Economou 1979** (11-14m)	RR 5.73 [0.25, 129.23] (30)	Large	Design -2, RoB -1, Imp -1
	TS (# of satisfied patients)		RR 0.70 [0.46, 1.05] (30)	Small	Design -2, RoB -1, Imp -1
	AE (infection, pseudarthrosis, fibrous union, implant luxation)		RR 6.00 [1.47, 24.55] (30)	Large	Design -2, RoB -1, Imp -1
13. T vs. T+APL shortening	**TS** (# of satisfied patients)	**NRCT Hollevoet 1996** (44.5m)	RR 1.02 [0.80, 1.29] (68)	Trivial	Design -2, RoB -2, Imp -1
14. T vs. T+LR (APL-FCR)	**Pain change** (NRS)	**NRCT Barthel 2018** (7.5y)	SMD 0.18 [-0.41, 0.77] (46)	Trivial	Design -2, RoB -1, Imp -1
	PF change (QuickDASH)		SMD 0.11 [-0.48, 0.69] (46)	Trivial	Design -2, RoB -1, Imp -1

15. T vs. T+LRTI (FCR- MT)	**AE** (reoperation)	**RCT De Smet 2004** (T group 34m; T+LRTI group 26m)	RR 4.57 [0.19, 107.29] (56)	Large	RoB -1, Imp -2
16. T vs. T+LRTI (APL slip-FCR)	**TS** (VAS)	**NRCT Elvebakk 2015** (T group median 26m; LRTI group median 41m)	SMD -0.19 [-0.58, 0.19] (104)	Trivial	Design -2, RoB -2, Imp -1
17. T vs. Partial T+chondrocostal autograft	**Pain** (# of patients with pain Alnot score)	**NRCT Gallinet 2011** (71m)	RR 10.29 [1.38, 76.76] (25)	Large	Design -2, RoB -2, Imp -1
	PF (DASH)		SMD 0.53 [-0.36, 1.42] (25)	Moderate	Design -2, RoB -2, Imp -1
	TS (# of moderately or very satisfied patients)		RR 0.58 [0.31, 1.07] (25)	Small	Design -2, RoB -2, Imp -1
	AE (CRPS)		RR 1.29 [0.14, 12.03] (25)	Small	Design -2, RoB -2, Imp -1
18. T + an absorbable gelatin sponge (Spongostan®) vs. first metacarpal + trapezium partial resection + Arpe® implant	**AE** (dislocation, fracture, heterotopic ossification, infection)	**NRCT Craik 2017** (trapeziectomy group 3.4y; ARPE group 2y)	RR 0.60 [0.21, 1.76] (129)	Small	Design -2, RoB -1, Imp -1
19. T vs. T+De la Caffinière® implant	**Pain** (VAS)	**NRCT De Smet 2007** (trapeziectomy group 34m; implant group 26m)	SMD 0.14 [-0.37, 0.66] (65)	Trivial	Design -2, RoB -2, Imp -1
	PF (DASH)		SMD 0.42 [-0.09, 0.94] (65)	Small	Design -2, RoB -2, Imp -1
	TS (# of patients with no pain improvement or worse pain)		RR 0.73 [0.22, 2.49] (65)	Small	Design -2, RoB -2, Imp -1
	AE (reoperation)		RR 1.95 [0.13, 29.78] (65)	Moderate	Design -2, RoB -2, Imp -1
20. T + an absorbable gelatin sponge (Spongostan®) vs. T+pyrocarbon Pi2® spacer	**Pain** (VAS)	**NRCT Maru 2012** (20m)	SMD -0.48 [-1.15, 0.18] (36)	Moderate	Design -2, RoB -2, Imp -1
	PF (DASH)		SMD -1.74 [-2.52, -0.96] (36)	Large	Design -2, RoB -2, Imp -1
	QoL (SF-36)		SMD -0.21 [- 0.87, 0.44] (36)	Small	Design -2, RoB -2, Imp -1
	TS (# of satisfied and very satisfied patients)		RR 1.50 [0.95, 2.38] (36)	Small	Design -2, RoB -2, Imp -1
21. T vs. T+pyrocarbon Pi2® spacer	**AE** (implant dislocation/displacement, infection, pain)	**2 NRCTs Colegate-Stone 2011** (12m) & **Maru 2012** (20m)	RR 0.12 [0.02, 0.61] (74) (Figure 13C)	Large	Design -2, RoB -2, Imp -1
22. T vs. T+Swanson silastic implant	**Pain** (# of painful patients)	**NRCT Coessens 1991** (2.5y)	RR 2.14 [0.85, 5.42] (19)	Moderate	Design -2, RoB -2, Imp -1
	AE (CRPS, residual pain, scar dehiscence, infection, implant dislocation, deformation)		RR 0.73 [0.28, 1.96] (19)	Small	Design -2, RoB -2, Imp -1
23. T+LR (APL-FCR) **vs. T+TI** (PL)	**Pain** (VAS)	**NRCT Pomares 2016** (LR group 13.5y; TI group 11.5y)	SMD 0.60 [0.03, 1.17] (67)	Moderate	Design -2, RoB -1, Imp -1
	PF (QuickDASH)		SMD 0.52 [-0.05, 1.09] (67)	Moderate	Design -2, RoB -1, Imp -1
	TS (# of satisfied patients)		RR 0.89 [0.74, 1.08] (67)	Trivial	Design -2, RoB -1, Imp -1
	AE (reoperation)		RR 3.19 [0.21, 48.11] (67)	Large	Design -2, RoB -1, Imp -1
24. T+LR (APL slip-1st MC-2nd MC-ECRL) **vs. T+LR** (Mini-Tightrope®-1st MC-2nd MC)	**AE** (Infection, metacarpal fracture, complaint about palpable hardware)	**NRCT Avant 2015** (APL group 17.6m; Suture group 9.5m)	RR 0.55 [0.10, 3.03] (60)	Moderate	Design -2, RoB -2, Imp -1
25. T+LR (Gore-tex®-MC- FCR)	**Pain** (VAS)	**NRCT Cheval 2013**	SMD -0.47 [-1.05, 0.12] (46)	Small	Design -2, RoB -1, Imp -1
	PF (DASH)		SMD -0.59 [-1.18, 0.00] (46)	Moderate	Design -2, RoB -1, Imp -1

vs. **T+LR** (Gore-tex®-MC- FCR) **+ pyrocarbon Pi2® spacer**	**TS** (# of satisfied patients)	(Without Pi2 group 24.7m; With Pi2 group 14.7m)	RR 1.15 [0.96, 1.37] (46)	Trivial	Design -2, RoB -1, Imp -1
	AE (CRPS)		RR 7.00 [0.38, 128.33] (46)	Large	Design -2, RoB -1, Imp -1
	AE (implant subluxation/luxation, radial nerve sensory deficit)		RR 0.11 [0.01, 1.95] (46)	Large	Design -2, RoB -1, Imp -1
26. T+LR (APL-FCR) **vs.** **First metacarpal +trapezium partial resection + Ivory® implant**	**Pain** (VAS)	**NRCT Erne 2018b** (LRTI group 36m; implant 42m)	SMD 0.39 [-0.08, 0.87] (71)	Trivial	Design -2, RoB -1, Imp -1
	PF (DASH)		SMD 1.34 [0.82, 1.85] (71)	Large	Design -2, RoB -1, Imp -1
	TS (NRS)		SMD 1.17 [0.66, 1.67] (71)	Large	Design -2, RoB -1, Imp -1
	AE (broken/loosening implant, radial nerve injury, hyposensitivity)		RR 0.41 [0.04, 3.72] (71)	Moderate	Design -2, RoB -1, Imp -1
27. T+LRTI (FCR -MT-FCR) **vs.** **Partial T+LRTI** (FCR -MT-FCR)	**Pain** (# of patients with slight pain at moderate/repetitive effort)	**NRCT Garcia-Mas 2009** (45m)	RR 1.12 [0.36, 3.50] (112)	Trivial	Design -2, RoB -2, Imp -1
	AE (joint subluxation)		RR 1.94 [0.22, 17.00] (75)	Moderate	Design -2, RoB -2, Imp -1
	AE (relapse of adduction)		RR 4.36 [1.13, 16.89] (75)		Design -2, RoB -2, Imp -1
28. T+TILR (APL -FCR) **vs.** **T+TILR** (APL-FCR-Mitek®)	**Pain at rest** (NRS)	**NRCT Nordback 2012** (12m)	SMD -0.71 [-1.27, -0.16] (55)	Moderate	Design -2, RoB -1, Imp -1
	TS (0-3)		SMD 0.12 [-0.42, 0.65] (55)	Trivial	Design -2, RoB -1, Imp -1
	AE (CRPS, persisting pain requiring reoperation)		RR 1.20 [0.32, 4.52] (55)	Trivial	Design -2, RoB -1, Imp -1
29. T+LRTI (ECRL-MT-FCR) **vs.** **T+TI** (PL)	**Pain** (# of patients with pain at rest)	**NRCT Livesey 1996** (LRTI group 29m; TI group 22m)	RR 0.25 [0.01, 5.45] (19)	Large	Design -2, RoB -1, Imp -1
	AE (infection, irritation, adduction deformity, pain, painful scar)		RR 1.45 [0.35, 6.09] (19)	Small	Design -2, RoB -1, Imp -1
30. T+LRTI (APL-FCR) **vs.** **Autologous fat injection**	**Pain** (VAS)	**NRCT Erne 2018a** (LRTI group 23.6m; injection group 18.1m)	SMD -0.76 [-1.66, 0.14] (21)	Moderate	Design -2, RoB -2, Imp -1
	PF (DASH)		SMD -0.11 [-0.97, 0.76] (21)	Trivial	Design -2, RoB -2, Imp -1
	TS (NRS)		SMD -0.29 [-1.16, 0.58] (21)	Small	Design -2, RoB -2, Imp -1
	AE (persisting pain, decreased sensitivity)		RR 0.75 [0.05, 10.44] (21)	Small	Design -2, RoB -2, Imp -1
31. T+LRTI (FCR - MT) **vs.** **First metacarpal and trapezium partial resection + ARPE® implant**	**Pain** (VAS)	**NRCT Robles-Molina 2017** (LRTI group 59.27m; implant group 55.81m)	SMD 0.03 [-0.46, 0.51] (65)	Trivial	Design-2, RoB -2, Imp -1
	PF change (QuickDASH)		SMD 0.02 [-0.47, 0.51] (65)	Trivial	Design-2, RoB -2, Imp -1
	AE (reoperation)		RR 0.61 [0.11, 3.40] (65)	Moderate	Design-2, RoB -2, Imp -1
32. T+LRTI (FCR - MT) **vs.** **Partial T+Artelon® spacer**	**AE** (removal of implant, salvage arthroplasty)	**NRCT Blount 2013** (LRTI group 48m; implant group 30m)	RR 0.09 [0.01, 1.48] (45)	Large	Design -2, RoB -2, Imp -1
33. T+LRTI (APL -FCR-APL-FCR) **vs.** **Partial T+Artelon® spacer**	**Pain** during key pinch (VAS)	**NRCT Nilsson 2005** (LRTI group median 37m; Artelon group median 36m)	SMD 0.58 [-0.52, 1.68] (15)	Moderate	Design -2, RoB -2, Imp -1
	AE (# of patients with transient inflammation and tenderness)		RR 0.37 [0.02, 6.46] (15)	Moderate	Design -2, RoB -2, Imp -1
34. T+LRTI (FCR - MT)	**Pain** (VAS)	**NRCT De Smet 2007** (26m)	SMD 0.17 [-0.28, 0.63] (77)	Trivial	Design -2, RoB -2, Imp -1
	PF (DASH)		SMD 0.13 [-0.32, 0.58] (77)	Trivial	Design -2, RoB -2, Imp -1

vs. **T+De la Caffinière® implant**	**TS** (# of patients with no pain improvement or worse pain)		RR 0.47 [0.14, 1.65] (77)	Moderate	Design -2, RoB -2, Imp -1
	AE (reoperation)		RR 0.42 [0.02, 9.97] (77)	Moderate	Design -2, RoB -2, Imp -1
35. T+LRTI (APL-FCR-APL) **vs.** **T+Elektra® implant**	**Pain** at rest	**NRCT Ulrich-Vinther 2008** (12m)	SMD 0.48 [0.06, 0.89] (98)	Small	Design -2, RoB -1, Imp -1
	Pain in activity		SMD 1.70 [0.88, 2.52] (98)	Large	Design -2, RoB -1, Imp -1
	TS (# of satisfied patients)		RR 0.92 [0.81, 1.04] (98)	Trivial	Design -2, RoB -1, Imp -1
	AE (tendon problem, scar tenderness, sensory changes, implant failure)		RR 1.55 [0.44, 5.47] (98)	Small	Design -2, RoB -1, Imp -1
36. T+LR (PL-MT) **+ TI** (PL) **vs.** **First metacarpal + trapezium partial resection + Guepar implant**	**Pain** (# of patients with pain)	**NRCT Alnot 1998** (LRTI group 3.5y; Guepar group 5.75y)	RR 1.30 [0.79, 2.15] (98)	Small	Design -2, RoB -2, Imp -1
	TS (# of satisfied patients)		RR 0.97 [0.82, 1.14] (98)	Trivial	Design -2, RoB -2, Imp -1
	AE (# of patients with loosening implant)		RR 0.48 [0.03, 7.91] (98)	Moderate	Design -2, RoB -2, Imp -1
37. T+LR (Gore-Tex double slip -MT) **+ Gore-tex slip interposition** **vs.** **Partial T+pyrocarbon PI2® implant**	**Pain** (VAS)	**NRCT Alligand-Perrin 2010** (Gore-Tex group 8m; Pi2 group 9m)	SMD -0.46 [-0.97, 0.04] (64)	Small	Design -2, RoB -2, Imp -1
	PF (QuickDASH)		SMD -0.68 [-1.19, -0.18] (64)	Moderate	Design -2, RoB -2, Imp -1
	TS (# of satisfied patients)		RR 0.91 [0.72, 1.15] (64)	Trivial	Design -2, RoB -2, Imp -1
	AE (# of patients with CRPS)		RR 1.93 [0.35, 10.77] (64)	Moderate	Design -2, RoB -2, Imp -1
38. T+LRTI (FCR-MT) **vs.** **T+Swanson® implant**	**Pain** (VAS)	**NRCT Lehmann 1998** (LRTI group 34m; Swanson group 67m)	SMD 0.24 [-0.20, 0.68] (102)	Small	Design -2, RoB -1, Imp -1
	TS (# of dissatisfied patients)		RR 2.16 [0.27, 17.13] (102)	Moderate	Design -2, RoB -1, Imp -1
39. T+LRTI (FCR-MT) **vs.** **T+Swanson® implant**	**AE** (dystrophic reaction, persistent dysaesthesia, implant subluxation, implant fracture, gross pain, stiffness, septic arthritis, arthroplasty disruption, dissatisfaction leading to a reoperation)	**2 NRCTs Lehmann 1998** (LRTI group 34m; Swanson group 67m), **Lovell 1999** (62m)	RR 1.42 [0.60, 3.33] (216)	Small	Design -2, RoB -1, Imp -1
40. T+LRTI (APL- MT) **vs.** **T+Swanson® implant**	**Pain** (# of painful patients with Alnot pain score ≥1)	**NRCT Parvex 2001** (LRTI group 20m; silastic group 64m)	RR 1.97 [1.42, 2.72] (236)	Moderate	Design -2, RoB -2, Imp -1
	AE (reoperation)		RR 0.70 [0.18, 2.80] (236)	Small	Design -2, RoB -2, Imp -1
41. T+TI (PL) **vs.** **T+Arex® implant**	**Pain** (VAS)	**NRCT Pereira 2015** (TI group 18.9m; AREX group 21.3m)	SMD -0.08 [-0.86, 0.71] (25)	Trivial	Design -2, RoB -1, Imp -1
	PF (QuickDASH)		SMD -0.04 [-0.82, 0.75] (25)	Trivial	Design -2, RoB -1, Imp -1
	AE (reoperation)		RR 1.29 [0.56, 2.99] (25)	Small	Design -2, RoB -1, Imp -1
42. T+AREX® implant **vs.** **MAIA® implant**	**AE** (implant loosening, De Quervain tendinitis)	**NRCT Jager 2013** (6m)	RR 0.10 [0.01, 1.68] (74)	Large	Design -2, RoB -2, Imp -1
	Pain (# of patients with pain)	**NRCT Wachtl 1998**	RR 0.73 [0.48, 1.09] (51)	Small	Design -2, RoB -2, Imp -1

43. First metacarpal osteotomy + T+De la Caffinière® implant vs. Metacarpal osteotomy + T+Ledoux® implant	**AE** (implant loosening/dislocation)	(De la Caffinière group 63.5m; Ledoux group 25.3m)	RR 0.58 [0.30, 1.11] (88)	Small	Design -2, RoB -2, Imp -1
44. T+Pyrocarbon (Pyrodisk®) interposition vs. T+Pyrocardan interposition	**Pain** (VAS)	**NRCT Odella 2014** (pyrocarbon group 42m; pyrocardan group 12m)	SMD -0.64 [-1.17, -0.12] (61)	Moderate	Design -2, RoB -2, Imp -1
	PF (DASH)		SMD -0.62 [-1.14, -0.10] (61)	Moderate	Design -2, RoB -2, Imp -1
	AE (persistent pain, subluxation)		RR 0.69 [0.10, 4.61] (61)	Small	Design -2, RoB -2, Imp -1

#, number; AE, adverse events; APL, abductor pollicis longus; CRPS, complex regional pain syndrome; DASH, Disabilities of the Arm, Shoulder and Hand; FCR, flexor carpi radialis; m, month(s); FU, follow-up; imp, imprecision; LRTI, ligament reconstruction tendon interposition; MT, metacarpal tunnel; NRCT, non-randomised controlled trial; NRS, numeric rating scale; PF, physical function; PL, palmaris longus; QoL, quality of life; RCT, randomised controlled trial; RoB, risk of bias; SF, short-form; TI, tendon interposition; TM, trapeziometacarpal; TS, treatment satisfaction; VAS, visual analog scale; y, year(s); w, week(s).

†**Interpretation of effect size:** Standardized mean difference (SMD) for continuous outcomes and risk ratio (RR) for dichotomous outcomes were used to establish relative effect of each intervention. Relative effect is considered trivial when SMD < |± 0.2| or 0.82 < RR < 1.22; small when SMD = |± 0.2| or RR = 1.22 (or 0.82); moderate when SMD = |± 0.5| or RR = 1.82 (or 0.55); large when SMD ≥ |± 0.8| or RR = 3.0 (or 0.33) [527,528,892]. The null values, that is, SMD = 0 and RR = 1 indicate no difference in treatment effect between the two compared interventions [893]. SMD < 0 indicates the superiority of the first interventions; if SMD > 0 indicated that the second intervention is superior. For dichotomous outcomes, when the outcome is non-desirable (e.g., number of painful patients, adverse events), RR < 1 indicates the superiority of the first interventions; RR > 1 indicated that the second intervention is superior. When the outcome is desirable (e.g., number of satisfied patients), RR > 1 indicates the superiority of the first interventions and RR < 1, the superiority of the second intervention.

5.2.5 Discussion

TMO is one of the most prevalent and painful forms of hand osteoarthritis.[21,115,863] TMO care pathway usually starts with nonsurgical interventions, when they are unsuccessful, surgery may be chosen.[52] Unfortunately, the evidence-based efficacy of comprehensive surgical interventions for TMO was lacking. Therefore, we carried out an SR to identify all the surgical interventions for TMO and to review their efficacy.

We identified 11 categories of surgical techniques: first metacarpal osteotomy,[736] first metacarpal and trapezium partial resection,[740,759] arthrodesis,[723,728,732,744,745,758-760,769,770,872] trapeziectomy,[716-720,725,726,741,743,746,748,753,764,766,868,874] T+HDA,[730,757] T+LR,[67,721,724,730,736,737,739,764,772] T+TI,[720,751,759,771,772] T+LRTI,[67,717-721,723,724,726-729,731-735,738,743,747,750,751,757,758,760,766,768-770,773,869-871,873] chondrocostal graft interposition,[746,757] autologous fat injection,[768] and the manufactured implants.[716,722,727,731,734,735,738-741,743,744,749,750,753,756,758,763,767,771,773,868-870,872-874] Pertaining to the efficacy of these surgical techniques, the evidence quality is at best low. Although some readers may view evidence of such quality as unreliable, one must consider that generating robust evidence in the surgery field would be nearly impossible due to numerous obstacles to conduct high-quality RCTs (e.g., impossibility to blind surgeon, urgent situations, learning curve, patients' reluctance at randomisation or participation in a trial).[894-897] If we systematically consider low-quality evidence unreliable, this research field would never generate new evidence through an SR (unless cumulative homogeneous RCTs would reach a pooled sample size of 400) and all the efforts deployed by the trialists of surgery research would be completely in vain. Therefore, we suggest considering low-quality evidence in such a context as 'the best available'. Indeed, a trivial or small effect estimate supported by low quality evidence would not be indicative of anything, but a moderate to large effect estimate could at least suggest some superiority of one intervention over another. From this perspective, we can conclude the findings of the present review as follows. **T+LRTI using ½FCR-MC or APL-FCR** would not be recommended when compared to the simpler procedure **trapeziectomy** due to higher complication rates in the **T+LRTI** groups.[717,719,720,726] Nor would **T+LRTI using ½FCR-MC** be justified due to its large inferior effect on physical function compared with another simpler procedure **T+LR using ½FCR-MC**.[724] **T+TI using palmaris longus** is neither recommended due to its moderate inferiority compared with **trapeziectomy** and **T+LRTI with ½FCR-MC** for pain. **HDA** would be an interesting choice for surgeons due to its simpler procedure and its capacity for maintaining "*the metacarpal height to the scaphoid, important aspect for force restoring*" since it was moderately to largely superior to **T+LR (APL-MT-FCR)** for three outcomes (pain, physical function and adverse events) with a relatively large sample size (n = 120).[730]

Trapeziectomy by anterior approach—less practiced than **the posterior one**—has shown large effects in terms of adverse events and higher treatment satisfaction compared with the latter,[725] probably because "*removal of the trapezium via the anterior approach is easier and, perhaps, can be achieved less traumatically"*.[725] Using **Swanson® silastic prosthesis, Permacol® xenograft or GraftJacket® allograft** and **hardware** (**screws/plate**) would increase the complication rate when compared to an **autograft**.[62,716,727,728,732]

Pertaining to first metacarpal osteotomy, first metacarpal and trapezium partial resection, chondrocostal graft interposition, autologous fat injection, and the manufactures implants (Arex®, ARPE®, Artelon®, De la Caffinière®, Guepar, Ivory®, Ledoux®, Maia®, Pi_2®, PyroDisk®, Pyrocardan®), their evidence quality is very low (Table 17), thus we have very little confidence in their effect estimates.

Our results diverged from the previous SR of Wajon et al.[67] who had concluded that "*Of the surgical options included, this systematic review has failed to identify any additional benefit in terms of pain, physical function, patient global assessment, strength, adverse events of any procedure over another*". The discrepancies between their SR and the present one are due to the diverged interpretations of '*not statistically significant'* which is commonly interpreted as *'no effect difference'* based on an arbitrary P value.[898] Yet, it should be interpreted as *'no strong evidence that the intervention effects are different'*.[898] Secondly, our SR included the scientific papers published before July 4th, 2018 whereas those of Wajon et al. before August 8th, 2013. Consequently, our SR added the new knowledge generated from six RCTs[728-733] presented in the Sections 2, 8, 9, and 12 in Table 16.

Despite its rigorous methodological quality based on the *Cochrane* and the *PRISMA* recommendations, the limitations of this SR need to be mentioned. Firstly, the evidence of this SR is at best of low quality thereby limiting our confidence in the effect estimates. Secondly, the literature search was limited to English and French. Yet, there is some evidence that the effect estimates of English-language restricted meta-analyses would not greatly differ from those which included other languages.[899] Thus, the bias related to languages in our findings may be negligible. Thirdly, certain trials[719,724,729-731,735,737,739,747,753,759,760,764,769,770,871] included patients with scaphotrapezial osteoarthritis, a common comorbidity of TMO. Other trials[718,721,725-727,738,740,743-745,749-751,757,758,766,868,869] did not report if they included this type of osteoarthritis or not. This may have compromised the validity of our findings. However, according to a cross-sectional study,[32] the presence of scaphotrapeziotrapezoid osteoarthritis accounted solely for 1% in the variance of pain intensity in TMO patients. We therefore believe that the inclusion of this type of osteoarthritis in our review did not threaten the validity of its findings.

The evidence quality supporting the efficacy of surgical interventions included in this SR was found to be low or very low. Indeed, it is highly challenging to conduct an RCT with minimal risk of bias in surgical research due to the aforementioned obstacles.[894-897] To be able to generate more robust evidence (at least moderate quality level), more RCTs are needed to obtain a pooled sample size of 400 (200/group) as required for the GRADE precision criteria for continuous variables.[506] Performing a network meta-analysis comparing directly and indirectly different surgical interventions for TMO could also be useful to summarize their relative efficacy. However, this type of analysis requires clinical and methodological homogeneity among trials. Thus, concerted efforts towards harmonization of trial methodology are desired (e.g., using same outcome measures and assessment time points).

5.3 Volet II : Facteurs biopsychosociaux associés à la douleur et l'incapacité fonctionnelle de la main et modalités de gestion non-chirurgicale de l'OTM (Article 6 - Biopsychosocial factors associated with pain severity and hand disability in trapeziometacarpal osteoarthritis and non-surgical management)

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En tant qu'auteure principale, je confirme mon apport majeur à la conception du protocole, la collecte et les analyses des données, et la rédaction du manuscrit sous la supervision de ma directrice de recherche, D^{re} Manon Choinière. D^{rs} Patrick G Harris, Nathalie J Bureau, Nathaly Gaudreault et Nicolas Patenaude ont révisé le protocole et contribué au recrutement de participants. Tous les auteurs ont révisé le manuscrit et approuvé la version finale.

5.3.1 Abstract

Background: Trapeziometacarpal osteoarthritis (TMO) is one of the most prevalent and painful forms of hand osteoarthritis.

Purpose: This study aimed at 1) describing the TMO pain experience, 2) identifying biopsychosocial factors associated with TMO pain severity and hand disability, and 3) documenting the use of non-surgical management modalities.

Study Design: Cross-sectional.

Methods: 228 participants who had presented for care for TMO were recruited from 15 healthcare institutions. They completed a questionnaire addressing sociodemographics, pain, disability, psychological well-being, quality of life (QoL), productivity, and non-surgical treatment modalities employed. Multivariable regression analyses identified biopsychosocial factors associated with pain intensity and magnitude of disability.

Results: Our sample's mean age was 63 years and 78.1% were women. More than 80% of the participants reported average pain of moderate to severe intensity in the last 7 days. Their mean hand disability was moderate (QuickDASH, 46.1/100). Nearly 30 % of them scored clinically significant levels of anxiodepressive symptoms. The participants' norm-based physical QoL score on the Short Form 12 item Health Survey (Version 2) was 41.0/100. Among 79 employed respondents, 13 reported having missed complete or part of workdays in the previous month and 18 reported being at risk of losing their job due to TMO. Pain frequency and disability magnitude accounted for 59.0% of the variance in pain intensity, while sex, pain intensity, depression, and education level explained 60.1% of the variance in disability. Acetaminophen, oral non-steroid anti-inflammatory drugs, cortisone injections, orthoses, hand massage/exercises, and heat/cold application were the most frequently used modalities. Almost 80% of the participants never used assistive devices and joint protection techniques. Psychosocial interventions were rarely provided.

Conclusions: Patients with TMO can experience moderate to severe pain, disability, disturbed emotional well-being, limited QoL, and reduced productivity. They should receive interventions most suited to their specific needs from a biopsychosocial perspective.

5.3.2 Introduction

Trapeziometacarpal osteoarthritis (TMO) is one of the most prevalent and painful forms of hand osteoarthritis (OA).[20-22] It can limit thumb mobility, hand function, and quality of life (QoL).[20-25] Radiographic TMO — i.e., the pathology is confirmed by radiographic evidence — is nearly universal with age: >90% of American populations aged ≥80 years have this pathology.[35,107] However, symptomatic TMO — i.e., the pathology is confirmed by clinical symptoms such as pain or stiffness — is much less prevalent (5-30%) for the same age group.[22,113] A large gap between radiographic and symptomatic TMO prevalences has also been reported by an American epidemiologic study (31.8% and 4.8% respectively).[26] In other words, most of the individuals with radiographic TMO are asymptomatic and do not seek care for their condition.[28,34] The discrepancy between radiographic and symptomatic prevalences may be explained by conflictual associations between radiographic severity and pain severity (absent,[27-29] weak,[20,31,32] strong[33]) and one may deem that this gap is due to a lack of radiographic sensitivity to detect some OA features (e.g., synovitis, bone marrow lesions) which are detectable by ultrasound or magnetic resonance imaging (MRI). However, ultrasound data has been reported not being associated with thumb base pain while the association between MRI data and pain would become insignificant when adjusted for radiographic osteophyte data.[33] Facing unpredictable pain severity by such objective data, more attention have been paid to the roles of psychosocial factors on pain.[28,34,35] Indeed, the *International Association for the Study of Pain* considers pain different from nociception, the former being "*influenced to varying degrees by biological, psychological, and social factors*".[2] The following biopsychosocial factors which can adversely influence pain experience in OA or chronic pain have been identified: biological factors (age,[113,115] sex,[26,105,113,114] race,[105,114,132] obesity,[22,901] heredity,[119] presence of other OA sites,[20,22,43,902] presence of other painful conditions,[903,904] pain duration,[905] pain frequency[906]), psychological factors (depression,[30,42] anxiety,[30,43] pain catastrophizing[30,42]) and social factors (education level,[42,132] co-habiting,[907] work status,[89] family income[132]). However, no studies have investigated the relative contribution of a variety of biological, psychological, and social factors to interindividual variability in TMO pain and disability by simultaneously integrating all these factors into multivariable regression models. Hoogendam et al (2019)[32] included biological (age, sex, radiographic severity, physical activity at work) and psychological factors

(psychological distress, pain catastrophization, illness perception) and demonstrated that psychological factors were stronger determinant in explaining the variance of pain severity (42%) compared to biological ones (6%), yet social factors were not included in their model. Becker et al (2014)[34] performed disability regression models in which they included 64 individuals with TMO seeking care while 64 whose TMO were incidentally discovered. Incidental/non-incidental discovery of TMO, sex, other painful condition(s), pain catastrophization, pain self-efficacy, and passive thumb metacarpophalangeal joint hyperextension accounted for 57% of the variability in the QuickDASH scores. However, education level was not included in the model, due to the bivariate analysis finding of no significant association between this independent variable and QuickDASH scores. Since these independent variables may be interrelated, it is preferable to simultaneously enter these variables in a multivariable model to better clarify their contributions to the variability of the dependent variable.[908]

Furthermore, the severity of pain and disability in TMO have been well documented,[20-23,27,34,37-39] yet other aspects such as psychological well-being and productivity of individuals with TMO have been less studied. As the prevalence of anxiety and depression is high in the OA population (approximately 20 %)[40,41] and that these comorbidities may adversely influence the pain experience in hand OA,[29,30,42,43] early detection of such comorbidities is important. As for productivity, several studies have identified occupational risk factors of TMO development or pain.[32,44-46] However, no studies have documented the impact of TMO on work absenteeism and presenteeism to our knowledge. To better provide patients with appropriate care and improve their clinical condition, these areas need to be further documented.

With regard to TMO management, various evidence-based non-surgical interventions are available.[52,53,455,519] Oral and topical non-steroid anti-inflammatory drugs (NSAIDs), acetaminophen, intraarticular cortisone injections, tramadol, and duloxetine are strongly or conditionally recommended.[52,53] Regarding non-pharmacologic interventions, orthoses, hand exercises, education in ergonomic principles, assistive devices, neuro-proprioceptive taping, acupuncture, thermal (cold/heat) interventions, radial/median nerve mobilization and cognitive behavioral therapy are recommended.[25,52,53,455,519] Surgical interventions for TMO are suggested when conservative interventions fail to relieve pain.[52] Recent European studies[48,49] reported that TMO management is far from being optimal with most patients having not received the recommended first-line non-pharmacological treatments. Since TMO treatment differs across continents and countries,[68] we needed to investigate if the aforementioned evidence-based interventions were provided to patients with TMO in the province of Quebec in Canada.

This study therefore aimed at 1) describing the pain experience of patients with TMO in terms of pain and disability, health-related QoL, psychological well-being, and work productivity, 2) investigating contributions of biopsychosocial factors in the variability of pain intensity and magnitude of disability, and 3) documenting the use of non-surgical TMO management modalities in the province of Quebec.

5.3.3 Methods

5.3.3.1 Participants.

The recruitment of this cross-sectional study took place from June 2016 to June 2019 at 15 healthcare institutions across the province of Quebec (Canada): a) 3 university hospitals offering tertiary/quaternary care (hand surgery, radiology, rheumatology, occupational/physical therapy); b) 6 secondary-care hospitals (occupational therapy); and c) 6 private clinics (family medicine, occupational/physical therapy). Patients were eligible if they were ≥ 18 years old; had TMO pain for ≥ 3 months; had a radiographic confirmation of TMO in their medical file; and were able to understand and complete questionnaires in French or English. Exclusion criteria were prior TMO surgery, traumatic TMO, thumb/wrist comorbidity (rheumatoid arthritis, OA, fracture, sprain, tendinitis, Wartenberg's syndrome), and incapacity of giving informed consent due to physical or mental inability. Patient eligibility was verified by the healthcare professionals of the participating institutions by interview or by reviewing medical files. Eligible participants were invited to complete an online consent form and the study questionnaire (SurveyMonkey®) via a hyperlink sent to them by email; otherwise, a paper version of the questionnaire was mailed along with the consent forms and a postage-paid envelope. As a token of appreciation, the participating institutions received Can$15 per referred patient. A 75$ gift certificate was provided to 10 of the participants selected by prize draw at the end of recruitment. The Research Ethical Boards of the participating institutions approved the project, and all the participants signed a consent form.

5.3.3.2 Variables and measurement tools.

5.3.3.2.1 Sociodemographic/clinical data

These variables included patient's age, sex, hand dominance, affected thumb (right/left), height, weight, ethnicity, education level, marital status, co-habiting (living with someone), employment status, occupation, potential employment loss due to TMO, and annual family income. The number of

comorbidities was assessed with the *Index of Elixhauser*[909] which includes 30 physical or mental comorbidities.

5.3.3.2.2 Pain experience

Pain duration (number of painful months since onset) and pain frequency (number of painful days/week) were recorded. Three types of pain intensity (now, on the average in the last 7 days, at its worst in the last 7 days) were measured using a 0-10 rating scale (0 = no pain and 10 = worst pain possible[910]). When patients had bilateral TMO, they answered all the questions referring to the most painful thumb. Magnitude of disability was measured with the world-widely used *QuickDASH* questionnaire,[93,911] a short version of the 30-item *Disabilities of the Arm, Shoulder and Hand*. This 11-item questionnaire assesses the level of physical function and symptoms among patients with upper limb musculoskeletal condition. The total score ranges from 0 to 100 and the higher it is, the more disabled is the patient.[93] Work productivity was measured with the *World Health Organization Health and Work Performance Questionnaire.*[912] 'Absenteeism' was assessed by the number of work hours patients reported having lost per month due to TMO pain while 'presenteeism' (defined as inadequate work performance) was rated by participants using a 0-10 scale where 0 = the worst possible performance and 10 = the best possible performance.[912] 'Absolute presenteeism' was computed by multiplying the 'presenteeism' score by 10, generating a score ranging from 0 to 100 where 0 = total lack of performance during the time on the job and 100 = no lack of performance.[912] 'Relative presenteeism' was computed by dividing the 'presenteeism' score by the overall work performance of most workers involved in the same job (0-10) as reported by the participants.[912] Psychological well-being was assessed with the *Hospital Anxiety Depression Scale* (HADS).[913,914] This scale is a well-validated 14-item questionnaire to assess anxiety and depression symptoms among non-psychiatric patients. It generates an Anxiety score and a Depression one from 0 to 21 where a higher score indicates greater distress. Anxiety Scores ≥ 10 and Depression Scores ≥ 7 are considered clinically significant.[914] Tendency to catastrophize in the face of pain was measured using the 13-item *Pain Catastrophizing Scale* (PCS)[101,915] that assesses 3 dimensions, rumination, magnification, and helplessness. The total score ranges from 0 to 52 where 52 = the highest level of catastrophization. PCS scores ≥ 30 are deemed clinically relevant.[916] Health-related QoL was measured with the widely used tool, *Short Form-12 Health Survey* (SF-12v2). [917,918] It includes 12 questions from which a physical and mental summary score (0–100) can be computed, and their interpretations are based on norm-based scores (mean = 50, standard deviation = 10).

5.3.3.2.3 Non-surgical TMO management.

Healthcare resource use was self-reported employing a similar methodology used by Lalonde et al. in their study on chronic pain. To document pharmacological modalities, participants indicated all the drugs or natural products (prescribed or over-the-counter ones) that they were taking to relieve TMO pain. Regarding non-pharmacological modalities, participants were provided a list of various modalities (e.g., cortisone injection, hyaluronic acid injection, relaxation/respiration, meditation, hand exercises, orthosis, assistive devices, ergonomic principles) and invited to indicate for each modality if they were using it, they had tried it in the past, or those they have never used it. If they used modalities not listed, they were invited to indicate them. Participants were also invited to choose from a list all the healthcare professionals they consulted for TMO pain since its onset.

5.3.3.2.4 Sample size and statistical analyses.

A sample size of 222 was needed to conduct multivariable linear regression analyses to identify biopsychosocial predictors of average pain intensity in the last 7 days, using G*Power [919] with $\alpha = 0.05$, $1-\beta = 0.80$, and $d = 0.10$ with 19 potential variables (age, sex, race, obesity, dominant side affected, pain duration, pain frequency, pain intensity, number of comorbidities, presence of other OA sites, presence of other painful conditions, family history of TMO, QuickDASH, anxiety, depression, pain catastrophizing, education, co-habiting, employment status, and family income). The following variables, age, body mass index, average pain intensity in the last 7 days, pain duration, pain frequency, pain intensity, number of comorbidities, QuickDASH, anxiety, depression, and pain catastrophizing were continuous while sex, race, dominant side affected, presence of other OA sites, presence of other painful conditions, family history of TMO, education, co-habiting, employment status, and family income were either dichotomous or categorical (see Table 18).

Descriptive statistics were used to depict the participants' demographic/clinical characteristics and the types of TMO management modality they used. To determine the contributions of the biopsychosocial factors to TMO to the variability in pain intensity and magnitude of disability, multivariable linear regression analyses were conducted using the data from participants who answered all the questions (complete case analysis). The comparability of sociodemographic/clinical characteristics between the included and excluded participants were verified with the Mann-Whitney U or Fisher's exact test. All the independent variables (biopsychosocial factors) were simultaneously entered into the models.[908] Stepwise approaches were not used to avoid eliminating important variables in favor of confounders.[908] All analyses were performed using SPSS (version 27).

5.3.4 Results

5.3.4.1 Participants.

Figure 14 presents a diagram of participant flow. Most of the participants were recruited in the tertiary/quaternary hospitals (79.4%); 11.8% of them in the private clinics; and 8.8% in the secondary-care hospitals. Their sociodemographic/clinical characteristics are presented in Table 18.

5.3.4.2 Impact of TMO on work productivity.

Among the 79 employed respondents, 13 (16.4%) reported having missed an entire or part of several workdays in the previous month due to TMO. The mean absolute presenteeism score was 76.2 ± 15.1 and the mean relative presenteeism score was 1.0 ± 0.4, suggesting that participants considered themselves as productive as most of their colleagues engaged in the same type of work. Eighteen (22.8%) reported being at risk of losing their job because of their TMO pain. Their occupations were various: dentist, dressmaker, firefighter, gardener, laboratory technician, mechanic, nurse, office worker, physiotherapist, project manager, and valet.

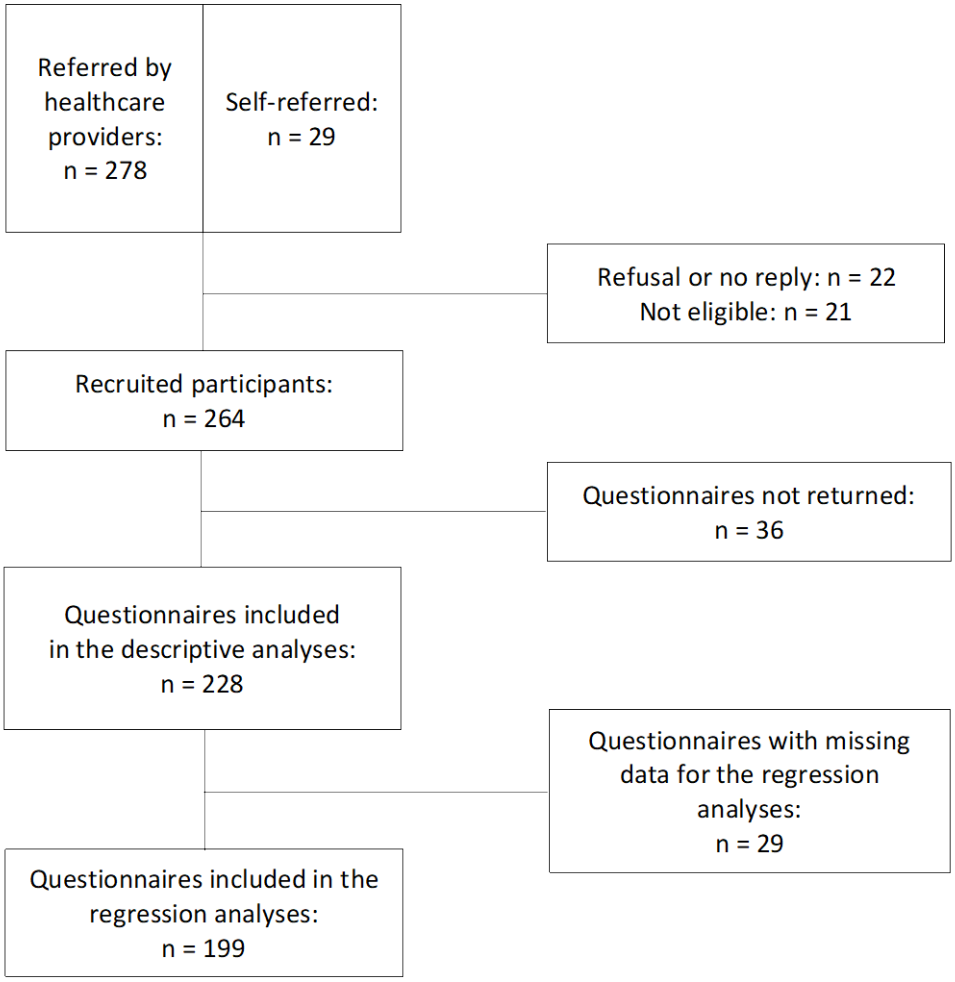

Figure 14. – Diagram of participant flow

Table 18. – Characteristics of participants (n = 228)

Variables	Mean ± SD, median (IQR), or frequency (%) Total sample (n = 228)	Mean ± SD, median (IQR), or frequency (%) Men (n = 50)	Mean ± SD, median (IQR), or frequency (%) Women (n = 178)	p value of t-test or chi-square test
Age (year)	62.6 ± 8.6	63.8 ± 8.1	62.3 ± 8.7	.47
Hand dominance (right)	188 (83.9 %)	38 (79.2%)	150 (85.2%)	.31
Dominant side affected (yes)	130 (58.3 %)	25 (52.1%)	105 (60.0%)	.32
Body mass index (kg/m^2)	27.0 ± 4.8	27.4 ± 4.7	26.8 ± 4.9	.47
Other OA site(s) (yes)	126 (55.3 %)	26 (57.8%)	100 (61.0%)	.70
Other type(s) of chronic pain (yes)	86 (50.0 %)	19 (51.4%)	67 (49.6%)	.85
Number of comorbidities (*Index of Elixhauser*)	1.4 ± 1.5	1.5 ± 1.7	1.4 ± 1.5	.81
Pain duration (months)	48.0 (IQR 24.0-84.0)	45.5 (IQR 24.0-87.0)	48.0 (IQR 24.0-82.0)	.93
Pain frequency (days/week)	5.9 ± 1.8	5.8 ± 1.9	5.9 ± 1.8	.40
Current pain intensity (0-10)	4.9 ± 2.5	5.1 ± 2.6	4.9 ± 2.5	.56
Current pain intensity categories				
No/mild (0-3)	68 (30.0 %)	17 (34.0%)	51 (28.8%)	
Moderate (4-6)	86 (37.9 %)	14 (28.0%)	72 (40.7%)	.26
Severe (7-10)	73 (32.2%)	19 (38.0%)	54 (30.5%)	
Average pain intensity during the last 7 days (0-10)	5.8 ± 2.1	5.6 ± 2.0	5.8 ± 2.2	.55
Average pain intensity categories during the last 7 days				
No/mild (0-3)	37 (16.2 %)	10 (20.0%)	27 (15.2%)	
Moderate (4-6)	93 (40.8 %)	21 (42.0%)	72 (40.4%)	.62
Severe (7-10)	98 (43.0%)	19 (38.0%)	79 (44.4%)	
Worst pain intensity during the last 7 days (0-10)	7.6 ± 1.9	7.7 ± 1.7	7.5 ± 2.0	.35
Worst pain intensity categories during the last 7 days				
No/mild (0-3)	11 (4.8 %)	1 (2.0%)	10 (5.6%)	
Moderate (4-6)	42 (18.4 %)	11 (22.0%)	31 (17.4%)	.47
Severe (7-10)	175 (76.8 %)	38 (76.0%)	137 (77.0%)	
Magnitude of disability (*QuickDASH*, 0-100, lower is better)	46.1 ± 18.6	41.8 ± 18.0	47.3 ± 18.7	.91
Quality of life (SF-12 v2, 0-100, higher is better, 50 = norm)				
Physical component	41.0 ± 9.4	43.6 ± 9.4	40.3 ± 9.3	.37
Mental component	48.7 ± 9.7	49.8 ± 9.3	48.3 ± 9.9	.48
Anxiety (*Hospital Anxiety Depression Scale,* 0-21, lower is better)	6.8 ± 4.2	6.5 ± 4.5	6.8 ± 4.1	.31
Clinically relevant (Anxiety Score ≥ 10)	60 (26.9 %)	14 (28.0%)	46 (26.6%)	.84
Depression (*Hospital Anxiety Depression Scale,* 0-21, lower is better)	4.7 ± 3.6	4.2 ± 3.5	4.9 ± 3.6	.73
Clinically relevant (Depression Score ≥ 7)	66 (29.3 %)	10 (20.4%)	56 (31.8%)	.12

Pain Catastrophizing (PSC, 0-52, lower is better)	18.3 ± 12.1	18.0 ± 12.6	18.4 ± 12.0	.35
Clinically relevant (PCS Score ≥ 30)	49 (22.5%)	12 (25.5%)	37 (21.6%)	.57
Ethnicity				
Caucasian	217 (95.6 %)	48 (96.0%)	169 (95.5%)	.70
Black	1 (0.4 %)	0 (0.0%)	1 (0.6%)	
Native American	2 (0.9 %)	1 (2.0%)	1 (0.6%)	
Hispanic	7 (3.1 %)	1 (2.0%)	6 (3.4%)	
Education				
≤ High school	68 (30.1 %)	16 (32.7%)	52 (29.4%)	.66
> High school	158 (69.9 %)	33 (67.3%)	125 (70.6%)	
Marital status				
Single, separated, divorced, widowed	72 (31.6 %)	7 (14.0%)	65 (36.5%)	**.002**
Married/common-law union	156 (68.4 %)	43 (86.0%)	113 (63.5%)	
Co-habiting				
Living alone	56 (24.6 %)	5 (10.0%)	51 (28.7%)	**.007**
Co-habiting (family, roommate, religious)	172 (75.4 %)	45 (90.0%)	127 (71.3%)	
Employment status				
Employed (full-time, part-time, homemaker, volunteer)	95 (41.9 %)	19 (38.0%)	76 (42.9%)	.53
Unemployed (retired, on disability, laid-off)	132 (58.1 %)	31 (62.0%)	101 (57.1%)	
Annual Family Income (Canadian $)				
≤ $20 000	17 (7.6 %)	4 (8.2%)	13 (7.4%)	.64
$20 000 - $34 999	29 (12.9 %)	6 (12.2%)	23 (13.1%)	
$35 000 – $49 000	33 (14.7 %)	7 (14.3%)	26 (14.9%)	
$50 000 - $64 999	27 (12.1 %)	7 (14.3%)	20 (11.4%)	
$65 000 – $79 999	18 (8.0 %)	3 (6.1%)	15 (8.6%)	
$80 000 – $99 999	21 (9.4 %)	3 (6.1%)	18 (10.3%)	
$100 000 – $119 999	16 (7.1 %)	7 (14.3%)	9 (5.1%)	
≥ $120 000	27 (12.1%)	5 (10.2%)	22 (12.6%)	
Do not wish to answer	36 (16.1 %)	7 (14.3%)	29 (16.6%)	

SD, standard deviation; IQR, interquartile range; QoL, quality of life; PCS, Pain Catastrophization Scale

5.3.4.3 Biopsychosocial factors associated with pain intensity and magnitude of disability.

The following four independent variables, *presence of other OA sites*, *presence of other painful conditions*, *family history of TMO,* and *annual family income,* were not included in the regression models due to their high rates of missing data (8.3%, 24.6%, 11.8%, and 17.6%, respectively).[908,920] Among 228 participants recruited, 29 were excluded from the regression analyses since they did not answer all the questions necessary for the analyses. The sociodemographic/clinical characteristics of the included patients and

those who were excluded were comparable ($0.23 < p < 0.98$) ensuring no selection bias related to the complete case analyses.

Results of our first multivariable linear regression model (Table 19) revealed that higher levels of pain intensity on the average in the last 7 days were significantly associated with more frequent pain and lower magnitudes of disability ($R^2 = 0.63$, adjusted $R^2 = 0.590$, $F(14, 184) = 22.3$, $p < 0.001$). Results of our second regression model showed that being female, having a lower education level, reporting higher pain intensity on the average in the last 7 days along with higher depression scores were significant predictors of greater disability ($R^2 = 0.63$, adjusted $R^2 = 0.601$, $F(14, 184) = 22.30$, $p < 0.001$). From the findings, we could summarize the relationship of these biopsychosocial factors as Figure 15.

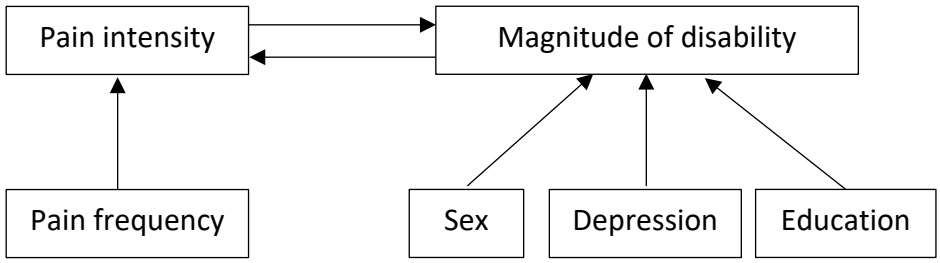

Figure 15. – Interrelationships among biopsychosocial factors, pain intensity and magnitude of disability according to the multivariable regression models.

Table 19. – Results of the multivariable linear regression analyses of average pain intensity during the last 7 days and hand disability (n = 199)

Average pain intensity during the last 7 days	Unstandardized coefficient (B)	Standardized coefficient (ß)	p
(Constant)	-1.0		.36
Age	.01	.05	.37
Sex	.08	.02	.74
Body mass index	.02	.03	.50
Dominant side affected	-.04	-.01	.83
Number of comorbidities	-.06	-.04	.45
Pain duration	-.001	-.02	.62
Pain frequency	.4	.4	**.00**
QuickDASH	.6	-.5	**.00**
Anxiety	-.02	-.03	.64
Depression	-.02	-.02	.74
Catastrophic thinking of pain	.02	.1	.07
Education	.2	-.05	.31
Co-habiting	.3	.06	.24
Employment	-.1	-.03	.55
Magnitude of disability (QuickDASH)	**Unstandardized coefficient (B)**	**Standardized coefficient (ß)**	**p**
(Constant)	-11.8		.23
Age	.2	.1	.08
Sex	4.3	.1	**.05**
Body mass index	.05	.01	.81
Dominant side affected	-1.1	-.03	.54
Number of comorbidities	.8	-.1	.23
Pain duration	.02	.05	.31
Pain frequency	.02	.002	.98
Average pain intensity	4.4	.5	**.00**
Anxiety	-.2	-.04	.58
Depression	1.6	.3	**.00**
Catastrophic thinking of pain	.2	.1	.09
Education	-5.1	-.1	**.01**
Co-habiting	2.5	.06	.24
Employment	3.6	.09	.08

5.3.4.4 Non-surgical TMO management modalities.

Table 20 and Figure 16 present the types of medication and non-pharmacological modalities the participants reported using for their TMO. Types of healthcare provider consulted are presented in Table 21. The mean number of healthcare professionals consulted per patient was 3.7 ± 1.7.

Table 20. – Types of current pain medication reported being used for TMO (n = 228)

Type of medication	Regular use (n, %)	As required (n, %)
Acetaminophen	94 (41.2)	53 (23.2)
Acetaminophen & opioid	3 (1.3)	2 (0.9)
Acetaminophen & muscle relaxant	0 (0.0)	2 (0.9)
Oral nonsteroidal anti-inflammatory drugs (NSAIDs)	34 (14.9)	38 (16.7)
Topical NSAIDs	9 (3.9)	18 (7.5)
Other anti-inflammatory drugs	1 (0.4)	0 (0.0)
Opioids	4 (1.8)	7 (3.1)
Cannabis	4 (1.8)	1 (0.4)
Antidepressants	5 (2.2)	1 (0.4)
Anticonvulsants	5 (2.2)	1 (0.4)
Muscle relaxants	1 (0.4)	0 (0.0)
Topical opioids	1 (0.4)	0 (0.0)
Topical capsaicin	1 (0.4)	0 (0.0)
Nutraceuticals/supplements	15 (6.6)	3 (1.3)
Topical natural products	3 (1.3)	6 (2.6)

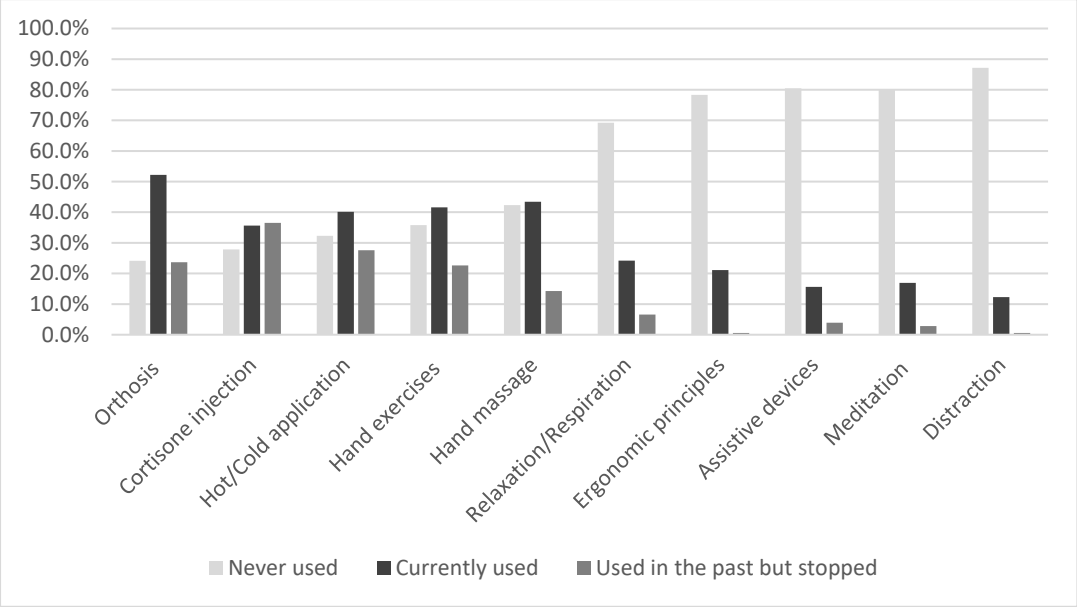

Figure 16. – Non-pharmacological methods for TMO (n = 228)

The following methods used by ≤ 10% of participants are not included: art, biofeedback, elastic bands, electro-stimulation, neuro-proprioceptive taping, hyaluronic acid injection, hypnosis, reiki, magnet therapy, pressure glove, reflexology, therapeutic touch, ultrasounds, and yoga.

Table 21. – Types of healthcare providers consulted for TMO pain

TYPE OF DISCIPLINE	Frequency (%)
MEDICAL DISCIPLINES	
Family practitioner	144 (69.2)
Plastic surgeon	120 (57.7)
Interventional radiologist	72 (34.6)
Orthopedic surgeon	43 (20.7)
Rheumatologist	41 (19.7)
Physiatrist	31 (14.9)
Anaesthesiologist	13 (6.3)
Emergency physician	10 (4.8)
Psychiatrist	2 (1.0)
Geriatrician	1 (0.5)
PHYSICAL DISCIPLINES	
Occupational therapist	66 (31.7)
Physical therapist	33 (15.9)
Osteopath	31 (14.9)
Orthosis technician	29 (13.9)
Chiropractor	24 (11.5)
Massage therapist	19 (9.1)
Kinesiotherapist	2 (1.0)
COUNSELLING DISCIPLINES	
Pharmacist	34 (16.3)
Psychologist	8 (3.8)
Nurse	3 (1.4)
Nutritionist	2 (1.0)
Social worker	1 (0.5)
ALTERNATIVE DISCIPLINES	
Acupuncturist	33 (15.9)
Naturopath	5 (2.4)
Homeopath	2 (1.0)
Others	9 (4.3)

5.3.5 Discussion

This study investigated the pain experience of patients with TMO, identified biopsychosocial factors associated with TMO pain intensity and magnitude of disability, and documented currently used non-surgical TMO management modalities.

5.3.5.1 Pain experience of patients with TMO.

This study showed that TMO's symptoms are far from being negligible: > 80% of the participants reported having experienced average pain of moderate to severe intensity during the last 7 days. Certain characteristics of our sample were similar to those of patients seeking care for TMO in a study (Becker et al, 2014)[11] which included care seekers (N = 64) and non-care seekers (N = 64) despite their radiographic TMO. The mean pain intensity of our sample was 5.8/10; that of the care seekers was 5.9/10 vs 0.6/10 for the non-care seekers.[11] Regarding sex difference, our sample was composed of 78% female participants while the Becker et al.'s care seeker group, 73%, and the non-care seeker group 48%.[11] The average scores of *Pain Catastrophizing Scale* of these three groups were: 18/51 (our sample), 20/51 (the care seeker group), 15/51 (the non-care seeker group).[11] The mean magnitude of disability of our sample was higher (46/100) than Becker et al's samples (36/100 for the care seeker group and 18/100 for the non-care seeker group).[11] Furthermore, nearly 30% of participants presented clinically significant levels of anxiodepressive symptoms, a result which is higher than 20% reported by Calfee et al.[29] Their mean physical component of QoL (SF-12v2) was one standard deviation lower than that of the general population (41.0 ± 9.4 vs 50.0 ± 10.0[917]) which was close to other studies.[24,25]

This study revealed that TMO can affect work productivity as it can constitute a cause of absenteeism and potential employment loss. Interestingly, when they were at work, patients with TMO perceived themselves as being as productive as their colleagues. This result sounds somewhat contradictory to the fact that some respondents reported being at risk of losing their job. It is tempting to speculate that they have maintained their level of work performance at the risk of developing pain.

5.3.5.2 Biopsychosocial factors associated with TMO pain severity and magnitude of disability.

Results of our multivariable regression models identified two factors associated with TMO pain severity felt on the average in the last 7 days, that is *pain frequency* and *magnitude of disability*. Kjøgx et al (2014) found that *pain frequency* moderates the relationship between *pain catastrophizing* and pain intensity.[906] *Pain frequency* may contribute to increasing pain intensity via a mechanism of temporal summation.[175,921] Repeated nociceptive stimuli would cause painful after-sensations which persist despite the cessation of

the nociceptive stimulus.[175] Once pain temporal summation is enhanced, it activates the supraspinal structures such as thalamus, somatosensory cortices, and the anterior cingulate cortex, resulting in increased pain sensitization.[175,906,921,922] The activated supraspinal sensitization would then increase attention to pain and the level of *pain catastrophizing*.[906,921-923]

Pain intensity, *depression level*, *education level* and *sex* were found to be significantly associated with magnitude of disability. The role of *depression* on disability have been well documented by several studies using multivariable regression in the TMO population[28-30,32,34] or in upper limb conditions.[924] A cross-sectional study[924] including 269 patients with a major upper limb condition (De Quervain's tendinopathy, carpal tunnel syndrome, trigger finger, ganglion cyst, mallet finger) has revealed that a QuickDASH /DASH score ≥ 55 is associated with major depression. Depressive symptoms including ineffective coping strategies and heightened illness perception may negatively affect disability.[924] The mean score of the QuickDASH in our sample was 46 which is closed to the cut-off point (55) associated with major depression.[924] This result is also consistent with the depression prevalence in our sample (30%) and the significant association we found between depression and magnitude of disability. Some earlier studies also reported such an association.[30,42] Clinically speaking, hand specialists are thus ethically obligated to refer patients to relevant resources. Accurate and timely diagnosis and treatment of mental health problems should be one of their priorities.

The participants who had a higher education than high school tended to have lower magnitude of disability. The role of *education level* on disability appear to be complex and would involve multiple factors such as economic (e.g., financial independence, access to healthcare), occupational (e.g., professional/management opportunities), behavioral (e.g., regular exercise, balanced diet, leisure activities) and social ones (e.g., social support).[925,926] It is possible that, with higher education, the participants would be less likely to have manual work physically demanding. They would have better incomes, thus more resources to accomplish their daily activities (e.g., hiring a house cleaner). Regarding *sex*, the sex difference in the QuickDASH scores have been also observed in another study.[48] It may be related to living condition (co-habiting): a significantly higher proportion of female participants (28.7%) were living alone than men (10.0%).

5.3.5.3 Non-surgical TMO management.

Acetaminophen, oral NSAIDs, and intraarticular cortisone injections were the pharmacological interventions most frequently employed by our participants. Regarding non-pharmacological modalities, most of the participants reported using or having used orthosis and hand exercises. However, only one-fifth of the respondents reported using (or having used) ergonomic techniques and assistive devices. These

modalities are considered essential for improving functional autonomy and relieve pain during activities and should be more broadly offered.[52] According to a randomized controlled trial,[25] when patients are well trained to self-manage their TMO by improving hand function through exercises and ergonomic techniques including assistive devices, no orthoses would provide additional benefits. As the efficacy of orthoses for TMO have been extensively documented,[52,53,519] offering therapeutic options adapted to patient's needs should be done. None of the participants reported using nerve mobilization. Since this technique may reduce pain sensitization,[567] it could be beneficial for this population. Psychosocial interventions were meagrely provided among our participants. Considering that greater pain severity was associated with higher levels of depression and pain catastrophizing and that about 30% of our sample had clinically relevant anxiodepressive symptoms while 20% had a significant tendency to catastrophize in the face of pain, it is plausible that a certain number of patients with TMO would benefit from psychological interventions.[32] Antidepressant medication (duloxetine), cognitive behavioral therapy, acceptance and commitment therapy, pain neurophysiology education, mindfulness mediation, and pain communication skill improvement could improve their clinical condition.[53,133,352,927-929] Moreover, some patients with TMO are at risk of work disability and some occupational risk factors (repetitive thumb movements >20/minute and insufficient break time) have been identified for TMO development.[44,45] It is thus possible that ergonomic interventions, task modification, and activity pacing would prolong their work capacity. Obtaining financial support would also be necessary to decrease stress associated with absenteeism. Therefore, multidisciplinary care is paramount to adequately tackle patients' specific needs.

5.3.5.4 Strengths and limitations of this study.

To our knowledge, the present study is the first of its kind to simultaneously integrate various biopsychosocial factors in regression models of TMO pain intensity and magnitude of disability.

The limitations of this study are as follows. First, four independent variables (*presence of other OA sites*, *presence of other painful conditions*, *family history of TMO,* and *annual family income*) were excluded from the regression models because of the high rates of missing data (> 5%) so it was not possible to assess their contribution. Second, other potential independent variables reported being associated with TMO pain in previous studies were not included in our study due to lack of resources (e.g., radiographic severity, metacarpophalangeal joint hyperextension). Third, the QuickDASH questionnaire contains 11 questions, one of which is about pain severity rated on a 5-point Likert scale. That is, the independent variable (pain intensity) is a part of the dependent variable (magnitude of disability) in the regression model. It would explain the reason why the contribution of pain intensity was the largest among the four significant predictors and vice versa. Fourth, the generalizability of this study may be restricted to Caucasians and to

those who have advanced symptomatic TMO since about 80% of the participants were recruited from the tertiary/quaternary hospitals. Fifth, this present study used a cross-sectional design so that temporal or causal associations cannot be inferred. Sixth, our results are based on patients' self-reports which are subjected to memory biases. However, they shed light on the patients' perspective reflecting their own pain experiences contrary to epidemiological studies carried out with medical administrative databases. Finally, as depression influences disability, taking antidepressants would have impacts on them. In our sample, only 6 participants were taking antidepressants, thus including this variable into our regression models was not possible.

5.3.5.5 Future research

Since some independent variables were omitted from our regression models (see the limitations of this study) due to missing data or limited resources, we need to investigate their contribution *presence of other OA sites*, *presence of other painful conditions*, *family history of TMO,* and *annual family income*, radiographic severity, metacarpophalangeal joint hyperextension, and drug use. Second, as the gap between the prevalence of radiographic and symptomatic TMO is large, more integrative models would allow us to understand why some TMO are symptomatic and others not. Third, since depression is one of independent factors for magnitude of disability, and this, in turn, would influence pain intensity. Therefore, addressing depression is paramount. The efficacy of depression treatment such as antidepressant medication or psychotherapy on magnitude of disability must thus be investigated.

5.3.6 Conclusion

Patients with TMO can experience moderate to severe pain which can affect hand function, psychological well-being, quality of life, and work productivity. Education including ergonomic principles and the use of assistive devices should be provided to all patients with TMO. Since pain experience is unique to each patient, they should benefit from the interventions most suited to their specific needs from a biopsychosocial perspective.

Chapitre 6 – DISCUSSION

L'OTM est une OA à la base du pouce qui peut engendrer une douleur vive, des incapacités fonctionnelles et affecter la vie quotidienne de la personne atteinte. Cette pathologie est le plus souvent traitée selon un modèle biomédical. Toutefois, à l'instar d'autres types de douleur chronique, la douleur associée à l'OTM est influencée par différents facteurs biopsychosociaux, alors il est primordial qu'une approche multimodale soit adoptée. De plus, la gestion de cette pathologie est souvent sous-optimale due à une méconnaissance de la maladie et l'absence de guide de pratique clinique spécifique à l'OTM. Les objectifs de cette thèse étaient donc de documenter l'efficacité de l'ensemble des interventions pour l'OTM, d'investiguer l'impact de cette pathologie (sévérité de la douleur, incapacités fonctionnelles, QdV, bien-être psychologique, productivité), d'examiner les facteurs biopsychosociaux qui influencent la douleur et des incapacités fonctionnelles, et de documenter l'utilisation des ressources en santé que font les personnes atteintes d'OTM symptomatique. Les principaux résultats, les contributions à la pratique clinique, les forces et les limitations des travaux de cette thèse, ainsi que des avenues de recherche futures sont décrits dans les prochaines sections du présent chapitre.

6.1 Principaux résultats et éléments de discussion

6.1.1 Principaux résultats des revues narratives

La première revue narrative effectuée dans cette thèse[133] a été rédigée en vue de conscientiser les cliniciens œuvrant dans le domaine de la thérapie de la main à l'importance de tenir en compte les aspects psychologiques de la douleur car le modèle biomédical prédomine dans les milieux de soins. La deuxième revue narrative[337] a abordé plus en détail les composantes psychosociales de la douleur arthrosique. Les modalités d'interventions adressant ces facteurs et qui s'appuient sur des données probantes ont été également identifiées dans ces deux revues.

Les principaux résultats des deux revues narratives effectuées dans la présente thèse[133,337] sont résumés de la façon suivante : les deux prochaines sous-sections décrivent brièvement les mécanismes par lesquelles des facteurs psychologiques influencent la douleur (6.1.1.1 « Mécanismes neurophysiologiques de la douleur et des facteurs psychologiques ») et les réponses immunitaires (6.1.1.2 « Système immunitaire et facteurs psychologiques »). Elles sont suivies des sections 6.1.1.3 « Composantes

psychologiques de la douleur et modalités thérapeutiques ciblant ces composantes en thérapie de la main » et 6.1.1.4 « Composantes psychosociales associées à la douleur arthrosique et modalités thérapeutiques ciblant ces composantes » résumant nos deux revues narratives menées afin d'identifier des facteurs psychosociaux qui influencent la douleur chez les individus atteints d'OTM.

6.1.1.1 Mécanismes neurophysiologiques de la douleur et facteurs psychologiques

Les mécanismes neurophysiologiques de la douleur impliquent des voies périphériques, ascendantes et descendantes.[169] Les voies périphériques transmettent les stimuli des nocicepteurs à la corne dorsale de la moelle épinière. Ces stimuli seront ultérieurement relayés par voies ascendantes au thalamus et aux aires somatosensorielles corticales primaires/secondaires spécialisées dans la dimension sensori-discriminante de la douleur, ainsi qu'aux aires préfrontales, limbiques et mésolimbiques, impliquées dans les dimensions cognitives, affectives et motivationnelles de la douleur (cortex préfrontal, amygdale, cortex cingulaire antérieur, insula, hippocampe, noyau accumbens, et tegmentum ventral).[143,166] Les voies descendantes projetées de la partie cognitivo-affectivo-motivationnelle du cerveau vers la corne dorsale spinale peuvent à leur tour moduler les stimuli nociceptifs ascendants.[172] Ainsi, des facteurs psychologiques influencent la sévérité de la douleur. Lorsque la nociception est amplifiée dans le système nerveux central, une hypersensibilité aux stimuli nociceptifs se produit, ce phénomène est appelé une sensibilisation centrale.[181]

6.1.1.2 Système immunitaire et facteurs psychologiques

Dans les conditions normales, l'axe hypothalamo-hypophyso-surrénalien (HHS) supprime les réponses pro-inflammatoires en libérant le cortisol du cortex surrénalien.[370,377-379] Lorsque les réponses inflammatoires deviennent excessives telles qu'observées dans l'arthrite, elles peuvent endommager les structures corporelles plus que l'agent pathogène lui-même.[375,376] Sous un stress psychologique (ex. : conflit social, fragilité socioéconomique), lorsque le cortisol et les cytokines pro-inflammatoires augmentent en même temps, les cellules immunitaires deviennent moins sensibles aux effets anti-inflammatoires des glucocorticoïdes.[367-370,380-383] Lorsque le stress devient chronique, il provoque des changements dans l'hippocampe, le cortex préfrontal et l'amygdale, lesquelles structures sont impliquées dans la régulation des émotions et les réponses inflammatoires.[361,381,384] La dépression et l'anxiété peuvent aussi altérer les réponses du système immunitaire et prolonger une inflammation[366-370] à travers le système nerveux sympathique et l'axe HHS.[370,385,386]

6.1.1.3 Composantes psychologiques de la douleur et modalités thérapeutiques ciblant ces composantes en thérapie de la main

Les facteurs cognitifs qui ont été identifiés comme pouvant moduler la sévérité de la douleur arthrosique et les incapacités fonctionnelles incluent le sentiment d'efficacité,[205-211] le catastrophisme face à la douleur,[142,205,207,208,214-221] le sentiment d'injustice,[206,213,222,224,225] les pensées négatives en lien avec la douleur,[147,205,227] la fusion cognitive,[229-231] l'inflexibilité psychologique[232,235-237] et l'intrusion cognitive de la douleur.[163] Quant aux facteurs émotionnels pouvant avoir un impact sur l'expérience de la douleur chez les personnes arthrosiques, ils comprennent la dépression,[207,209,216,240-246] l'anxiété,[142,190,207,247] l'hypochondrie,[252-255] la colère,[224,256-259] la peur-l'évitement[135,263-266] et l'affectivité négative.[269,270] Les modalités thérapeutiques ciblant les facteurs psychologiques qui pourraient être dispensées par des cliniciens non-psychologues ou non-psychothérapeutes comprennent l'éducation neurophysiologique de la douleur,[211,221,288-296] l'exposition graduelle,[301,305] le *Cognition-Targeted Exercise Therapy*,[306] le *Progressive Goal Attainment Program*,[930] et des programmes d'auto-gestion.[315] Les interventions offertes par des psychologues ou psychothérapeutes comprennent la thérapie cognitivo-comportementale,[316-319] l'entrainement aux habiletés de pleine conscience[321,327-329] et la thérapie d'acceptation et d'engagement.[232,235,332-335]

6.1.1.4 Composantes psychosociales associées à la douleur arthrosique et modalités thérapeutiques ciblant ces composantes

Des symptômes anxiodépressifs,[40,131,394] le catastrophisme face à la douleur,[32,395-397] des styles d'adaptation *(coping)* à la douleur,[395] la kinésiphobie,[399] la somatisation,[400-402] le sentiment d'efficacité face à la douleur,[396,397,403] l'optimisme,[404] la résilience psychologique,[404,405] les attentes par rapport au traitement, le sentiment d'efficacité pour la communication de la douleur,[407] un affect positif,[408] des traits de personnalité limite,[409] la fonction cognitive (ex. : mémoire, rappel, attention),[399,410] la pleine conscience (*mindfulness*),[411] la scolarité,[131,399] la cohabitation,[131] la tension conjugale,[412] et la confiance du conjoint[413] peuvent influencer positivement ou négativement l'expérience de la douleur chez les personnes atteintes d'arthrose. Diverses interventions psychologiques (thérapie cognitivo-comportementale, hypnose, entrainement aux habiletés à composer avec la douleur (*coping skills)*, thérapie de soutien, imagerie),[434] l'éducation en neurosciences de la douleur,[437] la thérapie d'acceptation et d'engagement[438] et la méditation en pleine conscience [439] peuvent améliorer l'expérience de la douleur arthrosique.

6.1.2 Principaux résultats du Volet I

En ce qui concerne l'efficacité des interventions non-chirurgicales et chirurgicales, la qualité de la majorité des preuves était faible sauf pour une étude.[554] Bien que des preuves d'une telle qualité puissent être considérées comme étant peu fiables, il faut tenir compte du fait qu'il est presque impossible de générer des preuves robustes dans les domaines non-pharmacologiques en raison de nombreux obstacles à la tenue d'essais randomisés contrôlés de haute qualité (ex. : mise en aveugle impossible à cause de la nature visible des interventions). Si nous jugeons systématiquement les preuves de faible qualité comme non fiables, ce domaine de recherche ne générera jamais de nouvelles preuves par le biais d'une revue systématique (RS) à moins que les essais cliniques homogènes cumulés n'atteignent un échantillon groupé de 400 et tous les efforts déployés par les chercheurs seraient totalement vains. Ainsi, nous suggérons de considérer des preuves de faible qualité dans ce contexte comme « les meilleures preuves disponibles ». En effet, une taille d'effet très faible à faible soutenue par des preuves de faible qualité n'indiquerait rien, tandis qu'une taille d'effet moyenne à élevée pourrait au moins suggérer une certaine supériorité d'une intervention par rapport à une autre. De cette perspective, on peut conclure à l'efficacité des interventions non-chirurgicales et chirurgicales pour l'OTM comme suit.

6.1.2.1 Efficacité des interventions non-chirurgicales pour l'OTM

Des preuves de qualité faible à modérée appuyaient la supériorité en termes d'efficacité des modalités non-chirurgicales suivantes en ce qui a trait à la douleur et/ou aux incapacités fonctionnelles: (1) l'injection intra-articulaire de solution saline par rapport à l'injection intra-articulaire de cortisone[554]; (2) les injections de solution saline dans les zones sous-cutanées sensibles par rapport aux injections simulées[563]; (3) l'orthèse de pouce en thermoplastique faite sur mesure par rapport au contrôle (aucune intervention)[550] ou aux soins habituels[559]; (4) l'orthèse de l'articulation trapézo-métacarpienne (orthèse de pouce sans inclure l'articulation métacarpo-phalangienne) en thermoplastique fabriquée sur mesure par rapport au contrôle (aucune intervention)[572]; (5) la mobilisation du nerf radial par rapport à l'ultrason simulé[567]; et (6) une combinaison d'exercices de la main, d'une mobilisation de l'articulation trapézo-métacarpienne et de la mobilisation nerveuse médiane/radiale par rapport à l'ultrason simulée.[455,568]

Certains de ces résultats sont cohérents avec ceux des RS précédentes concernant l'efficacité de l'injection intra-articulaire de solution saline par rapport à l'injection de cortisone (*National Institute for Health and Care Excellence*)[359] et une combinaison d'exercices de la main et de mobilisation articulaire et nerveuse (Bertozzi et al.).[455] Par ailleurs, nos conclusions sur l'efficacité des orthèses de pouce

divergeaient de la RS de Bertozzi et al.[455] Cependant, ces auteurs ont inclus des données de patients atteints d'OA de la main autres que l'OTM, ce qui pourrait expliquer la divergence de leurs résultats.

6.1.2.2 Efficacité des interventions chirurgicales pour l'OTM

Des preuves de faible qualité ont révélé des effets supérieurs des interventions chirurgicales suivantes pour la douleur, les incapacités fonctionnelles, la satisfaction de traitement et/ou les événements indésirables: (1) la trapézectomie (T) par voie postérieure par rapport à la T+RLIT en utilisant ½ flexor carpi radialis (FCR) et le tunnel métacarpien (TM)[719,720,726] ou abductor pollicis longus (APL) et FCR[717]; (2) la T par rapport à la T+IT en utilisant le palmaris longus (PL)[720]; (3) la T+LR avec ½FCR-TM par rapport à la T+RLIT avec ½FCR-TM[724]; (4) la T par voie antérieure par rapport à la T par voie postérieure[725]; (5) la T+LRIT en utilisant ½FCR-TM par rapport à la T+IT avec PL[720]; et (6) la T+arthroplastie par distraction d'hématome par rapport à la T+RL en utilisant APL-TM-FCR.[730] L'utilisation du matériau métallique (plaque et vis) et des implants comme GraftJacket®, Swanson® et Permacol® entraînerait des complications plus importantes que l'autogreffe.[62,716,727,728,732] L'utilisation des implants a aussi été associée à des taux de complications plus élevés selon une large étude longitudinale britannique (2021)[459] et une RS comparant les implants et la trapézectomie suivie d'autres types de chirurgie (2021).[931]

Nos résultats diffèrent de ceux de la RS de Wajon et al.[67] Ils n'ont pas identifié, entre autres, de bénéfice supplémentaire d'une procédure par rapport à une autre en termes de douleur, d'incapacités fonctionnelles et d'événements indésirables. Les divergences entre leurs conclusions et les nôtres sont en partie dues aux interprétations différentes de « non statistiquement significatif ». Ces auteurs ont en effet interprété un résultat non significatif comme « absence de différence d'effet » sur la base d'une valeur P arbitraire.[898] Or, selon la *Cochrane Collaboration*,[898] il devrait être interprété comme « absence de preuve solide » plutôt que « absence d'effets », ce que nous avons fait dans notre SR. De plus, nous avons inclus dans notre SR les articles publiés avant le 4 juillet 2018 alors que Wajon et al ont inclus ceux publiés avant le 8 août 2013. Par conséquent, notre RS a ajouté six essais randomisés contrôlés.[728-733]

6.1.3 Principaux résultats du Volet II

6.1.3.1 Caractéristiques des patients aux prises avec de l'OTM et ses impacts

Les 228 participants à l'étude étaient âgés en moyenne de 63 ans et la majorité était des femmes (78,1%). La sévérité de leur douleur associée était loin d'être négligeable : plus de 80% des participants rapportaient des intensités de douleur modérées à sévères (≥ 4/10) en moyenne au cours des 7 derniers jours. Quant

aux niveaux de douleur maximale pour la même période, 95,2% des patients les cotaient ≥ 4/10. Les participants ont aussi rapporté des effets négatifs de l'OTM dans différentes sphères de leur vie quotidienne. Leur score moyen du QuickDASH qui mesure les incapacités physiques était de 46,1 sur 100, ce qui correspond à une fonction modérément affectée. Le score moyen de la composante physique de la QdV évaluée avec le SF-12v2 était d'un écart-type plus bas que celui dans la population générale (41,0 ± 9,4 vs 50,0 ± 10,0). Un répondant sur six (16,5%) parmi les 79 qui étaient sur le marché du travail a rapporté s'être absenté des journées partielles ou complètes au cours du dernier mois et 22,7% (18) étaient à risque de perdre leur emploi à cause de l'OTM. Nos résultats suggèrent par ailleurs que le bien-être psychologique des personnes atteintes d'OTM symptomatique serait relativement peu touché. Cependant, il convient de noter que plus d'un répondant sur quatre rapportait des scores significatifs d'anxiété (26,9%) et dépression (29,3%), ce qui est loin d'être dérisoire. Les caractéristiques de notre échantillon étaient semblables aux résultats des études antérieures[24,32,34,42,48,95,634] en termes d'âge, de sexe, d'intensité de la douleur, d'incapacités fonctionnelles, du catastrophisme face à la douleur ou de qualité de vie.

Quant aux facteurs associés à une plus grande sévérité de douleur, le modèle de régression multivariable a démontré qu'une douleur plus fréquente (nombre de jours/semaine) et un niveau plus important d'incapacités fonctionnelles expliquaient 59,0% de la variance. En ce qui a trait à la sévérité des incapacités fonctionnelles, le sexe féminin, des intensités de douleur importantes, des scores de dépression élevés et un niveau d'éducation moindre expliquaient 60,1% de la variance. Certains des facteurs identifiés dans les modèles de régression sont modifiables, ce qui présage que des interventions thérapeutiques ciblant ces facteurs pourraient contribuer à diminuer la sévérité de la douleur et les incapacités fonctionnelles.

6.1.3.2 Gestion non-chirurgicale de l'OTM

Les traitements non-chirurgicaux que les participants rapportaient utiliser ou avoir utilisés comprenaient le port d'orthèses, des injections intra-articulaires de cortisone, des applications de chaleur/froid, des exercices et des massages de la main, de l'acétaminophène et des AINS oraux. Seul un cinquième des répondants ont déclaré utiliser (ou avoir utilisé) des principes ergonomiques et des aides techniques. Ces modalités sont considérées comme essentielles pour améliorer l'autonomie fonctionnelle et soulager la douleur pendant les activités et devraient être plus largement proposées aux patients.[52] En effet, lorsque les patients sont bien formés pour gérer eux-mêmes leur OTM en améliorant la fonction de la main par des exercices, des principles ergonomiques et des aides techniques, aucune orthèse n'apporterait

davantages supplémentaires.[25] Enfin, l'utilisation d'interventions psychosociales était rarement rapportée parmi les participants, un résultat qui montre que le modèle biomédical continue d'être largement employé par les cliniciens œuvrant dans ce domaine.

6.1.4 Analyses intégrant l'ensemble des travaux

6.1.4.1 Relation entre les facteurs associés à la douleur et aux incapacités fonctionnelles des personnes vivant avec l'OTM symptomatique

Les résultats de notre étude transversale (Volet II) vont dans le même sens que ceux de nos deux revues narratives à savoir que des facteurs psychosociaux peuvent avoir un impact sur la sévérité de la douleur et des capacités fonctionnelles chez les personnes ayant des affections de la main[133] ou des OA. [337] Ainsi, notre étude transversale a montré que des symptomes dépressifs élevés ainsi que des niveaux d'éducation moindres pourraient contribuer à la sévérité des limitations des capacités fonctionnelles chez les individus souffrant de l'OTM symptomatique (Figure 15). Les limitations fonctionnelles à leur tour pourraient augmenter l'intensité de la douleur. Selon nos modèles, la relation douleur-incapacité est bidirectionnelle, démontrant l'interdépendance entre ces deux variables. Il n'est pas difficile d'imaginer que des intensités élevées de douleur augmentent les incapacités fonctionnelles. Les incapacités fonctionnelles peuvent aussi augmenter la sévérité de la douleur. Par exemple, un déficit de sommeil peut perturber les mécanismes neurologiques de modulation de la douleur, notamment par les systèmes opioïdergiques et monoaminergiques (sérotonine, norépinephrine, dopamine) et affecter l'axe hypothalamo-hypophyso-surrénalien (HHS), celui-ci devenant hyper-réactif et augmentant par ricochet le niveau d'inflammation et la douleur.[932] Un déconditionnement physique peut aussi empirer la douleur.[264] En effet, le phénomène de déconditionnement est couramment observé chez les individus atteints d'OTM : raideur à la base du pouce,[28,34,55,83] limitations de la mobilité du pouce[23] et réduction de la force de la main.[83-87] Aux stades avancés, de l'atrophie musculaire à la base du pouce peut être présente.[55] À cause de ces limitations, les individus n'ont pas la capacité manuelle pour réaliser certaines tâches, ils se forcent, causant davantage de stress sur l'articulation trapézo-métacarpienne et les tissus mous entourant cette articulation (ex. : tendino-musculaire, ligamentaire), provoquant d'autres douleurs.

Notre modèle a démontré une relation entre les niveaux de dépression et les capacités fonctionnelles tout comme l'ont montré de nombreuses études [40,131,207,209,216,240-246,394] identifiées dans nos deux revues narratives.[133,337] En effet, la dépression est reconnue comme une des principales causes de

handicap dans le monde.[933-935] Il y a de nombreux symptômes dépressifs tels qu'une humeur morose, une perte de plaisir ou d'intérêt pour les activités, des difficultés de concentration, un sentiment de culpabilité ou dévalorisation de soi, un sentiment de désespoir face à l'avenir, un sommeil perturbé, un sentiment de grande fatigue et des pensées suicidaires.[935] Ces symptômes rendent difficile le fonctionnement personnel, familial, social, éducatif, professionnel et/ou dans d'autres domaines.[935]

Notre modèle de régression multivariable n'a pas démontré d'associations significatives entre l'intensité de la douleur et les facteurs psychologiques inclus (anxiété, dépression, catastrophisme). Ne serait-ce que les analyses univariables ont montré leurs associations significatives (anxiété $r = 0,219$, $p = 0,001$; dépression $r = 0,331$, $p < 0,0001$; catastrophisme $r = 0,384$, $p < 0,0001$). Il est possible que ces facteurs soient des médiateurs de la relation entre la douleur et les incapacités tel que suggéré par le modèle peur-évitement (MPÉ) de Vlaeyen.[264] Selon ce modèle, le catastrophisme est un précurseur de la peur (l'anxiété) d'avoir mal ce qui induit un évitement des activités jugées douloureuses par la personne. Cet évitement, s'il est prolongé, peut donner lieu à un déconditionnement, des incapacités fonctionnelles et de la dépression, et ensuite une augmentation de la douleur par la suite. Bien que cette séquence cyclique du MPÉ soit empiriquement contestée,[395,399,936-938] que la valeur prédictive de la peur de la douleur soit remise en question,[395,399,938,939] et que d'autres facteurs psychologiques potentiels (ex. : sentiment d'efficacité,[396,397,403] optimisme[404]) n'y soient pas intégrés, le MPÉ suggère que le catastrophisme, la peur, l'anxiété et la dépression sont des médiateurs de la relation entre la sévérité de la douleur et les incapacités fonctionnelles (Figure 17). Ceci pourrait expliquer la raison pour laquelle les facteurs psychologiques sont disparus de notre modèle de régression multivariable de sévérité de la douleur. D'autant plus, d'autres facteurs associés à la sévérité de la douleur ou des incapacités fonctionnelles, soit la fréquence de la douleur et le niveau d'éducation, sont associés à ces facteurs psychologiques selon nos analyses univariables faiblement, mais significativement. Les corrélations entre la fréquence de la douleur et le catastrophisme, l'anxiété et la dépression sont $r = 0,119$, $p = 0,048$; $r = 0,221$, $p = 0,001$; $r = 0,204$, $p = 0,002$ respectivement. Une explication possible est que la douleur fréquente active les structures cérébrales impliquées dans la perception de la douleur (ex. : le thalamus, les cortex somatosensoriels et cingulaire antérieure), résultant en sensibilisation douloureuse,[175,906,921,922] augmentant ainsi l'attention à la douleur et le niveau de catastrophisme.[906,921-923] Quant aux niveaux d'éducation élevés (> école secondaire), ils semblent avoir un effet protecteur contre ces facteurs psychologiques (catastrophisme $r = - 0,283$, $p < 0,0001$; anxiété $r = - 0,175$, $p = 0,007$; dépression $r = - 0,115$, $p = 0,053$).

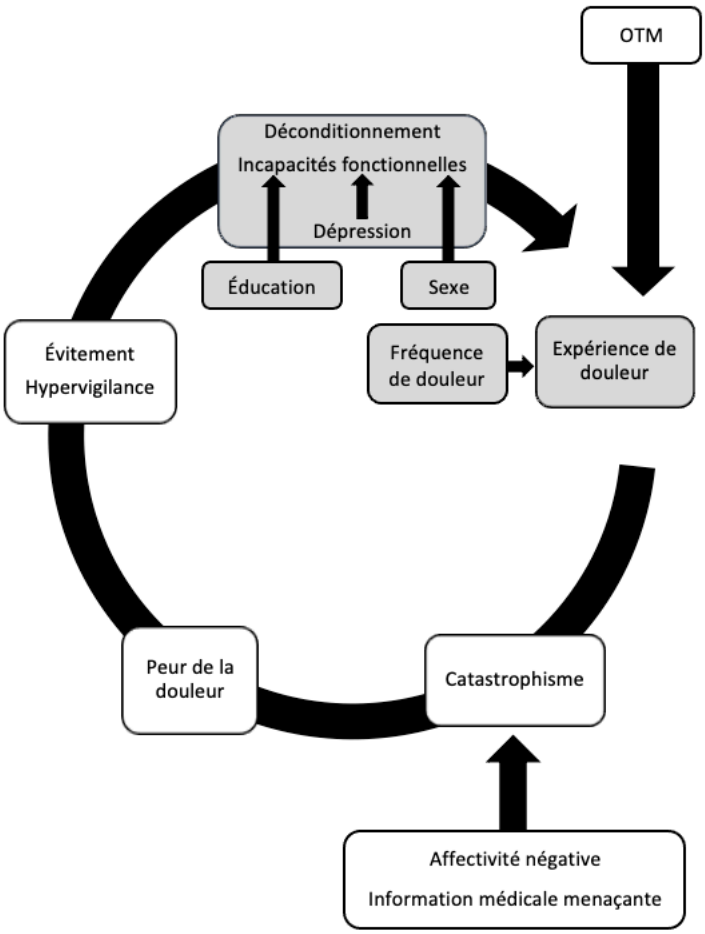

Figure 17. – Modèle peur-évitement adapté à l'OTM expliquant les relations entre les facteurs associés à la sévérité de la douleur et des incapacités fonctionnelles

Les bulles grises sont les facteurs associés à la sévérité de la douleur et des incapacités fonctionnelles dans nos modèles multivariables de notre étude transversale (Volet II).

En résumé, une douleur plus fréquente et un niveau plus important d'incapacités fonctionnelles sont associés à une plus grande sévérité de douleur. En ce qui a trait à la sévérité des incapacités fonctionnelles, le sexe féminin, des intensités de douleur importantes, des scores de dépression élevés et un niveau d'éducation moindre y sont associés. Certains facteurs psychologiques comme le catastrophisme ou l'anxiété pourraient aussi contribuer à la sévérité de la douleur et des incapacités fonctionnelles en tant que médiateurs de la relation entre ces deux variables.

6.1.4.2 Types d'interventions recommandés

Le tableau 22 intègre les résultats de nos revues narratives,[133,337] de nos revues systématiques (Volet I)[519,862] et de l'étude transversale (Volet II) en les ajoutant aux recommandations pour l'OA de la main élaborées par *l'European League Against Rheumatism* (EULAR)[52] et *l'American College of Rheumatology* (ACR).[53] Les recommandations sont ainsi devenues plus spécifiques à l'OTM et la section « Approche psychosociale » y est plus bonifiée. Bien que les facteurs psychologiques jouent un rôle important quant aux incapacités fonctionnelles et à la sévérité de la douleur, les recommandations de l'EULAR ne ciblent que les aspects physiques tandis que l'ACR discute des approches psychosociales, mais ce, minimalement. De plus, les auteurs se contentent de recommander des programmes d'auto-efficacité et d'auto-gestion multidisciplinaires visant à renforcer le sentiment d'efficacité et les compétences personnelles ainsi que la thérapie cognitive-comportementale. Alors il y a une lacune dans leurs recommandations à cet égard.

Tableau 22. – Recommandations de l'EULAR et de l'ACR pour la gestion de l'OA de la main auxquelles sont ajoutées les suggestions issues de la présente thèse

EULAR[52]	ACR[53]
Principes généraux	
• Le but primaire de la gestion de l'OA de la main est **de contrôler les symptômes** (ex. : douleur, raideur) et **d'optimiser la fonction de la main**, afin de **maximiser des activités, la participation et la QdV**. • Tous les patients devraient se voir offrir des **informations sur la nature et le cours de la maladie**, ainsi que de **l'éducation sur les principes d'autogestion** et des **options de traitement**. • La gestion de l'OA de la main devrait être **personnalisée** en tenant compte de sa localisation et de sa sévérité, ainsi que des comorbidités. • La gestion de l'OA de la main devrait être basée sur **la décision partagée** entre le patient et le professionnel de la santé. • La gestion optimale de l'OA de la main nécessite **une approche multidisciplinaire**. En plus des modalités non-pharmacologiques, des options pharmacologiques et chirurgicales devraient être considérées.	• **Un plan de traitement compréhensif** pour la gestion d'OA pourrait inclure des interventions éducationnelles, comportementales, psychosociales et physiques, ainsi que des médications topiques, orales et intra-articulaires. • Le choix des traitements devrait être en partie basé sur **les croyances et les préférences du patient**, ainsi que sur **son état médical**. Comorbidités, traumatismes, sévérité de la maladie, antécédents chirurgicaux, et accessibilité aux soins devraient être considérés.
Approche pharmacologique	
• Des **traitements topiques** sont préférables aux traitements systémiques pour des raisons de sécurité. Des **AINS topiques** sont le premier choix pharmacologique. • Des **analgésiques oraux**, surtout des **AINS** devraient être considérés pour une durée limitée afin de soulager les symptômes. Le **paracétamol** et le **tramadol** (avec ou sans paracétamol) peuvent être utilisés, toutefois, il n'y a pas de preuves solides pour appuyer leur efficacité. • Le **sulfate de chondroïtine** pourrait être utilisé pour diminuer la douleur et améliorer la fonction. • L'**injection intra-articulaire de cortisone** ne devrait pas être utilisée en général, à moins qu'il y ait de l'inflammation. Elle peut être considérée pour des OA interphalangiennes douloureuses. • Les patients avec de l'OA de la main ne devraient pas être traités avec des **médicaments conventionnels** ou des **antirhumatismaux modificateurs de la maladie**.	• Des **AINS oraux** sont fortement recommandés. • Des **AINS topiques,** l'**acétaminophène,** le **tramadol**, la **duloxétine** et la **chondroïtine** sont conditionnellement recommandés. • Des **injections intra-articulaires de cortisone** sont conditionnellement recommandées comparativement à d'autres formes d'injection incluant de l'acide hyaluronique. • Les **bisphosphonates**, la **glucosamine**, l'**hydroxychloroquine**, la **méthotrexate**, les **inhibiteurs du facteur de nécrose tumorale** et l'**antagoniste au récepteur de l'interleukine 1** ne sont pas recommandés et ce, fortement. • De façon conditionnelle, des **injections intra-articulaires de l'acide hyaluronique,** la **capsaïcine topique,** la **colchicine,** les **opioïdes autres que le tramadol, l'huile de poisson** et la **vitamine D** ne sont pas recommandés.
⇒ **La première RS[519] (Volet I) de cette thèse ajoute les informations suivantes pour la gestion de l'OTM :**	

- Des injections de solution saline dans les zones sous-cutanées sensibles[563] sont recommandées pour diminuer la douleur et améliorer les capacités fonctionnelles.
- L'injection intra-articulaire de solution saline, généralement considérée comme un agent inactif, était plus efficace que l'injection de cortisone pour diminuer la douleur à court et à long terme.[554] La recherche ultérieure afin de déterminer si l'injection de solution saline pourrait représenter une option thérapeutique pour l'OTM est recommandée.

Approche conservatrice non-pharmacologique (physique)

- De l'**éducation** et de l'**entraînement aux principes ergonomiques, des activités modérées** et **l'utilisation d'aides techniques** devraient être offerts à tous les patients.
- Des **exercices pour améliorer la fonction et la force musculaire et pour diminuer la douleur** devraient être considérés pour tous les patients.
- Des **orthèses** devraient être considérées **pour l'OTM** afin de diminuer les symptômes. Une utilisation à long terme est préconisée.
- Des **exercices** et des **programmes d'auto-efficacité et d'autogestion** sont fortement recommandés.
- Des **orthèses** sont fortement recommandées **pour l'OTM**.
- Des **interventions thermales** (chaleur humide, diathermie, ultrason, chaleur/froid, paraffine) sont conditionnellement recommandées.
- Le **taping neuro-proprioceptif** est conditionnellement recommandé **pour l'OTM**.
- De façon conditionnelle, l'**ionophorèse** n'est pas recommandée **pour l'OTM**.

⇒ **La première RS[519] (Volet I) de cette thèse ajoute les informations suivantes pour la gestion de l'OTM:**

- Types d'orthèse recommandés : orthèse de pouce en thermoplastique faite sur mesure (portée durant la journée[550] ou la nuit[559]) ; orthèse de l'articulation trapézo-métacarpienne (TM) en thermoplastique fabriquée sur mesure (portée lors des activités manuelles).
- La mobilisation nerveuse (nerf radial) est recommandée pour diminuer la douleur.[567]
- Types d'exercices recommandés : mobilisation et renforcement du pouce[546] et de la main[455,568] plutôt que de se limiter à l'articulation TM.
- La combinaison d'exercices de la main, de la mobilisation de l'articulation TM et de la mobilisation nerveuse (médiane/radiale) est recommandée pour diminuer la douleur.[455,568]

Approche chirurgicale

- Une **chirurgie** devrait être considérée pour les patients atteints d'anomalies structurales si d'autres modalités ne sont pas efficaces pour soulager la douleur. Une **trapézectomie** devrait être considérée pour l'OTM. La réadaptation devrait être offerte après la chirurgie.

⇒ **La deuxième RS[862] (Volet I) de cette thèse ajoute les informations suivantes pour la gestion de l'OTM:**

- La trapézectomie (T) par voie postérieure est préférable à la T+RLIT en utilisant ½FCR-tunnel métacarpien (TM)[719,720,726] ou APL-FCR[717] pour minimiser le nombre d'événements indésirables.
- La T par voie postérieure est préférable à la T+IT en utilisant PL pour réduire la douleur.[720]
- La T+LR avec ½FCR-TM à la T+RLIT avec ½FCR-TM pour améliorer la fonction physique.[724]
- La T par voie antérieure est préférable à la T par voie postérieure pour une meilleure satisfaction du traitement et pour minimiser le nombre d'événements indésirables.[725]
- La T+LRIT en utilisant ½FCR-TM est préférable à la T+IT avec PL pour réduction de la douleur.[720]
- La T+arthroplastie par distraction d'hématome est préférable à la T+RL en utilisant APL-TM-FCR pour réduire la douleur, améliorer la fonction physique et diminuer le risque d'événements indésirables.[730]

• L'utilisation du matériel métallique (plaque/vis) et des implants fabriqués (GraftJacket®, Swanson® et Permacol®) entraîne des complications plus importantes que l'autogreffe.[62,716,727,728,732]	
Approche psychosociale	
	• **La thérapie cognitivo-comportementale** est conditionnellement recommandée.
⇒ **Selon les revues narratives[133,337] et l'étude descriptive[900] (Volet II) de cette thèse :** • Puisque les facteurs psychologiques (ex. : catastrophisme,[32,142,205,207,208,214-221,395-397] anxiété,[40,131,142,190,207,247,394] dépression[40,131,207,209,216,240-246,394]) peuvent augmenter la douleur, diminuer les capacités fonctionnelles et affecter la qualité de vie (physique et mentale), dépister ces facteurs est primordial. ⇒ **Selon les revues narratives[133,337] :** • Lorsque tels facteurs sont détectés chez le patient, ce dernier pourrait bénéficier de l'éducation neurophysiologique de la douleur,[211,221,288-296,437] l'exposition graduelle,[221,300-303,305] le *Progressive Goal Attainment Program* (PGAP),[930] la thérapie cognitivo-comportementale,[316,317,438,940] la thérapie d'acceptation et d'engagement,[235,438] et la méditation en pleine conscience.[439] ⇒ **Selon l'étude descriptive[900] (Volet II) :** • Les patients bénéficieraient d'interventions multidisciplinaires telles que l'adaptation ergonomique des outils, la modification des tâches, la modération des activités (*activity pacing*), et une implication accrue de leurs employeurs. • L'obtention d'un soutien financier faciliterait la prise de congés du travail pour se rendre à des rendez-vous médicaux et paramédicaux, diminuant le stress associé.	
Approche en médecine alternative	
	• **L'acupuncture** est conditionnellement recommandée.

ACR, *American College of Rheumatology*; AINS, anti-inflammatoires non stéroïdiens ; APL, abductor pollicis longus; EULAR, *European League Against Rheumatism* ; FCR, flexor carpi radialis; IT, interposition tendineuse; RL, reconstruction ligamentaire; OTM, ostéoarthrose trapézo-métacarpienne; PL, palmaris longus ; RS, revue systématique ; T, trapézectomie ; TM, tunnel métacarpien.

6.1.4.3 Lacunes dans la gestion non-chirurgicale de l'OTM au Québec

En comparant les données sur la gestion non-chirurgicale de l'OTM provenant de l'étude transversale (Volet II) avec les recommandations énoncées dans le tableau 22, on constate qu'il y a des lacunes dans la gestion non-chirurgicale de cette pathologie au Québec. Ces lacunes sont explicitées dans les sous-sections suivantes.

6.1.4.3.1 Interventions pharmacologiques

L'*acétaminophène* était le médicament le plus utilisé chez nos participants avec une prise régulière ou au besoin (2/3 des participants). Des *AINS oraux* ont été utilisés par 1/3 des participants tandis que des *AINS topiques*, seulement par 1/10. Selon l'EULAR, des AINS topiques sont considérés de première ligne pour

des raisons de sécurité car leurs effets sont moins systémiques que des analgésiques oraux. Quant à l'ACR, elle privilégie les AINS oraux puisque les topiques sont moins pratiques (ex. : lavage fréquent de la main). L'acétaminophène est moins recommandé à cause d'une absence de prevues appuyant son utilisation.[52] Notre revue systématique n'a trouvé aucune étude de qualité fiable qui comparait l'efficacité des médicaments pour l'OTM.

Des *antidépresseurs* étaient prescrits chez six participants (un était la duloxétine) et des *opiacés* chez 16 personnes (3 étaient le tramadol). Selon l'EULAR et l'ACR, le seul antidépresseur recommandé est la duloxétine, et le seul opiacé, le tramadol. Il est donc possible que les prescripteurs ne soient pas au courant des recommandations ou n'ont considéré que d'autres comorbidités telles la dépression ou d'autres syndromes douloureux. Par ailleurs, la Société canadienne de l'arthrite ne recommande que la duloxétine comme antidépresseur pour l'OA et aucun opiacé.[941]

Des *injections intra-articulaires de cortisone* ont été offertes à un peu moins de 70% des participants. Cette pratique est conditionnellement recommandée par l'ACR dû à l'absence de preuves appuyant l'efficacité de cette substance. L'EULAR va dans le même sens, la pratique est généralement non recommandée à moins qu'il y ait de l'inflammation articulaire flagrante. Puisqu'il est impossible de savoir si nos participants ayant reçu une (des) injection(s) de cortisone souffraient d'inflammation, on ne peut pas juger si les injections intra-articulaires de cortisone offertes au Québec sont conformes aux recommandations de l'ACR et l'EULAR. Huit participants ont reçu des *injections intra-articulaires de l'acide hyaluronique*. Cette préparation ne devrait pas être utilisée faute de preuves.[52,53]

6.1.4.3.2 Interventions non-pharmacologiques (physiques)

En ce qui concerne l'*orthèse*, 75,8% des participants ont déclaré en utiliser ou en avoir utilisé. Environ deux tiers des participants ont rapporté effectuer ou avoir effectué des *exercices de la main*. Notre étude n'a toutefois pas investigué la nature des orthèses ni des exercices, alors il est impossible de savoir si ces interventions étaient conformes aux données probantes issues de notre revue systématique. Quant aux *principes ergonomiques* et aux *aides techniques,* seulement 20% des répondants ont déclaré les avoir utilisés. Selon l'EULAR, ces modalités sont jugées essentielles dans le but d'améliorer l'autonomie fonctionnelle et soulager la douleur pendant les activités et devraient donc être proposées à tous les patients.[52] La *mobilisation nerveuse* n'était pratiquée par aucun des participants. Étant donné que cette modalité pourrait réduire la sensibilisation à la douleur,[567] elle pourrait être bénéfique pour cette population.

Bref, il est clair qu'il y a des lacunes dans la gestion de l'OTM au Québec. Plusieurs hypothèses sont possibles pour expliquer cet état de fait. Au Québec, des *orthèses* sont fournies (ou proposées) par des ergothérapeutes ou orthésistes. Des patients pourraient aussi s'en procurer en pharmacie, dans un magasin spécialisé d'équipements médicaux, ou en ligne (ex. : www.amazon.ca) sans ordonnance. Des *exercices de la main*, l'*enseignement des principes ergonomiques* (y compris l'utilisation des *aides techniques*) et la *mobilisation nerveuse* sont généralement enseignés par des physiothérapeutes ou des ergothérapeutes. Des kinésiologues, des infirmiers spécialisés en rhumatologie et certains médecins fournissent aussi ce type d'enseignement que ce soit formel ou non. Alors, les intervenants ci-mentionnés jouent un rôle essentiel dans la gestion non-pharmacologique de l'OTM.[52,53] Cependant, nos données indiquent que seulement 31,7% des participants ont rencontré un ergothérapeute, 15,9% un physiothérapeute, 1,4%, un infirmier, et 1,0%, un kinésiologue. Ce faible taux de consultation auprès de ces intervenants pourrait être expliqué par des non-références des médecins aux services-clés dues aux méconnaissances des pratiques de ces intervenants[942,943] et des recommandations de pratique clinique sur la gestion de l'OA de la main.[942] Une nécessité perçue ou non pour ces services de la part des patients a aussi un impact sur la prestation des services.[944] L'accessibilité aux services est également un enjeux crucial. Il est rapporté que les temps d'attente entre la référence du médecin et la consultation en physiothérapie ou ergothérapie sont longs (> 6 mois) dans le système public pour les personnes arthritiques ou arthrosiques au Québec.[945,946] Il est possible que ces longues attentes soient causées par une pénurie des professionnels de la santé[947,948] et que ces conditions chroniques comme l'arthrite soient considérés moins prioritaires que des conditions aiguës (ex. : fracture, arthroplastie).[946,949] Des facteurs socioéconomiques peuvent ajouter un obstacle à l'accès aux services par le fait que certains services de physiothérapie et d'ergothérapie ne sont pas nécessairement couverts par le régime public.[946] Les patients mieux nantis pourraient se payer les services offerts mais non ceux à faible revenu.[950]

6.1.4.3.3 Interventions psychosociales

Notre première revue systématique n'a identifié aucune étude primaire explorant l'efficacité d'interventions psychosociales pour l'OTM. En ajoutant le fait que les recommandations pour l'OA de la main élaborées par l'EULAR ne considèrent nullement les facteurs psychologiques,[52] il devient évident que des modèles biomédicaux prédominent dans ce domaine. Quant à nos revues narratives, elles ont recensé des données probantes supportant l'efficacité de plusieurs interventions psychosociales pratiquées dans le domaine de la thérapie de la main ou le domaine de l'OA, soit *l'éducation neurophysiologique de la douleur*,[211,221,288-296,437] *l'exposition graduelle*,[221,300-303,305] le *Cognition-Targeted Exercise Therapy*,[306] le

Progressive Goal Attainment Program (PGAP),[930] des *programmes d'auto-gestion*,[52,53] la *thérapie cognitivo-comportementale*,[316,317,438,940] la *thérapie d'acceptation et d'engagement*[235,438] et la *méditation en pleine conscience*.[439] Toutefois, selon nos données de l'étude transversale, les interventions psychosociales semblent être très peu dispensées. Seulement 11 participants ont rapporté consulter ou avoir consulté des cliniciens psychosociaux (2 psychiatres, 8 psychologues, 1 travailleur social). Il est possible que l'éducation neurophysiologique de la douleur, le PGAP, l'exposition graduelle et la méditation en pleine conscience ont été informellement dispensées par d'autres professionnels de la santé. Cependant nos données ne permettent pas de nous en informer. Par ailleurs, un nombre appréciable de participants pratiquent la *respiration* (ou la *relaxation*) (n = 56), la *méditation* (n = 35), la *distraction* (n = 22), la *visualisation* (n = 14) ou l'*hypnose* (n = 2) suggérant que ces patients reconnaissent l'utilité de ces modalités pour réduire la douleur associée à l'OTM.

6.1.4.3.4 Pistes de solution

Les résultats de notre étude transversale suggèrent des diverses lacunes dans la gestion de l'OTM : (1) les AINS topiques ou oraux devraient être privilégiés plutôt que l'acétaminophène; (2) l'éducation sur les principes ergonomiques et sur l'utilisation des aides techniques devrait être offerte à tous les patients; (3) la mobilisation nerveuse devrait être enseignée pour ceux qui manifestent une sensibilisation à la douleur; et (4) des interventions psychosociales devraient être offertes aux patients dont les facteurs psychologiques aggravent leur douleur et leurs capacités fonctionnelles.

Les raisons possibles de ces lacunes sont multiples : (1) méconnaissances des pratiques des intervenants de la part de référents (médecins),[942,943] (2) méconnaissances des recommandations de pratique clinique sur la gestion de l'OA de la main,[942] (3) non-reconnaissance du besoin pour les services de la part des patients,[944] (4) longues listes d'attente,[945,946] (5) pénurie de professionnels de la santé,[947,948] (6) considération de l'OA comme non-prioritaire,[946,949] (7) facteurs socioéconomiques,[946,950] et (8) approche biomédicale prédominante en milieu clinique où l'approche biopsychosociale fait défaut. Alors, quelles pistes de solution faut-il suivre afin de minimiser ces lacunes ? Certaines nécessitent un changement d'infrastructure majeur (ex. : durée d'attente, pénurie d'intervenants, système de santé à deux vitesses), ce qui sous-entend une implication politique accrue. D'autres lacunes pourraient être comblées par différentes stratégies de transfert de connaissances (congrès scientifiques, formations professionnelles continues, conférences grand public et vulgarisations scientifiques) afin de pouvoir offrir aux patients des informations fiables sur la maladie et les ressources disponibles.[951] À cet effet, une fiche santé CHUM (https://www.chumontreal.qc.ca/fiches-sante) expliquant l'OTM et les

interventions/ressources possibles sera produite dans un futur rapproché. Elle s'adressera au grand public et sera accessible en ligne. Un groupe de soutien éducatif et d'auto-gestion, considéré essentiel,[52,53,951] sera également offert sous peu au Centre de la main du CHUM. Au niveau universitaire, l'importance d'une approche biopsychosociale auprès des patients arthrosiques devrait être enseignée à tous les futurs professionnels de la santé. Par exemple, durant le cours « Affections de la main » à l'École de réadaptation de l'Université de Montréal, l'importance accordée aux facteurs psychologiques est préconisée depuis deux ans.

6.2 Contributions à la pratique clinique

Les contributions de la présente thèse sont tangibles sur le plan de la pratique clinique. Les résultats de nos revues narratives, de nos SR et de notre étude descriptive permettent de bonifier les recommandations de l'EULAR[52] et de l'ACR[53] pour la gestion de l'OA de la main (Tableau 8 présenté dans le chapitre 2), lesquelles recommandations se font plus spécifiques à l'OTM et intègrent aussi une approche biopsychosociale (Tableau 22).

6.2.1 Contributions des revues narratives

Les deux revues narratives[133,337] effectuées dans le cadre de la présente thèse qui ont été incluses dans la recension des écrits (chapitre 2) révèlent l'importance de porter une attention toute spéciale aux facteurs psychosociaux en lien avec la douleur arthrosique. Elles permettent de conscientiser les intervenants dans le domaine de l'OA où des modèles biomédicaux prédominent. Des interventions psychosociales dispensées par les psychologues/psychothérapeutes et d'autres cliniciens sont également recensées. Ces informations sont importantes afin de savoir à qui référer les patients aux prises avec des conditions psychologiques délétères. Ces informations sont aussi pertinentes car l'accès aux psychologues et psychothérapeutes est déplorablement limitée au Québec.[952] Sans prétendre que ceux-ci peuvent se substituer aux services de psychologues, certaines modalités peuvent au moins contribuer à accroître l'arsenal thérapeutique dont disposent les cliniciens pour l'OTM compte tenu que l'expérience de la douleur en est une qui est multidimensionnelle[16,17] et qu'on ne peut se limiter à sa seule composante physique.[18,19]

6.2.2 Contributions du Volet I

Les résultats des RS du Volet I[519,862] ajoutent aux recommandations pour la gestion de l'OA de la main,[52,53] notamment, les types d'orthèses à recommander, quand porter l'orthèse (jour, nuit ou durant les activités) de même que quels exercices à prescrire qui sont mieux précisés.[543,550,559,572,856] L'orthèse de pouce en thermoplastique faite sur mesure comprenant l'articulation métacarpo-phalangienne semble être légèrement supérieure pour soulager la douleur.[856] Cependant, le type d'orthèse doit être choisi en fonction des besoins de chaque patient, des activités à entreprendre et de leur préférence.[94] Une combinaison d'exercices de la main et de mobilisation articulaire et nerveuse a montré une grande taille d'effet (SMD -11.23) sur la douleur deux mois après la fin de traitements.[455,568] Ce résultat suggère que cette clientèle peut bénéficier d'interventions multimodales et que les cliniciens auraient avantage à les utiliser.

En ce qui a trait aux interventions chirurgicales, l'EULAR[52] a recommandé la trapézectomie simple en se basant sur la RS de Wajon et al (2015)[67] qui n'a pas trouvé de bénéfice additionnel d'une technique chirurgicale à l'autre et que des techniques plus complexes que la trapézectomie simple ont tendance à induire plus de complications sans générer de bénéfice. Cependant, cette RS a été retirée de la *Cochrane Library* depuis 2017 en raison de commentaires internes auxquels les auteurs doivent répondre. Lorsqu'ils le feront, leurs conclusions pourraient alors être modifiées. Quant à notre RS,[862] bien qu'elle n'ait pas permis de cibler une technique chirurgicale en particulier, elle indique du moins la supériorité relative de certaines modalités par rapport à d'autres (ex. : trapézectomie, T+LR ou T+LRIT en utilisant ½FCR-TM, arthroplastie par distraction d'hématome).

6.2.3 Contributions du Volet II

Le Volet II du présent travail contribue à mieux caractériser l'expérience de la douleur associée à l'OTM et ses impacts sur le vécu quotidien des patients. L'utilisation d'échelles dûment validées qui mesurent l'intensité de la douleur et les incapacités fonctionnelles a permis d'évaluer de façon adéquate la sévérité de la condition des patients et la variabilité inter-individuelle. Considérant le principe bien connu de Robin S. Sharma qui dit « *What gets measured gets improved* », ces échelles auraient avantage à être employées de façon routinière dans les milieux cliniques d'autant plus qu'elles permettraient de mieux documenter l'évolution temporelle de la condition des patients.

Le Volet II a aussi permis d'identifier des facteurs associés à la sévérité de la douleur et des incapacités fonctionnelles. Comme certains de ces facteurs sont modifiables—i.e., la dépression et les incapacités fonctionnelles, les cliniciens doivent être attentifs à ces aspects dans leur pratique afin d'évaluer la nécessité d'intervenir sur le plan psychologique. Il est, par ailleurs, important de noter que lorsque les cliniciens ont à implanter une intervention pour réduire la tendance au catastrophisme face à la douleur, ils doivent faire preuve de jugement clinique quant à l'emploi des termes. Certains auteurs[953] ont en effet soulevé la problématique de l'utilisation du terme *catastrophize* qui est défini comme la tendance à « *exagerate the negative consequences of events or decisions* » (https://dictionary.apa.org/catastrophize). Alors, l'emploi de l'expression « catastrophisme face à la douleur » peut insinuer que la personne exagère sa douleur. Cette vision peut contribuer à stigmatiser les patients souffrant de la douleur en les étiquetant comme simulateur ou manipulateur.[953] Il est donc primordial de bien expliquer ce concept aux patients afin de les aider à mieux gérer leur douleur et non de les stigmatiser.

L'étude du Volet II a aussi montré que l'OTM peut causer de l'absentéisme et menacer la longévité professionnelle. Ce résultat suggère que les patients bénéficieraient d'interventions multi-disciplinaires telles que l'adaptation ergonomique des outils, la modification des tâches, la modération des activités (*activity pacing*), et une implication accrue de leurs employeurs. L'obtention d'un soutien financier faciliterait la prise de congés du travail pour se rendre à des rendez-vous médicaux et paramédicaux, ainsi diminuant le stress associé.

6.2.4 Contributions de cette thèse

Cette thèse, ajoutant des informations plus spécifiques à l'OTM aux recommandations pour l'OA de la main émises par les organismes internationales reconnues en rhumatologie (EULAR/ACR)[52,53] et bonifiant les informations concernant les facteurs psychologiques dans le domaine de l'OA de la main là où des modèles biomédicaux prédominent, peut contribuer à minimiser la sévérité de la douleur et des incapacités fonctionnelles, en plus d'améliorer la qualité de vie des personnes qui vivent avec l'OTM. Le modèle peur-évitement adapté à l'OTM (MPÉ-OTM), bien qu'il doive être validé empiriquement, illustre de façon intéressante les relations entre les facteurs psychosociaux associés à la sévérité de la douleur et à celle de l'incapacité fonctionnelle.

6.3 Forces et limitations des travaux de la présente thèse

6.3.1 Forces

6.3.1.1 Forces des revues narratives

Les mécanismes neurophysiologiques de la douleur et leurs interactions avec des facteurs psychosociaux sont peu connus parmi les professionnels de la santé,[954] notamment chez ceux qui n'ont pas reçu la formation spécifique sur la douleur.[955] Les deux revues narratives de la littérature[133,337] effectuées dans le cadre de la présente thèse décrivent ces mécanismes, ce qui devrait aider les cliniciens à mieux les cerner, à dissocier les notions de nociception vs douleur et à apprécier comment divers facteurs biopsychosociaux interagissent et influencent l'expérience de la douleur, tel que le prône l'*International Association for the Study of Pain* (IASP).[2] Ces deux revues identifient également les facteurs psychosociaux associés à la douleur musculo-squelettique de la main ou à la douleur arthrosique, des sujets très peu abordés dans ces domaines où une approche biomédicale prédomine.

6.3.1.2 Forces du Volet I

Tel que montré dans le Tableau 22, les deux RS contenues dans la présente thèse contribuent à l'amélioration des recommandations pour l'OA de la main[52,53] et pourront faciliter le processus de décision partagé et éclairé entre les cliniciens et les patients au moment de choisir des options thérapeutiques. La méthodologie employée dans ces deux RS respectait les recommandations de la *Cochrane Collaboration,* ce qui leur confère une rigueur scientifique plus appréciable.[486] La majorité des RS antérieures dans ce domaine était de qualité médiocre, ne répondant pas à l'ensemble des critères de l'*Agency for Healthcare Research and Quality*.[521] De plus, les RS que nous avons effectuées sont les plus complètes à ce jour en termes de types d'intervention couverte. Enfin, nous avons inclus un ensemble des preuves provenant de certaines RS antérieures qui renforcent la validité de nos RS.[521]

6.3.1.3 Forces du Volet II

Le second volet du présent travail doctoral est le premier du genre à notre connaissance à s'appuyer sur un modèle biopsychosocial de la douleur pour caractériser et étudier les impacts de l'OTM symptomatique. Il a permis d'identifier les facteurs biopsychosociaux pouvant prédire la sévérité de la douleur associée à l'OTM et son impact fonctionnel. Certains de ces facteurs se sont révélés

psychologiques, appuyant ainsi la pertinence d'aller au-delà du modèle biomédical en termes d'interventions thérapeutiques. De plus, aucune étude n'avait documenté à ce jour l'impact de l'OTM sur la productivité au travail. Les résultats obtenus dans notre étude suggèrent que davantage d'attention devrait être accordée à cet aspect afin d'optimiser les conditions de travail des personnes atteintes d'OTM. Par ailleurs, cette étude a permis de répertorier les stratégies de gestion de la douleur utilisées par les patients souffrant de cette pathologie, ce qui n'avait jamais été fait jusqu'à présent au sein du système de santé québécois. Il est attendu que les résultats de ce projet conscientiseront les professionnels de la santé impliqués dans ce domaine en ce qui a trait aux lacunes dans la pratique et l'implantation de modalités thérapeutiques additionnelles pour améliorer la qualité de leurs interventions et, par ricochet, la condition et la qualité de vie de leurs patients aux prises avec de l'OTM.

6.3.2 Limitations

6.3.2.1 Limitations des revues narratives

Le devis méthodologique de la revue narrative comporte en soi des limitations comparativement à celui de la RS de littérature. Celles-ci incluent, entre autres, l'absence d'évaluation des risques de biais des études répertoriées et la non-considération de la qualité des preuves. Cependant, les sujets traités dans ces deux revues ne se prêtent pas à des RS compte tenu de la variabilité dans les articles dans ce domaine.

6.3.2.2 Limitations du Volet I

Malgré ses points forts, nos RS présentent certaines limitations. Premièrement, notre recherche documentaire s'est limitée à l'anglais et au français. Cependant, il semblerait que les estimations des effets des méta-analyses restreintes à la langue anglaise diffèrent peu de celles qui incluaient d'autres langues.[860] Ainsi, le biais lié aux langues dans nos résultats pourrait être minime. Deuxièmement, quelques-unes des études répertoriées ont inclus uniquement des patients atteints d'OTM de stade avancé. D'autres n'ont pas rapporté les stades radiographiques ; ainsi, ils peuvent avoir inclus des patients atteints d'OA pantrapézienne. Bien que cela puisse menacer la validité de certaines de nos conclusions, la présence d'OA scapho-trapézo-trapézoïdienne ne représenterait que 1% de la variance dans l'intensité de la douleur chez les patients atteint d'OTM selon une étude transversale.[32] L'inclusion de ce type d'OA dans les études répertoriées incluses dans nos RS ne menacerait pas vraiment ou très peu la validité de nos conclusions.

6.3.2.3 Limitations du Volet II

Tout comme n'importe quelle étude, l'étude descriptive de la présente thèse comporte elle aussi des limitations. Premièrement, quatre variables indépendantes (présence d'autres sites corporels d'OA, présence d'autres affections douloureuses, antécédents familiaux d'OTM et revenu familial annuel) ont dû être exclues des modèles de régression en raison du niveau élevé de données manquantes, de sorte qu'il n'a pas été possible d'évaluer leur contribution. Deuxièmement, d'autres variables indépendantes signalées comme étant associées à la douleur de l'OTM dans des études antérieures n'ont pas été incluses en raison du manque de ressources (sévérité radiographique,[33] hyperextension de l'articulation métacarpo-phalangienne[34]). Troisièmement, le questionnaire QuickDASH contient 11 questions dont une sur la sévérité de la douleur. C'est-à-dire que la variable indépendante (intensité de la douleur) fait partie de la variable dépendante (incapacités fonctionnelles) dans le modèle de régression. Cela expliquerait la raison pour laquelle la contribution de l'intensité de la douleur était la plus importante parmi les quatre facteurs significatifs (intensité de la douleur, ß = 0,5 ; dépression, ß = 0,3 ; sexe, ß = 0,1; éducation, -0,1 dans le Table 19). La généralisabilité des résultats de cette étude est aussi limitée aux Caucasiens et à ceux qui ont une OTM symptomatique avancée puisqu'environ 80% des participants ont été recrutés dans les hôpitaux tertiaires/quaternaires. Le fait que l'étude a été effectuée au Québec uniquement peut aussi limiter la généralisabilité de nos résultats notamment pour des patients traités dans des systèmes de santé qui diffèrent de celui en vigueur au Québec et au Canada. Le devis transversal de l'étude ne permet pas, pour sa part, d'établir des liens de causalité dans les inter-relations. Enfin, nos résultats sont basés sur des données auto-rapportées par les participants, ce qui a pu introduire un biais de rappel. Cependant, ce type de données éclaire le point de vue et la perspective des patients reflétant leurs propres expériences douloureuses contrairement aux études épidémiologiques réalisées avec des bases de données médico-administratives.

6.3.2.4 Limitations du présent travail doctoral

Le but original de ce projet doctoral était de développer un guide de pratique clinique spécifique à l'OTM en suivant la méthodologie de l'AGREE *(Appraisal of Guidelines for REsearch & Evaluation).*[956,957] Pour ce faire, un troisième volet consistant en une étude participative incluant les diverses parties prenantes (patients, cliniciens, gestionnaires) était prévu. Toutefois, le volet de développement d'un tel guide s'est définitivement avéré trop ambitieux dans le contexte d'une thèse de doctorat.

Le modèle peur-évitement adapté à l'OTM (MPÉ-OTM) développé en intégrant nos modèles de régression multivariables de la sévérité de la douleur et des incapacités fonctionnelles liées à l'OTM

symptomatique au modèle peur-évitement de Vlaeyen[264] n'est qu'un modèle hypothétique qui doit être validé empiriquement.

6.4 Avenues de recherche futures

6.4.1 Robustesse des preuves scientifiques et qualité des études

Une conclusion importante de nos RS est la faible qualité de la majorité des preuves scientifiques soutenant l'efficacité des interventions pour l'OTM. À cause de la nature visible des interventions non-pharmacologiques et des modalités chirurgicales, il est généralement impossible de dissimuler (*blinding*) les interventions effectuées, les fournisseurs des interventions, et/ou les évaluateurs. Ceci contribue ainsi à dégrader la qualité des preuves des essais cliniques lorsqu'on applique le système de classification du GRADE.[500-513] Face à ce biais inévitable, les chercheurs doivent minimiser d'autres biais de sorte que la dégradation de la qualité des preuves sera limitée. Par exemple, le diagnostic d'OTM doit être confirmé par radiographie ; les injections intra-articulaires doivent être guidées par imagerie pour assurer la précision du site d'injection ; lorsque des co-interventions (ex. : médicaments, orthèses) sont utilisées, l'équivalence de leur utilisation entre les groupes doit être correctement mesurée pour s'assurer que la différence d'effet de groupe est attribuée uniquement aux interventions ciblées. Afin de pouvoir générer des preuves plus robustes (au moins d'un niveau de qualité modérée), davantage d'essais randomisés contrôlés sont nécessaires pour obtenir une taille d'échantillon groupée de 400 (200/groupe) comme requis pour les critères de précision du GRADE pour les variables continues.[506]

Une méta-analyse de réseau comparant directement et indirectement différentes interventions pourrait également être utile afin de synthétiser leur efficacité. Cependant, ce type d'analyse nécessite une homogénéité clinique et méthodologique entre les essais cliniques. Ainsi, des efforts concertés vers une harmonisation de la méthodologie des essais randomisés contrôlés sont requis, par exemple, en utilisant les mêmes échelles et les mêmes moments d'évaluation.

6.4.2 Efficacité et utilité de l'injection intra-articulaire de solution saline

Dans notre première RS,[519] la supériorité de l'injection intra-articulaire de solution saline par rapport à l'injection de cortisone pour réduire la douleur[554] a été rapportée; une découverte surprenante étant

donné que la solution saline est généralement considérée comme un agent inactif. La question de savoir si l'injection intra-articulaire de solution saline pourrait représenter une option thérapeutique pour l'OTM mérite une investigation plus approfondie en considérant les résultats d'une autre étude qui supportent l'efficacité des injections sous-cutanées de solution saline.[563]

6.4.3 Développement et diffusion d'un guide de pratique clinique spécifique à l'OTM

Tel que mentionné précédemment, il n'existe pas malheureusement de guide de pratique clinique qui soit spécifique à l'OTM. Un tel guide développé à partir de la méthodologie de l'AGREE[956,957] pourrait toutefois être très utile tant pour les cliniciens que pour les patients. Pour ce faire, il serait pertinent tel qu'initialement prévu au Volet III du présent travail doctoral de mener une étude participative impliquant les diverses parties prenantes (patients, cliniciens, gestionnaires), laquelle étude permettrait d'évaluer, entre autres, la pertinence des recommandations ajoutées au Tableau 22. Le guide de pratique clinique serait par la suite diffusé auprès des cliniciens alors qu'une fiche de santé s'adressant aux patients atteints d'OTM serait produite afin de les guider dans leurs choix des interventions selon leurs besoins.[517,518] Une telle initiative pourrait faciliter le processus de décision partagée et éclairée entre les cliniciens et les patients au moment de choisir des modalités de traitement.

6.4.4 Facteurs biopsychosociaux influençant l'expérience de la douleur liée à l'OTM

Davantage d'études utilisant des modèles de régression pour prédire la sévérité de la douleur et des incapacités fonctionnelles reliées à l'OTM sont nécessaires afin de documenter la contribution respective de variables indépendantes qui n'ont pu être tenues en compte dans notre étude descriptive, soit la présence d'autres sites d'OA, la présence d'autres affections douloureuses, les antécédents familiaux d'OTM, le revenu familial annuel, la sévérité radiographique, et l'hyperextension de l'articulation métacarpo-phalangienne. De plus, il serait intéressant d'inclure d'autres variables et instruments de mesure tels que la perception du patient par rapport à la maladie,[958] le degré d'acceptation et d'auto-efficacité face à la douleur,[273,284] la kinésiophobie,[285,286] la fatigue,[959] et le niveau d'engagement des patients dans leurs soins.[960] Enfin, il serait pertinent de mener une vaste étude longitudinale qui

permettrait de suivre l'évolution clinique des patients et de mieux documenter les prédicteurs sur le plan causal.

6.4.5 OTM asymptomatique et symptomatique

Comme le démontre une étude épidémiologique américaine,[26] l'écart entre la prévalence de l'OTM radiographique (i.e., OTM confirmée par la radiographie avec ou sans présence de symptômes) et la prévalence de l'OTM symptomatique (i.e., OTM confirmée par la radiographie avec présence de symptômes) est grand, soit 31,8% et 4,8% respectivement. Autrement dit, environ 85% des individus ayant de l'évidence radiographique (i.e., présence potentielle de nociception) n'avaient pas de symptômes. Quels sont les facteurs qui rendent l'OTM symptomatique chez 15 % des individus ? Certains gènes sont-ils impliqués comme suggérés pour d'autres types de douleur[144,191] ? Certaines cytokines sont-elles en cause ?[961] Ou certains facteurs psychologiques sont-ils déterminants ? Afin de répondre à ces questions, des études comparant les caractéristiques biopsychosociales y compris les identités génétiques et la condition inflammatoire des patients symptomatiques et asymptomatiques sont nécessaires.

6.4.6 Validation du modèle peur-évitement adapté à l'OTM (MPÉ-OTM)

À partir des résultats du Volet II et nos revues narratives, une version du modèle peur-évitement de l'OTM (Figure 17) a été proposée dans la section 6.1.4. Ce modèle devrait être empiriquement vérifié par une étude ultérieure afin de vérifier si le catastrophisme, l'anxiété et la peur-évitement sont des médiateurs de la relation entre la sévérité de la douleur et des incapacités et si les interventions psychosociales ciblant de tels facteurs psychologiques améliorent les conditions cliniques des patients souffrant de l'OTM symptomatique—i.e., diminuent la douleur et les incapacités fonctionnelles en plus d'améliorer la qualité de vie.

6.5 Conclusions

Le premier volet de la présente thèse qui comportait deux revues systématiques (RS) a permis de recenser de façon rigoureuse les données probantes sur l'efficacité de diverses interventions non-chirurgicales et chirurgicales pour l'ostéoarthrose trapézo-métacarpienne (OTM). Le deuxième volet de ce travail doctoral

consistait en une étude descriptive auprès d'un échantillon important de patients qui a permis de caractériser l'expérience de la douleur associée à l'OTM et ses impacts. Les résultats ont révélé que l'OTM peut engendrer de la douleur importante et ainsi affecter différentes sphères de leur vie telles que leur capacités fonctionnelles, leur bien-être psychologique, leur productivité au travail et leur qualité de vie physique. Cette étude a aussi permis de constater que certaines modalités thérapeutiques sont peu ou pas utilisées chez les personnes atteintes d'OTM, notamment des médicaments anti-inflammatoires non stéroïdiens, des principes ergonomiques, des aides techniques, de la mobilisation nerveuse et des interventions psychologiques. Enfin, cette étude a aussi révélé que la sévérité de la douleur et des incapacités fonctionnelles associées à l'OTM peuvent être influencées par divers facteurs biopsychosociaux dont certains sont modifiables et pourraient faire l'objet d'interventions sur le plan psychologique. Le fait de prendre en compte ces différents facteurs permettra de mieux personnaliser les plans de traitement pour l'OTM. En somme, les nouvelles connaissances générées par cette thèse permettent de bonifier les recommandations des guides de pratique pour l'OA de la main, ainsi, faciliteront la prise de décision quant aux options thérapeutiques les plus pertinentes et ce, au-delà d'un simple modèle biomédical. Enfin, la présente thèse ouvre la voie à des recherches futures qui permettront d'améliorer la condition des patients atteints d'OTM et les modalités thérapeutiques dont ils disposent.

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ANNEXES

Annexe 1 Stratégies de recherche du Volet I

Template *:* bibliothequeduchum.ca | Research : Daniela Ziegler, librarian

1. CINAHL

Database	
Databases	CINAHL Complete
Interface	EBSCO
Research date	July 4, 2018

Syntax	
MH	Exact Subject Headings
N	Near operator
TI	Title
AB	Abstract
S (1, 2, 3…)	Search
OR, AND	Boolean operators

Search strategy

search #1

#	Question	Résultats
S1	((carpal* or metacarp* or thumb or pollex or carpo-metacarpal or carpometacarpal or CMC or trapezio-metacarpal or trapeziometacarpal or trapezial-metacarpal or trapezialmetacarpal or (basal N2 thumb) or (basilar N2 thumb) or (thumb N2 base))) OR ((MH "Metacarpophalangeal Joint") OR (MH "Thumb") OR (MH "Carpal Bones"))	8,765
S2	((MH "Osteoarthritis") OR (MH "Joint Diseases")) OR (osteoarth* or joint disease*)	37,407
S3	(((MH "Physical Therapy") OR (MH "Drug Combinations") OR (MH "Occupational Therapy") OR (MH "Drug Therapy") OR (MH "Psychotherapy") OR (MH "Splints") OR (MH "Social Work") OR (MH "Cognitive Therapy") OR (MH "Relaxation") OR (MH "Simple Relaxation Therapy (Iowa NIC)") OR (MH "Orthoses") OR (MH "Counseling")) OR (TI ((surger* or therap* or treatment* or (joint N2 protection*) or (assistive N2 device*) or (thermal N2 modalit*))) OR AB ((surger* or therap* or treatment* or (joint N2 protection*) or (assistive N2 device*) or (thermal N2 modalit*))) OR TI (((famil* N2 support) or	1,259,964

	(social N2 work*))) OR AB (((famil* N2 support) or (social N2 work*))) OR TI ((relaxation* or (cognitive N2 therap*) or orthosis or orthese* or biofeedback or (supportive N2 psychotherap*) or (group N2 therap*) or counseling)) OR AB ((relaxation* or (cognitive N2 therap*) or orthosis or orthese* or biofeedback or (supportive N2 psychotherap*) or (group N2 therap*) or counseling))) OR ((MH "Exercise") OR (MH "Manual Therapy") OR (MH "Hand Therapy") OR (MH "Injections")) OR (TI (orthotic* or exercise* or injection*) OR AB (orthotic* or exercise* or injection*)) OR (TI self N2 management OR AB self N2 management) OR (TI (((manual or hand) N2 therapy)) OR AB (((manual or hand) N2 therapy)))	
S4	**S1 AND S2 AND S3**	**390**

search #2

#	Question	Résultats
S1	((carpal* or metacarp* or thumb or pollex or carpo-metacarpal or carpometacarpal or CMC or trapezio-metacarpal or trapeziometacarpal or trapezial-metacarpal or trapezialmetacarpal or (basal N2 thumb) or (basilar N2 thumb) or (thumb N2 base))) OR ((MH "Metacarpophalangeal Joint") OR (MH "Thumb") OR (MH "Carpal Bones"))	8,765
S2	((MH "Osteoarthritis") OR (MH "Joint Diseases")) OR (osteoarth* or joint disease*)	37,407
S3	((MH "Pain") OR (MH "Chronic Pain") OR (MH "Hyperalgesia") OR (MH "Arthralgia")) OR (hyperalgesia OR pain*)	256, 515
S6	**S1 AND S2 AND S3**	**304**

search #3

#	Question	Résultats
S	rhizoarthrosis or rhizarthrosis	4

CINAHL (EBSCO)

Search #1 OR Search #2 OR Search #3
Total: 475

2. EBM Reviews

Database	
Data base	EBM Reviews - Cochrane Database of Systematic Reviews 2005 to June 28, 2018, EBM Reviews - ACP Journal Club 1991 to June 2018, EBM Reviews - Database of Abstracts of Reviews of Effects 1st Quarter 2016, EBM Reviews - Cochrane Clinical Answers June 2018, EBM Reviews - Cochrane Central Register of Controlled Trials June 2018, EBM Reviews - Cochrane Methodology Register 3rd Quarter 2012, EBM Reviews - Health Technology Assessment 4th Quarter 2016, EBM Reviews - NHS Economic Evaluation Database 1st Quarter 2016
Interface	OvidSP
Research date	July 4, 2018

Syntax	
/	Exact Subject Heading
af	All fields
or, and	Boolean operators
*	Truncation
adj2	The Adjacent operator

Search strategy

search #1

1 thumb*.af. (1255)
2 pollex.af. (5)
3 Thumb/ (166)
4 (carpal* or metacarp* or trapezio-metacarpal or trapeziometacarpal or trapezial-metacarpal or trapezialmetacarpal or (basal adj2 thumb) or (basilar adj2 thumb) or (thumb adj2 base)).af. (1955)
5 Carpal Bones/ or Trapezium Bone/ (45)
6 trapezium.af. (50)
7 Metacarpal Bones/ (21)
8 carpo-metacarpal.af. (7)
9 carpometacarpal.af. (117)
10 CMC.af. (380)
11 Carpometacarpal Joints/ (35)
12 Metacarpophalangeal Joint/ (69)
13 or/1-12 (3410)
14 osteoarthriti*.af. (12744)
15 Osteoarthritis/ (3198)
16 joint disease.tw,kw. (623)
17 Joint Diseases/ (515)
18 or/14-17 (13514)

19 Acute Pain/ or Breakthrough Pain/ or Pain/ or Musculoskeletal Pain/ or Chronic Pain/ or Pain Management/ (14416)
20 pain*.af. (135699)
21 Hyperalgesia/ (540)
22 hyperalgesia.af. (1270)
23 Arthralgia/ (700)
24 or/19-23 (135836)
25 13 and 18 and 24 (249)

search #2
1 thumb*.af. (1255)
2 pollex.af. (5)
3 Thumb/ (166)
4 (carpal* or metacarp* or trapezio-metacarpal or trapeziometacarpal or trapezial-metacarpal or trapezialmetacarpal or (basal adj2 thumb) or (basilar adj2 thumb) or (thumb adj2 base)).af. (1955)
5 Carpal Bones/ or Trapezium Bone/ (45)
6 trapezium.af. (50)
7 Metacarpal Bones/ (21)
8 carpo-metacarpal.af. (7)
9 carpometacarpal.af. (117)
10 CMC.af. (380)
11 Carpometacarpal Joints/ (35)
12 Metacarpophalangeal Joint/ (69)
13 or/1-12 (3410)
14 osteoarthriti*.af. (12744)
15 Osteoarthritis/ (3198)
16 joint disease.tw,kw. (623)
17 Joint Diseases/ (515)
18 or/14-17 (13514)
19 Acute Pain/ or Breakthrough Pain/ or Pain/ or Musculoskeletal Pain/ or Chronic Pain/ or Pain Management/ (14416)
20 pain*.af. (135699)
21 Hyperalgesia/ (540)
22 hyperalgesia.af. (1270)
23 Arthralgia/ (700)
24 or/19-23 (135836)
25 Occupational Therapy/ or Drug Therapy/ or Physical Therapy Modalities/ or Drug Therapy, Combination/ or Physical Therapy Department, Hospital/ or Exercise Therapy/ or Occupational Therapy Department, Hospital/ (40666)
26 therap*.af. (466958)
27 treatment*.af. (601517)
28 Therapeutics/ (66)
29 Psychotherapy/ (2204)
30 Splints/ (403)
31 (surger* or (joint adj2 protection*) or (assistive adj2 device*) or (thermal adj2 modalit*)).af. (158040)
32 ((famil* adj2 support) or (social adj2 work*)).af. (4030)
33 Social Work/ (198)

34 relaxation*.af. (9284)
35 Relaxation/ or Relaxation Therapy/ (1495)
36 cognitive therapy/ (7063)
37 (cognitive adj2 therap*).af. (15869)
38 Orthotic Devices/ (535)
39 (orthosis or orthese*).af. (942)
40 (orthotic adj2 device*).af. (713)
41 Biofeedback, Psychology/ (915)
42 biofeedback.af. (2880)
43 (supportive adj2 psychotherap*).af. (377)
44 Psychotherapy, Group/ (1967)
45 (group adj2 therap*).af. (15761)
46 Directive Counseling/ or Counseling/ (4207)
47 counseling.af. (14150)
48 Self Care/ or Orthotic Devices/ or Exercise/ or Injections/ (19991)
49 (orthotic* or exercise* or injection*).af. (143795)
50 ((manual or hand) adj2 therapy).af. (1918)
51 (self adj2 management).af. (5870)
52 (self adj2 management).af. (5870)
53 or/25-52 (878757)
54 13 and 18 and 53 (292)

search #3
1 (rhizoarthrosis or rhizarthrosis).af. (11)
2 Acute Pain/ or Breakthrough Pain/ or Pain/ or Musculoskeletal Pain/ or Chronic Pain/ or Pain Management/ (14416)
3 pain*.af. (135699)
4 Hyperalgesia/ (540)
5 hyperalgesia.af. (1270)
6 Arthralgia/ (700)
7 or/2-6 (135836)
8 Occupational Therapy/ or Drug Therapy/ or Physical Therapy Modalities/ or Drug Therapy, Combination/ or Physical Therapy Department, Hospital/ or Exercise Therapy/ or Occupational Therapy Department, Hospital/ (40666)
9 therap*.af. (466958)
10 treatment*.af. (601517)
11 Therapeutics/ (66)
12 Psychotherapy/ (2204)
13 Splints/ (403)
14 (surger* or (joint adj2 protection*) or (assistive adj2 device*) or (thermal adj2 modalit*)).af. (158040)
15 ((famil* adj2 support) or (social adj2 work*)).af. (4030)
16 Social Work/ (198)
17 relaxation*.af. (9284)
18 Relaxation/ or Relaxation Therapy/ (1495)
19 cognitive therapy/ (7063)
20 (cognitive adj2 therap*).af. (15869)
21 Orthotic Devices/ (535)

22 (orthosis or orthese*).af. (942)
23 (orthotic adj2 device*).af. (713)
24 Biofeedback, Psychology/ (915)
25 biofeedback.af. (2880)
26 (supportive adj2 psychotherap*).af. (377)
27 Psychotherapy, Group/ (1967)
28 (group adj2 therap*).af. (15761)
29 Directive Counseling/ or Counseling/ (4207)
30 counseling.af. (14150)
31 Self Care/ or Orthotic Devices/ or Exercise/ or Injections/ (19991)
32 (orthotic* or exercise* or injection*).af. (143795)
33 ((manual or hand) adj2 therapy).af. (1918)
34 (self adj2 management).af. (5870)
35 (self adj2 management).af. (5870)
36 or/8-35 (878757)
37 7 or 36 (901485)
38 1 and 37 (10)

EBM Reviws (Ovid)
Search #1 OR Search #2 OR Search #3
Total: 300

3. EMBASE

Database	
Data base	Embase 1974 to 2018 July 03
Interface	OvidSP
Research date	July 4, 2018
Filters	Languages : English, French Human

Syntax	
/	Exact Subject Heading
tw	Textword field in EMBASE includes Title (TI), Abstract (AB), and Drug Trade Name (TN)
kw	Keywords
or, and	Boolean operators
adj2	The Adjacent operator
Exp	Function used to find the selected term in combination with all of its narrower, more specific terms.

Search strategy

Search #1

1 thumb*.tw,kw. (18918)
2 pollex.tw,kw. (78)
3 Thumb/ (8996)
4 (carpal* or metacarp* or trapezio-metacarpal or trapeziometacarpal or trapezial-metacarpal or trapezialmetacarpal or (basal adj2 thumb) or (basilar adj2 thumb) or (thumb adj2 base)).tw,kw. (32453)
5 trapezium.tw,kw. (1024)
6 carpo-metacarpal.tw,kw. (146)
7 carpometacarpal.tw,kw. (1715)
8 CMC.tw,kw. (10992)
9 carpal bone/ (3683)
10 trapezium bone/ (425)
11 metacarpal bone/ (5452)
12 carpometacarpal joint/ (1666)
13 metacarpophalangeal joint/ (5819)
14 or/1-13 (65065)
15 therap*.tw,kw. (3540919)
16 treatment*.tw,kw. (5422557)
17 (surger* or (joint adj2 protection*) or (assistive adj2 device*) or (thermal adj2 modalit*)).tw,kw. (1471450)

18 ((famil* adj2 support) or (social adj2 work*)).tw,kw. (36559)
19 physiotherapy/ (78898)
20 drug combination/ (91619)
21 occupational therapy/ (20811)
22 drug therapy/ (551076)
23 kinesiotherapy/ (29925)
24 therapy/ (1282602)
25 psychotherapy/ (88089)
26 splint/ (8373)
27 social work/ (23215)
28 cognitive therapy/ (42524)
29 relaxation*.tw,kw. (120260)
30 relaxation training/ (10072)
31 (cognitive adj2 therap*).tw,kw. (26926)
32 orthosis/ (6386)
33 (orthosis or orthese*).tw,kw. (4777)
34 biofeedback.tw,kw. (9302)
35 feedback system/ (78664)
36 (supportive adj2 psychotherap*).tw,kw. (951)
37 group therapy/ (19677)
38 (group adj2 therap*).tw,kw. (28210)
39 directive counseling/ or counseling/ (58987)
40 counseling.tw,kw. (79753)
41 orthotics/ or self care/ or exercise/ or injection/ (424740)
42 (orthotic* or exercise* or injection*).tw,kw. (1035734)
43 (self adj2 management).tw,kw. (22927)
44 ((manual or hand) adj2 therapy).tw,kw. (4395)
45 or/15-44 (9790449)
46 osteoarth*.tw,kw. (88551)
47 osteoarthritis/ (78763)
48 joint disease.tw,kw. (9551)
49 arthropathy/ (25970)
50 or/46-49 (146202)
51 14 and 45 and 50 (2261)
52 animal/ not human/ (1411792)
53 51 not 52 (2186)
54 limit 53 to (embase and (english or french)) (1355)

Search #2

1 thumb*.tw,kw. (18918)
2 pollex.tw,kw. (78)
3 Thumb/ (8996)
4 (carpal* or metacarp* or trapezio-metacarpal or trapeziometacarpal or trapezial-metacarpal or trapezialmetacarpal or (basal adj2 thumb) or (basilar adj2 thumb) or (thumb adj2 base)).tw,kw. (32453)
5 trapezium.tw,kw. (1024)
6 carpo-metacarpal.tw,kw. (146)
7 carpometacarpal.tw,kw. (1715)

8 CMC.tw,kw. (10992)
9 carpal bone/ (3683)
10 trapezium bone/ (425)
11 metacarpal bone/ (5452)
12 carpometacarpal joint/ (1666)
13 metacarpophalangeal joint/ (5819)
14 or/1-13 (65065)
15 osteoarth*.tw,kw. (88551)
16 osteoarthritis/ (78763)
17 joint disease.tw,kw. (9551)
18 arthropathy/ (25970)
19 or/15-18 (146202)
20 pain*.tw,kw. (885402)
21 breakthrough pain/ or pain/ or pain assessment/ or hand pain/ or chronic pain/ or bone pain/ (393221)
22 hyperalgesia/ (17709)
23 hyperalgesia.tw,kw. (16651)
24 arthralgia/ (52648)
25 or/20-24 (1008137)
26 14 and 19 and 25 (1718)
27 animal/ not human/ (1411792)
28 26 not 27 (1703)
29 limit 28 to (embase and (english or french)) (1035)

Search #3

1	pain*.tw,kw.	885402
2	breakthrough pain/ or pain/ or pain assessment/ or hand pain/ or chronic pain/ or bone pain/	393221
3	hyperalgesia/	17709
4	hyperalgesia.tw,kw.	16651
5	arthralgia/	52648
6	or/1-5	1008137
7	therap*.tw,kw.	3540919
8	treatment*.tw,kw.	5422557
9	(surger* or (joint adj2 protection*) or (assistive adj2 device*) or (thermal adj2 modalit*)).tw,kw.	1471450
10	((famil* adj2 support) or (social adj2 work*)).tw,kw.	36559
11	physiotherapy/	78898
12	drug combination/	91619
13	occupational therapy/	20811
14	drug therapy/	551076
15	kinesiotherapy/	29925
16	therapy/	1282602
17	psychotherapy/	88089
18	splint/	8373
19	social work/	23215
20	cognitive therapy/	42524

21	relaxation*.tw,kw.	120260
22	relaxation training/	10072
23	(cognitive adj2 therap*).tw,kw.	26926
24	orthosis/	6386
25	(orthosis or orthese*).tw,kw.	4777
26	biofeedback.tw,kw.	9302
27	feedback system/	78664
28	(supportive adj2 psychotherap*).tw,kw.	951
29	group therapy/	19677
30	(group adj2 therap*).tw,kw.	28210
31	directive counseling/ or counseling/	58987
32	counseling.tw,kw.	79753
33	orthotics/ or self care/ or exercise/ or injection/	424740
34	(orthotic* or exercise* or injection*).tw,kw.	1035734
35	(self adj2 management).tw,kw.	22927
36	((manual or hand) adj2 therapy).tw,kw.	4395
37	or/7-36	9790449
38	(rhizoarthrosis or rhizarthrosis).tw,kw.	124
39	6 or 37	10195885
40	38 and 39	95
41	**animal/ not human/**	**1411792**
42	**40 not 41**	**95**
43	**limit 42 to (embase and (english or french))**	**38**

EMBASE (Ovid)
Search #1 OR Search #2 OR **Search #3**
Total: **1701**

4. MEDLINE (OVID)

Database	
Data base	Ovid MEDLINE(R) Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R) Daily, Ovid MEDLINE and Versions(R) 1946 to June 27, 2018
Interface	OVID
Research date	July 4, 2018
Filters	Languages: English, French Human

Syntax	
/	Exact Subject Heading
tw	Textword field includes Title (TI) and Abstract (AB)
kw	Keywords
or, and	Boolean operators
Exp	Function used to find the selected term in combination with all of its narrower, more specific terms.
Adj	Adjacent operator (ADJ) retrieves records with search terms next to each other.

Search strategy

Search #1

1 thumb*.tw,kw. (15830)
2 pollex.tw,kw. (60)
3 Thumb/ (8521)
4 (carpal* or metacarp* or trapezio-metacarpal or trapeziometacarpal or trapezial-metacarpal or trapezialmetacarpal or (basal adj2 thumb) or (basilar adj2 thumb) or (thumb adj2 base)).tw,kw. (26723)
5 Carpal Bones/ or Trapezium Bone/ (5669)
6 trapezium.tw,kw. (912)
7 Metacarpal Bones/ (1410)
8 carpo-metacarpal.tw,kw. (114)
9 carpometacarpal.tw,kw. (1489)
10 CMC.tw,kw. (7967)
11 Carpometacarpal Joints/ (621)
12 Metacarpophalangeal Joint/ (2931)
13 or/1-12 (53378)
14 osteoarth*.tw,kw. (62013)
15 Osteoarthritis/ (33837)
16 joint disease*.tw,kw. (10025)
17 Joint Diseases/ (23811)
18 or/14-17 (99916)

19 Occupational Therapy/ or Drug Therapy/ or Physical Therapy Modalities/ or Drug Therapy, Combination/ or Physical Therapy Department, Hospital/ or Exercise Therapy/ or Occupational Therapy Department, Hospital/ (262770)
20 therap*.tw,kw. (2432179)
21 treatment*.tw,kw. (3967806)
22 Therapeutics/ (8305)
23 Psychotherapy/ (51540)
24 Splints/ (8401)
25 (surger* or (joint adj2 protection*) or (assistive adj2 device*) or (thermal adj2 modalit*)).tw,kw. (1041509)
26 ((famil* adj2 support) or (social adj2 work*)).tw,kw. (26477)
27 Social Work/ (14548)
28 relaxation*.tw,kw. (111574)
29 Relaxation/ or Relaxation Therapy/ (8130)
30 cognitive therapy/ (21969)
31 (cognitive adj2 therap*).tw,kw. (17144)
32 Orthotic Devices/ (6068)
33 (orthosis or orthese*).tw,kw. (3356)
34 (orthotic adj2 device*).tw,kw. (477)
35 Biofeedback, Psychology/ (6893)
36 biofeedback.tw,kw. (6237)
37 (supportive adj2 psychotherap*).tw,kw. (643)
38 Psychotherapy, Group/ (13291)
39 (group adj2 therap*).tw,kw. (18290)
40 Directive Counseling/ or Counseling/ (35233)
41 counseling.tw,kw. (59126)
42 Self Care/ or Orthotic Devices/ or Exercise/ or Injections/ (168027)
43 (orthotic* or exercise* or injection*).tw,kw. (788949)
44 ((manual or hand) adj2 therapy).tw,kw. (2751)
45 (self adj2 management).tw,kw. (15418)
46 or/19-45 (6838213)
47 13 and 18 and 46 (1633)
48 Animals/ not Humans/ (4436891)
49 47 not 48 (1493)

Search #2
1 thumb*.tw,kw. (15830)
2 pollex.tw,kw. (60)
3 Thumb/ (8521)
4 (carpal* or metacarp* or trapezio-metacarpal or trapeziometacarpal or trapezial-metacarpal or trapezialmetacarpal or (basal adj2 thumb) or (basilar adj2 thumb) or (thumb adj2 base)).tw,kw. (26723)
5 Carpal Bones/ or Trapezium Bone/ (5669)
6 trapezium.tw,kw. (912)
7 Metacarpal Bones/ (1410)
8 carpo-metacarpal.tw,kw. (114)
9 carpometacarpal.tw,kw. (1489)
10 CMC.tw,kw. (7967)
11 Carpometacarpal Joints/ (621)

12 Metacarpophalangeal Joint/ (2931)
13 or/1-12 (53378)
14 osteoarth*.tw,kw. (62013)
15 Osteoarthritis/ (33837)
16 joint disease*.tw,kw. (10025)
17 Joint Diseases/ (23811)
18 or/14-17 (99916)
19 Acute Pain/ or Breakthrough Pain/ or Pain/ or Musculoskeletal Pain/ or Chronic Pain/ or Pain Management/ (152504)
20 pain*.tw,kw. (608217)
21 Hyperalgesia/ (10241)
22 hyperalgesia.tw,kw. (12183)
23 Arthralgia/ (7125)
24 or/19-23 (651359)
25 13 and 18 and 24 (1633)
26 Animals/ not Humans/ (4436891)
27 25 not 26 (1493)

Search #3
1 (rhizoarthrosis or rhizarthrosis).tw,kw. (76)
2 Acute Pain/ or Breakthrough Pain/ or Pain/ or Musculoskeletal Pain/ or Chronic Pain/ or Pain Management/ (152504)
3 pain*.tw,kw. (608217)
4 Hyperalgesia/ (10241)
5 hyperalgesia.tw,kw. (12183)
6 Arthralgia/ (7125)
7 or/2-6 (651359)
8 Occupational Therapy/ or Drug Therapy/ or Physical Therapy Modalities/ or Drug Therapy, Combination/ or Physical Therapy Department, Hospital/ or Exercise Therapy/ or Occupational Therapy Department, Hospital/ (262770)
9 therap*.tw,kw. (2432179)
10 treatment*.tw,kw. (3967806)
11 Therapeutics/ (8305)
12 Psychotherapy/ (51540)
13 Splints/ (8401)
14 (surger* or (joint adj2 protection*) or (assistive adj2 device*) or (thermal adj2 modalit*)).tw,kw. (1041509)
15 ((famil* adj2 support) or (social adj2 work*)).tw,kw. (26477)
16 Social Work/ (14548)
17 relaxation*.tw,kw. (111574)
18 Relaxation/ or Relaxation Therapy/ (8130)
19 cognitive therapy/ (21969)
20 (cognitive adj2 therap*).tw,kw. (17144)
21 Orthotic Devices/ (6068)
22 (orthosis or orthese*).tw,kw. (3356)
23 (orthotic adj2 device*).tw,kw. (477)
24 Biofeedback, Psychology/ (6893)
25 biofeedback.tw,kw. (6237)

26 (supportive adj2 psychotherap*).tw,kw. (643)
27 Psychotherapy, Group/ (13291)
28 (group adj2 therap*).tw,kw. (18290)
29 Directive Counseling/ or Counseling/ (35233)
30 counseling.tw,kw. (59126)
31 Self Care/ or Orthotic Devices/ or Exercise/ or Injections/ (168027)
32 (orthotic* or exercise* or injection*).tw,kw. (788949)
33 ((manual or hand) adj2 therapy).tw,kw. (2751)
34 (self adj2 management).tw,kw. (15418)
35 or/8-34 (6838213)
36 7 or 35 (7140609)
37 36 and 1 (56)
38 Animals/ not Humans/ (4436891)
39 37 not 38 (56)

MEDLINE (Ovid)
Search #1 OR Search #2 OR Search #3
(1873)
limit to (english or french) (1648)

5. MEDLINE (PubMed)

Database	
Database	MEDLINE
Interface	PubMed
Research date	July 4, 2018
Filters	Languages: English, French Human

Syntax	
[MeSH Terms]	Medical Subject Heading
OR, AND	Boolean operators
*	Truncation

Search strategy

Search #1

"Self Care"[Mesh] **OR** "Orthotic Devices"[Mesh] **OR** "Exercise"[Mesh] **OR** "Musculoskeletal Manipulations"[Mesh] **OR** "Injections"[Mesh] **OR** self-management[Title/Abstract] **OR** orthotic[Title/Abstract] **OR** exercise*[Title/Abstract] **OR** manual therap*[Title/Abstract] **OR** hand therap*[Title/Abstract] **OR** injection*[Title/Abstract] **OR** therap*[Title/Abstract] **OR** treatment*[Title/Abstract] **OR** surger*[Title/Abstract] **OR** joint protection*[Title/Abstract] **OR** assistive device*[Title/Abstract] **OR** thermal modalit*[Title/Abstract] **OR** family support[Title/Abstract] **OR** social work*[Title/Abstract] **OR** relaxation*[Title/Abstract] **OR** cognitive therap*[Title/Abstract] **OR** orthosis[Title/Abstract] **OR** orthese*[Title/Abstract] **OR** orthotic device[Title/Abstract] **OR** biofeedback[Title/Abstract] **OR** supportive psychotherap*[Title/Abstract] **OR** group therap*[Title/Abstract] **OR** counseling[Title/Abstract] **OR** "Occupational Therapy"[Mesh] **OR** "Drug Therapy"[Mesh] **OR** "Physical Therapy Modalities"[Mesh] **OR** "Drug Therapy, Combination"[Mesh] **OR** "Exercise Therapy"[Mesh] **OR** "Occupational Therapy Department, Hospital"[Mesh] **OR** "Therapeutics"[Mesh] **OR** "Psychotherapy"[Mesh] **OR** "Splints"[Mesh] **OR** "Social Work"[Mesh] **OR** "Relaxation"[Mesh] **OR** "Relaxation Therapy"[Mesh] **OR** "Cognitive Therapy"[Mesh] **OR** "Orthotic Devices"[Mesh] **OR** "Biofeedback, Psychology"[Mesh] **OR** "Psychotherapy, Group"[Mesh] **OR** "Counseling"[Mesh] **OR** "Directive Counseling"[Mesh]

AND

thumb*[Title/Abstract] **OR** pollex[Title/Abstract] **OR** carpal*[Title/Abstract] **OR** metacarp*[Title/Abstract] **OR** trapezio-metacarpal[Title/Abstract] **OR** trapeziometacarpal[Title/Abstract] **OR** trapezial-metacarpal[Title/Abstract] **OR** trapezialmetacarpal[Title/Abstract] **OR** basal thumb[Title/Abstract] **OR** basilar thumb[Title/Abstract] **OR** thumb base[Title/Abstract] **OR** trapezium[Title/Abstract] **OR** carpo-metacarpal[Title/Abstract] **OR** carpometacarpal[Title/Abstract] **OR** CMC[Title/Abstract] **OR** "Thumb"[Mesh] **OR** "Carpal Bones"[Mesh] **OR** "Trapezium Bone"[Mesh] **OR** "Metacarpal Bones"[Mesh] **OR** "Carpometacarpal Joints"[Mesh] **OR** "Metacarpophalangeal Joint"[Mesh]

AND

osteoarth*[Title/Abstract] **OR** joint diseas*[Title/Abstract] **OR** "Osteoarthritis"[Mesh] OR "Joint Diseases"[Mesh]

NOT "Animals"[Mesh]) **NOT** "Humans"[Mesh]

Filters: English; French

Total: 3711

Search #2
"Pain"[Mesh] **OR** "Acute Pain"[Mesh] **OR** "Pain Management"[Mesh] **OR** "Breakthrough Pain"[Mesh] **OR** "Musculoskeletal Pain"[Mesh] **OR** "Chronic Pain"[Mesh] **OR** pain*[Title/Abstract] **OR** "Hyperalgesia"[Mesh] **OR** hyperalgesia[Title/Abstract] OR "Arthralgia"[Mesh]

AND

thumb*[Title/Abstract] **OR** pollex[Title/Abstract] **OR** carpal*[Title/Abstract] **OR** metacarp*[Title/Abstract] **OR** trapezio-metacarpal[Title/Abstract] **OR** trapeziometacarpal[Title/Abstract] **OR** trapezial-metacarpal[Title/Abstract] **OR** trapezialmetacarpal[Title/Abstract] **OR** basal thumb[Title/Abstract] **OR** basilar thumb[Title/Abstract] **OR** thumb base[Title/Abstract] **OR** trapezium[Title/Abstract] **OR** carpo-metacarpal[Title/Abstract] **OR** carpometacarpal[Title/Abstract] **OR** CMC[Title/Abstract] **OR** "Thumb"[Mesh] **OR** "Carpal Bones"[Mesh] **OR** "Trapezium Bone"[Mesh] **OR** "Metacarpal Bones"[Mesh] **OR** "Carpometacarpal Joints"[Mesh] **OR** "Metacarpophalangeal Joint"[Mesh]

AND

osteoarth*[Title/Abstract] **OR** joint diseas*[Title/Abstract] **OR** "Osteoarthritis"[Mesh] OR "Joint Diseases"[Mesh]

NOT "Animals"[Mesh] **NOT** "Humans"[Mesh]

Filters: English; French

Total: 2073

Search #3
"Self Care"[Mesh] **OR** "Orthotic Devices"[Mesh] **OR** "Exercise"[Mesh] **OR** "Musculoskeletal Manipulations"[Mesh] **OR** "Injections"[Mesh] **OR** self-management[Title/Abstract] **OR** orthotic[Title/Abstract] **OR** exercise*[Title/Abstract] **OR** manual therap*[Title/Abstract] **OR** hand therap*[Title/Abstract] **OR** injection*[Title/Abstract] **OR** therap*[Title/Abstract] **OR** treatment*[Title/Abstract] **OR** surger*[Title/Abstract] **OR** joint protection*[Title/Abstract] **OR** assistive device*[Title/Abstract] **OR** thermal modalit*[Title/Abstract] **OR** family support[Title/Abstract] **OR** social work*[Title/Abstract] **OR** relaxation*[Title/Abstract] **OR** cognitive therap*[Title/Abstract] **OR** orthosis[Title/Abstract] **OR** orthese*[Title/Abstract] **OR** orthotic device[Title/Abstract] **OR** biofeedback[Title/Abstract] **OR** supportive psychotherap*[Title/Abstract] **OR** group therap*[Title/Abstract] **OR** counseling[Title/Abstract] **OR** "Occupational Therapy"[Mesh] **OR** "Drug Therapy"[Mesh] **OR** "Physical Therapy Modalities"[Mesh] **OR** "Drug Therapy, Combination"[Mesh] **OR**

"Exercise Therapy"[Mesh] **OR** "Occupational Therapy Department, Hospital"[Mesh] **OR** "Therapeutics"[Mesh] **OR** "Psychotherapy"[Mesh] **OR** "Splints"[Mesh] **OR** "Social Work"[Mesh] **OR** "Relaxation"[Mesh] **OR** "Relaxation Therapy"[Mesh] **OR** "Cognitive Therapy"[Mesh] **OR** "Orthotic Devices"[Mesh] **OR** "Biofeedback, Psychology"[Mesh] **OR** "Psychotherapy, Group"[Mesh] **OR** "Counseling"[Mesh] **OR** "Directive Counseling"[Mesh] **OR** "Pain"[Mesh] **OR** "Acute Pain"[Mesh] **OR** "Pain Management"[Mesh] **OR** "Breakthrough Pain"[Mesh] **OR** "Musculoskeletal Pain"[Mesh] **OR** "Chronic Pain"[Mesh] **OR** pain*[Title/Abstract] **OR** "Hyperalgesia"[Mesh] **OR** hyperalgesia[Title/Abstract] **OR** "Arthralgia"[Mesh]

AND

rhizoarthrosis[tw] **OR** rhizarthrosis[tw]

NOT "Animals"[Mesh]) **NOT** "Humans"[Mesh]

Filters: English; French

Search #1 OR Search #2 OR Search #3
Total: 4390

6. PSYCHINFO

PsychInfo #1 : 19 results
((Any Field: (osteoarth*)) OR (Any Field: (joint disease*)) OR (Any Field: (rhizoarthrosis)) OR (Any Field: (rhizarthrosis)))
AND
((IndexTermsFilt: ("Occupational Therapy") OR IndexTermsFilt: ("Drug Therapy") OR IndexTermsFilt: ("Physical Therapy") OR IndexTermsFilt: ("Exercise") OR IndexTermsFilt: ("Social Casework") OR IndexTermsFilt: ("Relaxation") OR IndexTermsFilt: ("Relaxation Therapy") OR IndexTermsFilt: ("Counseling") OR IndexTermsFilt: ("Injections") OR IndexTermsFilt: ("Activities of Daily Living") OR IndexTermsFilt: ("Rehabilitation") OR IndexTermsFilt: ("Group Psychotherapy") OR IndexTermsFilt: ("Cognitive Therapy") OR IndexTermsFilt: ("Cognitive Behavior Therapy") OR IndexTermsFilt: ("Feedback") OR IndexTermsFilt: ("Biofeedback Training") OR IndexTermsFilt: ("Biofeedback") OR IndexTermsFilt: ("Self-Management")) OR (Index Terms: (relaxation*)) OR (Any Field: (cognitive therap*)) OR (Any Field: (orthosis)) OR (Any Field: (orthese*)) OR (Any Field: (biofeedback)) OR (Any Field: (feedback)) OR (Any Field: (supportive psychotherap*)) OR (Any Field: (group therap*)) OR (Any Field: (counseling)) OR (Any Field: (self management)) OR (Any Field: (orthotic*)) OR (Any Field: (exercise*)) OR (Any Field: (manual therap*)) OR (Any Field: (hand therap*)) OR (Any Field: (injection*)))
AND
((IndexTermsFilt: ("Thumb")) OR (Any Field: (thumb)) OR (Any Field: (pollex)) OR (Any Field: (carpal*)) OR (Any Field: (metacarp*)) OR (Any Field: (trapezio-metacarpal)) OR (Any Field: (trapeziometacarpal)) OR (Any Field: (trapezial-metacarpal)) OR (Any Field: (trapezialmetacarpal)) OR (Any Field: (basal thumb)) OR (Any Field: (basilar thumb)) OR (Any Field: (trapezium)) OR (Any Field: (carpo-metacarpal)) OR (Any Field: (carpometacarpal)))

PsychInfo #2 17 results
((Any Field: (pain*)) OR (Any Field: (arthralg*)) OR (Any Field: (hyperalgesia)) OR (Any Field: AnyFieldFilt: ("Pain") OR Any Field: AnyFieldFilt: ("Somatosensory Disorders")))
AND
((IndexTermsFilt: ("Thumb")) OR (Any Field: (thumb)) OR (Any Field: (pollex)) OR (Any Field: (carpal*)) OR (Any Field: (metacarp*)) OR (Any Field: (trapezio-metacarpal)) OR (Any Field: (trapeziometacarpal)) OR (Any Field: (trapezial-metacarpal)) OR (Any Field: (trapezialmetacarpal)) OR (Any Field: (basal thumb)) OR (Any Field: (basilar thumb)) OR (Any Field: (trapezium)) OR (Any Field: (carpo-metacarpal)) OR (Any Field: (carpometacarpal)))
AND
((Any Field: (osteoarth*)) OR (Any Field: (joint disease*)) OR (Any Field: (rhizoarthrosis)) OR (Any Field: (rhizarthrosis)))
Search Databases: PsycINFO, PsycARTICLES, PsycBOOKS
17 Results

Search #1 or Search #2 : 25 results

Annexe 2 Certificat d'éthique du Volet II

CHUM

Comité d'éthique de la recherche du CHUM
Pavillon P, [illegible] rue St-Denis, 3e étage
Montréal, Québec, H2X 3A9

Le 25 février 2016

Docteur Manon Choinière
Axe de recherche : système de soins et services

a/s: Tokiko Hamasaki
courriel: tokiko.hamasaki.chum@ssss.gouv.qc.ca

Objet:	Autorisation de réaliser la recherche suivante:
	Vers une coordination multidisciplinaire des soins et de la gestion de la douleur associée à l'Ostéoarthrose TrapézoMétacarpienne: Le Projet OTM – Volet II **- Numéro identifiant multicentique: MP-02-2016-6076** **- Numéro CÉR CHUM: 15.315**

Docteur,

Il nous fait plaisir de vous autoriser à réaliser la recherche identifiée en titre dans notre établissement et/ou sous ses auspices.

Cette autorisation vous est accordée sur la foi des documents que vous avez déposés auprès de notre établissement, notamment la lettre du Comité d'éthique de la recherche (CÉR) du CHUM portant la date du 22 février 2016 qui établit que votre projet de recherche a fait l'objet d'un examen scientifique et d'un examen éthique dont le résultat est positif.

Si ce CÉR vous informe pendant le déroulement de cette recherche d'une décision négative portant sur l'acceptabilité éthique de cette recherche, vous devrez considérer que la présente autorisation de réaliser la recherche dans notre établissement est, de ce fait, révoquée à la date que porte l'avis du CÉR évaluateur.

Cette autorisation suppose également que vous respectiez les modalités énoncées ci-après:

1. avoir un statut de chercheur confirmé et à jour;
2. avoir obtenu l'autorisation du bureau des contrats;
3. vous conformer aux demandes du CÉR évaluateur, notamment pour le suivi éthique continu de la recherche;
4. rendre compte au CÉR évaluateur et à la signataire de la présente autorisation du déroulement du projet, des actes de votre équipe de recherche, s'il en est une, ainsi que du respect des règles de l'éthique de la recherche;

5. respecter les moyens relatifs au suivi continu qui ont été fixés par le CÉR évaluateur;
6. conserver les dossiers de recherche pendant la période fixée par le CÉR évaluateur, après la fin du projet, afin de permettre leur éventuelle vérification;
7. respecter les modalités arrêtées au regard du mécanisme d'identification des participants à la recherche dans notre établissement, à savoir, la tenue à jour et la conservation de la liste à jour des sujets de recherche recrutés dans notre établissement. Cette liste devra nous être fournie sur demande.

La présente autorisation peut être suspendue ou révoquée par notre établissement en cas de non-respect des conditions établies. Le CÉR évaluateur en sera alors informé.

Vous consentez également à ce que notre établissement communique aux autorités compétentes des renseignements personnels qui sont nominatifs au sens de la loi en présence d'un cas avéré de manquement à la conduite responsable en recherche de votre part lors de la réalisation de cette recherche.

Je vous invite à entrer en communication avec moi pendant le déroulement de cette recherche dans notre établissement, si besoin est. Vous pouvez aussi solliciter l'appui de notre CÉR en vous adressant au secrétariat pour obtenir les conseils et le soutien voulu, aux coordonnées suivantes:
- par courriel: ethique.recherche.chum@ssss.gouv.qc.ca
- par téléphone: 514 890-8000, poste 14485.

En terminant, je vous demanderais de toujours mentionner dans votre correspondance au sujet de ce projet de recherche le numéro attribué à votre demande par notre établissement 15.315 ainsi que le numéro attribué au projet de recherche par le CÉR évaluateur MP-02-2016-6076 Par ailleurs, vous voudrez bien faire suivre cette lettre aux personnes mentionnées ci-dessous (en cc).

Nous vous prions d'accepter, Docteur, nos salutations distinguées.

Mme Lynda Hertatte

Personne-ressource pour le Comité d'éthique de la recherche du CHUM,
instance mandatée pour autoriser la réalisation des recherches
au nom du Directeur du Centre de recherche du CHUM

c.c.:

- Président du CÉR évaluateur
- Président du CÉR de l'établissement
- Promoteur (le cas échéant)
- Chercheur à qui est adressée la lettre du CÉR évaluateur donnant le résultat de l'examen éthique (si cette personne est différente du chercheur à qui est adressée la présente lettre d'autorisation)

Annexe 3 Formulaire de consentement du Volet II

APPROUVÉ – CÉR DU CHUM

DATE : 22 février 2016
INITIALES : CA

FORMULAIRE D'INFORMATION ET DE CONSENTEMENT

Titre du projet : Vers une coordination multidisciplinaire des soins et de la gestion de la douleur associée à l'Ostéoarthrite TrapézoMétacarpienne (Le projet OTM) - Volet II

Chercheur principal au CHUM et responsable du projet

- Manon Choinière, PhD, Santé des populations, CHUM, CRCHUM

Co-chercheurs

- Tokiko Hamasaki, erg., MSc, Centre de la main, CHUM, Doctorante, Santé des populations, CRCHUM
- Dr Patrick Harris, Centre de la main, Service de plastie, Département de chirurgie, CHUM
- Dre Nathalie J Bureau, MSc, Département de radiologie et médecine nucléaire, CHUM, Imagerie et ingénierie, CRCHUM
- Lyne Lalonde, B. Pharm., PhD, Santé des populations, CRCHUM
- Nathaly Gaudreault, pht., PhD, Université de Sherbrooke, Centre de recherche du Centre hospitalier universitaire de Sherbrooke
- Richard Hovey, PhD, Université McGill
- Hélène Lanctôt, inf., BSc, Santé des populations, CRCHUM

Financement :

- Fonds du groupe de recherche de la douleur du Centre de recherche du CHUM
- Fonds de chirurgies de main de la Fondation du CHUM

No de l'étude au CÉR CHUM: 15.315

Identifiant multicentrique : MP-02-2016-6076

PRÉAMBULE

Nous sollicitons votre participation à un projet de recherche parce que vous souffrez d'arthrose à la base du pouce (ostéoarthrose trapézo-métacarpienne ou OTM). Cependant, avant d'accepter de participer à ce projet et de signer ce formulaire d'information et de consentement, veuillez prendre le temps de lire, de comprendre et de considérer attentivement les renseignements qui suivent.

Ce formulaire peut contenir des mots que vous ne comprenez pas. Nous vous invitons à poser toutes les questions que vous jugerez utiles au chercheur responsable du projet ou aux autres membres du personnel affectés au projet de recherche et à leur demander de vous expliquer tout mot ou renseignement qui n'est pas clair.

NATURE ET OBJECTIFS DU PROJET

Beaucoup de Canadiens souffrent d'arthrose à la base du pouce (OTM). Cette maladie est douloureuse, limite les capacités fonctionnelles et diminue la qualité de vie des gens qui en souffrent. Toutefois, très peu d'études ont été conduites auprès de cette clientèle.

Le but du présent projet de recherche vise à investiguer les caractéristiques de cette douleur, son impact sur le fonctionnement quotidien des patients, sur le bien-être psychologique, et sur la qualité de vie reliée à la santé ainsi que sur l'utilisation des ressources de santé.

NOMBRE DE PARTICIPANTS ET DURÉE DE LA PARTICIPATION

Environ 226 patients seront recrutés pour participer à cette étude au Québec, dont 100 patients au CHUM. La durée totale de l'étude sera de 6 mois. La durée de votre participation sera de 20 à 60 minutes.

NATURE DE LA PARTICIPATION DEMANDÉE ET DÉROULEMENT DU PROJET

Si vous acceptez de participer à ce projet de recherche et après avoir signé le présent formulaire d'information et de consentement, votre participation consistera à compléter un questionnaire portant sur :

- la durée de votre douleur reliée à l'OTM, sa fréquence, son intensité et son impact sur votre vie quotidienne ;
- votre niveau d'anxiété et de dépression, sur votre qualité de vie reliée à la santé, et sur les ressources utilisées (professionnels de la santé consultés, types de traitement reçus et vos différentes stratégies pour faire face à la douleur) ;
- et sur vos informations socio-démographiques (âge, sexe, ethnicité, langue maternelle, scolarité, condition de vie actuelle, état civil, statut d'emploi, profession, changement de travail à cause de l'OTM, revenu familial), votre histoire médicale et vos habitudes de consommation (tabac, alcool, drogues illicites), ainsi que votre poids et taille.

Il vous faudra entre 20 et 60 minutes pour compléter ce questionnaire, selon votre condition.

Après avoir complété le questionnaire, vous devrez le retourner à l'équipe de recherche par la poste dans l'enveloppe préaffranchie ci-jointe dans un délai de deux semaines. Le cas échéant, vous recevrez un appel téléphonique de rappel.

RISQUES ET INCONVÉNIENTS

Le fait de compléter le questionnaire pourrait vous occasionner de la douleur à la base du pouce de la main avec laquelle vous écrivez si ce pouce est atteint d'OTM. Par ailleurs, le temps octroyé à la complétion du questionnaire pourrait constituer un inconvénient pour certain(e)s participant(e)s.

Il est possible que certain(e)s participant(e)s se sentent gênés de répondre à certaines questions (ex. consommation de drogues pour soulager la douleur). Si tel est le cas, vous aurez l'option de ne pas répondre à ces questions.

Il est possible que le fait de répondre à certaines questions portant sur l'anxiété et la dépression vous amène à ressentir des émotions désagréables : si cela se produit, n'hésitez pas à contacter le chercheur et à en parler avec lui. S'il y a lieu, nous pourrons vous référer à une personne-ressource. Il vous sera également possible de choisir de ne pas répondre à ces questions.

AVANTAGES

Vous ne retirerez aucun bénéfice personnel de votre participation à ce projet de recherche. À tout le moins, les résultats obtenus contribueront à l'avancement des connaissances dans ce domaine.

CONFIDENTIALITÉ

Durant votre participation à ce projet, le chercheur responsable ainsi que son personnel recueilleront et consigneront dans un dossier de recherche les renseignements vous concernant. Seuls les renseignements nécessaires pour répondre aux objectifs scientifiques de ce projet seront recueillis.

Ces renseignements peuvent comprendre la durée de votre douleur reliée à l'OTM, sa fréquence, son intensité, son impact sur votre vie quotidienne, votre niveau d'anxiété et de dépression, votre qualité de vie reliée à la santé, les ressources utilisées, histoire médicale et habitudes de consommation. Votre dossier peut aussi comprendre d'autres renseignements tels que votre nom, votre sexe, votre date de naissance et votre origine ethnique.

Tous les renseignements recueillis demeureront strictement confidentiels dans les limites prévues par la loi. Afin de préserver votre identité et la confidentialité des renseignements, vous ne serez identifié(e) que par un numéro de code. La clé du code reliant votre nom à votre dossier de recherche sera conservée par le chercheur responsable.

Les données sur la base de données ***SurveyMonkey®*** seront encryptées et seul un utilisateur avec le mot de passe (qui ne sera connu que du chercheur principal et d'une des co-chercheurs) pourra accéder aux données et les télécharger. Cet utilisateur faisant parti de l'équipe de recherche est assujetti aux mêmes mesures de confidentialité que le chercheur et les concepteurs du projet.

Le chercheur responsable du projet utilisera les données à des fins de recherche dans le but de répondre aux objectifs scientifiques du projet décrits dans le formulaire d'information et de consentement.

Ces données seront conservées pendant 5 ans par le chercheur responsable.

Les données pourront être publiées dans des revues spécialisées ou faire l'objet de discussions scientifiques, mais il ne sera pas possible de vous identifier.
À des fins de surveillance et de contrôle, votre dossier de recherche ainsi que vos dossiers médicaux pourront être consultés par une personne mandatée par le comité d'éthique de la recherche du CHUM ou par l'établissement, ainsi que par une personne mandatée par des organismes publics autorisés. Toutes ces personnes et ces organismes adhèrent à une politique de confidentialité.

À des fins de protection, notamment afin de pouvoir communiquer avec vous rapidement, vos noms et prénoms, vos coordonnées et la date de début et de fin de votre participation au projet seront conservés pendant un an après la fin du projet dans un répertoire à part maintenu par le chercheur responsable.

Vous avez le droit de consulter votre dossier de recherche pour vérifier les renseignements recueillis, et les faire rectifier au besoin, et ce, aussi longtemps que le chercheur responsable du projet ou l'établissement détiennent ces informations. Cependant, afin de préserver l'intégrité scientifique du projet, vous pourriez n'avoir accès à certaines de ces informations qu'une fois votre participation terminée.

COMMUNICATION DES RÉSULTATS GÉNÉRAUX

Vous pourrez connaître les résultats généraux de cette étude si vous en faites la demande au chercheur principal à la fin de l'étude. Vous recevrez ainsi un résumé des résultats de l'étude par courriel.

FINANCEMENT DU PROJET

Ce projet de recherche est financé par les Fonds du groupe de recherche de la douleur du Centre de recherche du CHUM et Fonds de chirurgies de main de la Fondation du CHUM.

COMPENSATION

Vous ne recevrez aucune compensation monétaire pour votre participation à ce projet de recherche. Cependant, suite à la complétion du questionnaire, vous serez éligible à un tirage au sort de l'une des 10 cartes-cadeaux Visa® d'une valeur de 75 $.

INDEMNISATION EN CAS DE PRÉJUDICE ET DROITS DU(DE LA) PARTICIPANT(E) À LA RECHERCHE

Si vous deviez subir quelque préjudice que ce soit par suite de toute procédure reliée à l'étude, vous recevrez tous les soins et services requis par votre état de santé, sans frais de votre part.

En acceptant de participer à cette étude, vous ne renoncez à aucun de vos droits ni ne libérez les chercheurs ou l'établissement de leurs responsabilités légales et professionnelles.

PARTICIPATION VOLONTAIRE ET POSSIBILITÉS DE RETRAIT

Votre participation à ce projet de recherche est volontaire. Vous êtes donc libre de refuser d'y participer. Vous pouvez également vous retirer de ce projet à n'importe quel

moment, sans avoir à donner de raisons, en faisant connaitre votre décision au chercheur responsable du projet ou à l'un des membres du personnel affecté au projet.

Votre décision de ne pas participer à ce projet de recherche ou de vous en retirer n'aura aucune conséquence sur la qualité des soins et des services auxquels vous avez droit ou sur votre relation avec le chercheur responsable du projet et les autres intervenants.

Le chercheur responsable du projet de recherche et le comité d'éthique de la recherche du CHUM peuvent mettre fin à votre participation, sans votre consentement, si de nouvelles découvertes ou informations indiquent que votre participation au projet n'est plus dans votre intérêt, si vous ne respectez pas les consignes du projet de recherche ou s'il existe des raisons administratives d'abandonner le projet.

Si vous vous retirez ou êtes retiré(e) du projet, l'information déjà obtenue dans le cadre de ce projet sera conservée aussi longtemps que nécessaire pour assurer votre sécurité et aussi celles des autres participant(e)s à la recherche et rencontrer les exigences réglementaires.

Toute nouvelle connaissance acquise durant le déroulement du projet qui pourrait affecter votre décision de continuer d'y participer vous sera communiquée sans délai verbalement et par écrit.

PERSONNES-RESSOURCES

Si vous avez des questions concernant le projet de recherche ou si vous éprouvez un problème que vous croyez être relié à votre participation au projet de recherche, vous pouvez communiquer avec le chercheur responsable ou une co-chercheuse du projet de recherche, entre 8h00 et 16h00 :

- Manon Choinière, 514-890-8000 poste 14082
- Tokiko Hamasaki, 514-890-8000 poste 31600

En tout autre temps (soir, nuit, fin de semaine et jour férié), en cas d'urgence, pour rapporter des effets secondaires ou toute lésion liée à la recherche, vous devrez vous présenter à l'urgence de l'Hôpital St-Luc du CHUM au besoin et vous serez vu(e) par le médecin de garde. Vous devrez mentionner que vous participez à ce projet de recherche.

Pour toute question concernant vos droits en tant que participant(e) à ce projet de recherche ou si vous avez des plaintes ou des commentaires à formuler, vous pouvez communiquer avec le commissaire local aux plaintes et à la qualité des services de l'Hôpital St-Luc du CHUM au numéro 514-890-8000, poste 36366.

SURVEILLANCE DES ASPECTS ÉTHIQUES

Le Comité d'éthique de la recherche du CHUM a approuvé ce projet de recherche pour tous les centres participants au Québec et en assure le suivi. De plus, il approuvera au préalable toute révision et toute modification apportées au formulaire d'information et de consentement et au protocole de recherche.

CONSENTEMENT

Avant de signer et dater le présent formulaire de consentement, j'ai reçu des explications complètes sur les méthodes et les moyens qui seront utilisés dans cette étude ainsi que sur les désagréments et les risques qui pourraient y être associés.

J'ai lu et j'ai eu suffisamment de temps pour comprendre pleinement les renseignements présentés ci-dessus concernant cette étude. J'ai eu l'occasion de poser toutes mes questions et on y a répondu à ma satisfaction. Je suis libre de poser d'autres questions à n'importe quel moment. J'accepte de plein gré de signer ce formulaire de consentement. Je recevrai un exemplaire de ce formulaire signé et daté. Un exemplaire sera également déposé à mon dossier médical. En conséquence, je comprends que cette information sera disponible à toute personne à qui je donnerai accès à mon dossier médical. En apposant ma signature sur ce formulaire, je ne renonce cependant à aucun de mes droits légaux ni ne libère le chercheur et l'hôpital de leur responsabilité civile et professionnelle.

_____

Nom et signature du(de la) participant(e) à la recherche Date

Signature de la personne qui a obtenu le consentement, si différente du chercheur responsable du projet de recherche

J'ai expliqué au(à la) participant(e) à la recherche les termes du présent formulaire d'information et de consentement et j'ai répondu aux questions qu'il(elle) m'a posées.

_____

Nom et signature de la personne qui obtient le consentement Date

Engagement du chercheur

Je certifie qu'on a expliqué au(à la) participant(e) à la recherche les termes du présent formulaire d'information et de consentement, que l'on a répondu aux questions que le(la) participant(e) à la recherche avait à cet égard et qu'on lui a clairement indiqué qu'il(elle) demeure libre de mettre un terme à sa participation.

Je m'engage, avec l'équipe de recherche, à respecter ce qui a été convenu au formulaire d'information et de consentement et à en remettre une copie signée et datée au(à la) participant(e) à la recherche.

_____

Nom et signature du chercheur responsable du projet de recherche Date

Annexe 4 Questionnaire du Volet II

INSTRUCTIONS POUR LES PATIENTS
QUI COMPLÈTENT LES QUESTIONNAIRES

Vous trouverez dans ce document, une série de questions portant sur votre douleur à la base du pouce causée par de l'ostéoarthrose trapézométacarpienne (OTM). Ces informations nous aideront à mieux comprendre votre douleur, l'impact qu'elle a sur votre vie, de même que vos besoins spécifiques.

Rappelez-vous qu'il n'y a pas de bonnes ou de mauvaises réponses. Répondez aux questions au meilleur de votre connaissance.

- Vous devez compléter seul ce questionnaire. Néanmoins, si un problème physique limite votre capacité à écrire, un membre de votre famille ou un ami peut vous aider à écrire vos réponses aux questions, mais il/elle ne doit en aucun moment influencer vos choix.

Dans ce document, le genre masculin est utilisé sans discrimination et dans le seul but d'alléger la lecture.

PROJET OTM

QUESTIONNAIRE DU PATIENT

Date: _____ _____ _____ **Initiales du patient:** _____ _____ _____
jj mmmm aaaa

À compléter par l'assistante de recherche

Identification du patient

☐☐-☐☐☐
Région # Patient

DOULEUR À LA BASE DU POUCE RELIÉE À L'OSTÉOARTHROSE TRAPÉZOMÉTACARPIENNE (OTM)

1. **Quel pouce est atteint d'OTM ? Si vous avez de la douleur reliée à l'OTM aux deux pouces, veuillez répondre au questionnaire en vous basant sur le pouce POUR LEQUEL VOUS RESSENTEZ LE PLUS DE DOULEUR.**

   ☐ 0 Gauche

   ☐ 1 Droit

   ☐ 2 Douleur identique dans les 2 pouces

2. **Depuis combien de temps ressentez-vous la douleur reliée à l'OTM ?**

   ☐☐ mois ou ☐☐ années

3. **Comment décrivez-vous la fréquence de votre douleur reliée à l'OTM au cours des 7 derniers jours ?**

   ☐ 1 Présente continuellement

   ☐ 2 Présente occasionnellement: Pendant combien de jours avez-vous ressenti de la douleur au cours des 7 derniers jours ?

   ☐ jours

   ☐ 0 Aucune douleur: Si vous n'avez pas ressenti de douleur au cours des 7 derniers jours, combien de jours vous avez ressenti de la douleur au cours du dernier mois ?

   ☐☐ jours

INTENSITÉ DE LA DOULEUR RELIÉE À L'OTM

Nous vous rappelons que si vous avez de la douleur reliée à l'OTM aux deux pouces, veuillez répondre À TOUTES LES QUESTIONS qui suivent en vous basant sur le pouce POUR LEQUEL VOUS RESSENTEZ LE PLUS DE DOULEUR.

1. **Veuillez choisir le chiffre qui décrit le mieux la douleur reliée à l'OTM que vous ressentez <u>MAINTENANT</u>**

0	1	2	3	4	5	6	7	8	9	10
Aucune douleur										La pire douleur possible

2. **Veuillez choisir le chiffre qui décrit le mieux la douleur reliée à l'OTM que vous avez ressentie EN MOYENNE OU EN GÉNÉRAL au cours des <u>7 derniers jours</u>**

0	1	2	3	4	5	6	7	8	9	10
Aucune douleur										La pire douleur possible

3. **Veuillez choisir le chiffre qui décrit le mieux la douleur reliée à l'OTM que vous avez ressentie lorsqu'elle était À SON PLUS FORT au cours des <u>7 derniers jours</u>**

0	1	2	3	4	5	6	7	8	9	10
Aucune douleur										La pire douleur possible

SYMPTÔMES ET CAPACITÉ À RÉALISER DES ACTIVITÉS

Évaluez votre capacité à faire les activités suivantes au cours de la dernière semaine en cochant la réponse appropriée. Si vous n'avez pas eu l'occasion de réaliser une activité au cours de la dernière semaine, faites de *votre mieux* pour choisir la réponse qui serait la plus juste. Répondez en vous basant sur votre capacité à réaliser la tâche sans vous soucier de comment vous l'effectuez ou de quelle main vous utilisez pour réaliser l'activité.

	Pas de difficulté	Difficulté légère	Difficulté moyenne	Difficulté sévère	Incapable
1. Ouvrir un pot neuf ou fermé serré.	☐1	☐2	☐3	☐4	☐5
2. Faire de gros travaux ménagers (ex.: laver les murs, laver les planchers).	☐1	☐2	☐3	☐4	☐5
3. Transporter un sac d'épicerie ou un porte-document (valise).	☐1	☐2	☐3	☐4	☐5
4. Laver votre dos.	☐1	☐2	☐3	☐4	☐5
5. Utiliser un couteau pour couper des aliments.	☐1	☐2	☐3	☐4	☐5
6. Activités de loisirs durant lesquelles vous bougez votre bras librement (ex.: jouer au frisbee, au badminton, etc.).	☐1	☐2	☐3	☐4	☐5

7. Au cours de la dernière semaine, dans quelle mesure votre OTM a-t-il nui à vos activités sociales habituelles avec votre famille, amis, voisins ou groupes ?

Pas du tout	Un peu	Moyennement	Beaucoup	Extrêmement
☐1	☐2	☐3	☐4	☐5

8. Au cours de la dernière semaine, avez-vous été limité dans votre travail ou dans vos autres activités habituelles à cause de votre OTM ?

Pas limité du tout	Légèrement limité	Moyennement limité	Très limité	Incapable
☐1	☐2	☐3	☐4	☐5

Évaluer la sévérité des symptômes suivants au cours de la dernière semaine.

	Aucune	Légère	Modérée	Sévère	Extrême
9. Douleur reliée à l'OTM.	☐1	☐2	☐3	☐4	☐5
10. Picotements (fourmillements) au bras, à l'épaule ou à la main.	☐1	☐2	☐3	☐4	☐5

11. Au cours de la dernière semaine, dans quelle mesure avez-vous eu de la difficulté à dormir à cause de votre douleur reliée à l'OTM ?

Pas de difficulté	Difficulté légère	Difficulté moyenne	Difficulté sévère	Tellement de difficulté que je n'ai pas pu dormir
☐1	☐2	☐3	☐4	☐5

TRAVAIL

Veuillez compléter cette section si vous travaillez à temps complet ou à temps partiel.

☐ Je ne travaille pas (étudiant, retraité, à la maison, invalidité temporaire ou permanente, sans emploi, mise à pied ou bénévole) : allez à la section suivante intitulée BIEN-ÊTRE ÉMOTIONNEL .

1. Combien d'heures au total avez-vous travaillé au cours des 7 derniers jours ? (Si plus de 97, écrivez 97)

☐☐ Nombre d'heures (00-97)

2. Combien d'heures de travail votre employeur attend t-il de vous au cours d'une semaine typique de 7 jours ? (Si ce nombre varie, estimez la moyenne. Si plus de 97, écrivez 97)

☐☐ Nombre d'heures (00-97)

3. Maintenant, merci de réfléchir à votre travail au cours des 4 dernières semaines (28 jours). Remplissez les cases ci-dessous avec le nombre de jours passés dans chacune des situations de travail mentionnées.

Durant les 4 dernières semaines (28 jours), combien de jours avez-vous…	Nombre de jours (00-28)
3a manqué une journée entière de travail à cause de votre OTM ? (merci d'indiquer seulement les jours d'absence dus à votre OTM et non à cause d'autres problèmes de santé ou ceux de quelqu'un d'autre).	☐☐
3b manqué une journée entière de travail pour toute autre raison (y compris pour des vacances) ?	☐☐
3c manqué en partie une journée de travail à cause de votre OTM ? (merci d'indiquer seulement les jours d'absence dus à votre OTM et non à cause d'autres problèmes de santé ou ceux de quelqu'un d'autre).	☐☐
3d manqué en partie une journée de travail pour toute autre raison (y compris pour des vacances) ?	☐☐
3e eu à venir plus tôt, partir plus tard ou travailler pendant vos jours de repos ?	☐☐

4. Combien d'heures au total avez-vous travaillé au cours des 4 dernières semaines (28 jours) ?
(Voir les exemples ci-dessous)

☐☐☐ Nombre d'heures au cours des 4 dernières semaines (28 jours)

Exemples pour calculer le nombre d'heures travaillées au cours des 4 dernières semaines :

40 heures par semaine pendant 4 semaines = 160 heures

35 heures par semaine pendant 4 semaines = 140 heures

40 heures par semaine pendant 4 semaines avec 2 journées d'absence de 8 heures = 144 heures

40 heures par semaine pendant 4 semaines avec 3 demi-journées d'absence de 4 heures = 148 heures

35 heures par semaine pendant 4 semaines avec absence pendant 2 journées de 8 heures et pendant 3 demi-journées = 112 heures.

5. Sur une échelle de 0 à 10 où 0 = « la plus mauvaise performance au travail possible à votre poste » et 10 = « la meilleure performance possible », comment noteriez-vous la performance habituelle de la plupart des travailleurs à un poste similaire au vôtre ?

Performance la plus mauvaise										La meilleure performance
0	1	2	3	4	5	6	7	8	9	10

6. Sur la même échelle de 0 à 10, comment noteriez-vous votre performance habituelle pendant la ou les deux dernière(s) semaine(s) ?

Performance la plus mauvaise										La meilleure performance
0	1	2	3	4	5	6	7	8	9	10

7. Sur la même échelle de 0 à 10, comment noteriez-vous votre performance globale pendant les jours où vous avez travaillé au cours de ces 4 dernières semaines (28 jours) ?

Performance la plus mauvaise										La meilleure performance
0	1	2	3	4	5	6	7	8	9	10

BIEN-ÊTRE ÉMOTIONNEL

Cette partie du questionnaire est conçue pour nous aider à savoir comment vous vous sentez. Lisez chaque item et cochez la réponse qui est le plus près de comment vous vous êtes senti(e) dans la dernière semaine.

Ne prenez pas trop de temps pour répondre, votre réaction immédiate à chacun des items sera probablement plus précise qu'une réponse longuement réfléchie.

1. Je me sens tendu(e):

- ☐ 3 La plupart du temps
- ☐ 2 Très souvent
- ☐ 1 De temps en temps
- ☐ 0 Jamais

2. Je prends encore plaisir aux choses que j'aimais avant:

- ☐ 0 Tout à fait autant
- ☐ 1 Pas tout à fait autant
- ☐ 2 Un peu seulement
- ☐ 3 Presque pas du tout

3. J'éprouve une sorte de sensation de peur comme si quelque chose d'horrible allait arriver:

- ☐ 3 Oui, très nettement et c'est plutôt grave
- ☐ 2 Oui, mais ce n'est pas trop grave
- ☐ 1 Un peu, mais cela ne m'inquiète pas
- ☐ 0 Pas du tout

4. Je peux rire et voir le côté amusant des choses:

- ☐ 0 Autant que par le passé
- ☐ 1 Pas tout à fait autant maintenant
- ☐ 2 Vraiment moins qu'avant
- ☐ 3 Plus du tout

5. **Des inquiétudes me passent par la tête:**

☐ 3 Très souvent

☐ 2 Assez souvent

☐ 1 De temps en temps mais pas trop souvent

☐ 0 Seulement à l'occasion

6. **Je me sens de bonne humeur:**

☐ 3 Jamais

☐ 2 Pas souvent

☐ 1 Parfois

☐ 0 La plupart du temps

7. **Je peux m'asseoir tranquille et me sentir détendu(e):**

☐ 0 Oui, tout à fait

☐ 1 Habituellement

☐ 2 Pas souvent

☐ 3 Jamais

8. **J'ai l'impression d'être au ralenti:**

☐ 3 Presque toujours

☐ 2 Très souvent

☐ 1 Parfois

☐ 0 Pas du tout

9. **J'éprouve une sorte de sensation de peur comme si j'avais des « papillons » dans l'estomac:**

☐ 0 Jamais

☐ 1 Parfois

☐ 2 Assez souvent

☐ 3 Très souvent

10. Je ne m'intéresse plus à mon apparence:

☐$_3$ Je ne m'y intéresse plus du tout

☐$_2$ Je n'y accorde pas autant d'attention que je le devrais

☐$_1$ Il se peut que je n'y fasse pas autant attention

☐$_0$ J'y prête autant d'attention que par le passé

11. J'ai la bougeotte comme si je ne pouvais pas tenir en place:

☐$_3$ Oui, beaucoup

☐$_2$ Assez

☐$_1$ Pas beaucoup

☐$_0$ Jamais

12. J'envisage les choses à venir avec plaisir:

☐$_0$ Autant qu'avant

☐$_1$ Plutôt moins qu'avant

☐$_2$ Bien moins qu'avant

☐$_3$ Presque jamais

13. J'éprouve des sensations soudaines de panique:

☐$_3$ Vraiment très souvent

☐$_2$ Assez souvent

☐$_1$ Pas très souvent

☐$_0$ Jamais

14. Je peux prendre plaisir à un bon livre ou à une émission de radio ou de télévision:

☐$_0$ Souvent

☐$_1$ Parfois

☐$_2$ Peu souvent

☐$_3$ Très rarement

PCS

Chacun d'entre nous aura à subir des expériences douloureuses. Cela peut être la douleur associée aux maux de tête, un mal de dent, ou encore la douleur musculaire ou aux articulations. Il nous arrive souvent d'avoir à subir des expériences douloureuses telles que la maladie, une blessure, un traitement dentaire ou une intervention chirurgicale.

Dans le présent questionnaire, nous vous demandons de décrire le genre de pensées et d'émotions que vous avez quand vous avez de la douleur. Vous trouverez ci-dessous treize énoncés décrivant différentes pensées et émotions qui peuvent être associées à la douleur. Selon l'échelle suivante, veuillez indiquer à quel point vous avez ces pensées et émotions quand vous avez de la douleur en cochant la réponse appropriée.

Quand j'ai de la douleur…	**Pas du tout**	**Quelque peu**	**De façon modérée**	**Beaucoup**	**Tout le temps**
1. J'ai peur qu'il n'y aura pas de fin à la douleur.	☐0	☐1	☐2	☐3	☐4
2. Je sens que je ne peux pas continuer.	☐0	☐1	☐2	☐3	☐4
3. C'est terrible et je pense que ça ne s'améliorera pas.	☐0	☐1	☐2	☐3	☐4
4. C'est affreux et je sens que c'est plus fort que moi.	☐0	☐1	☐2	☐3	☐4
5. Je sens que je ne peux plus supporter la douleur.	☐0	☐1	☐2	☐3	☐4
6. J'ai peur que la douleur s'empire.	☐0	☐1	☐2	☐3	☐4
7. Je ne fais que penser à d'autres expériences douloureuses.	☐0	☐1	☐2	☐3	☐4
8. Avec inquiétude, je souhaite que la douleur disparaisse.	☐0	☐1	☐2	☐3	☐4
9. Je ne peux m'empêcher d'y penser.	☐0	☐1	☐2	☐3	☐4
10. Je ne fais que penser à quel point ça fait mal.	☐0	☐1	☐2	☐3	☐4
11. Je ne fais que penser à quel point je veux que la douleur disparaisse.	☐0	☐1	☐2	☐3	☐4
12. Il n'y a rien que je puisse faire pour réduire l'intensité de la douleur.	☐0	☐1	☐2	☐3	☐4
13. Je me demande si quelque chose de grave va se produire.	☐0	☐1	☐2	☐3	☐4

Votre santé et votre bien-être

Les questions qui suivent portent sur votre santé, telle que vous la percevez. Vos réponses permettront de suivre l'évolution de votre état de santé et de savoir dans quelle mesure vous pouvez accomplir vos activités courantes.

Pour chacune des questions suivantes, cochez la case ☒ correspondant le mieux à votre réponse.

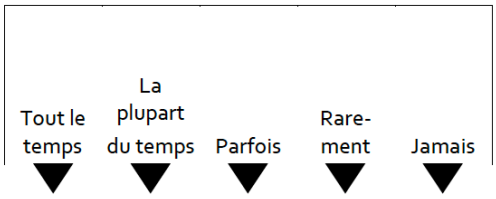
1. En général, diriez-vous que votre santé est:

Excellente	Très bonne	Bonne	Passable	Mauvaise
☐1	☐2	☐3	☐4	☐5

2. Les questions suivantes portent sur les activités que vous pourriez avoir à faire au cours d'une journée normale. Votre état de santé actuel vous limite-t-il dans ces activités ? Si oui, dans quelle mesure ?

	Mon état de santé me limite beaucoup	Mon état de santé me limite un peu	Mon état de santé ne me limite pas du tout
a) Dans les activités modérées comme déplacer une table, passer l'aspirateur, jouer aux quilles ou au golf	☐1	☐2	☐3
b) Pour monter plusieurs étages à pied	☐1	☐2	☐3

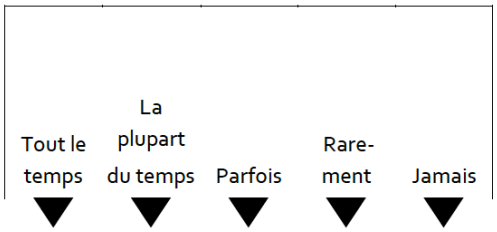
3. **Au cours des <u>quatre dernières semaines</u>, combien de fois avez-vous eu l'une ou l'autre des difficultés suivantes au travail ou dans vos autres activités quotidiennes <u>à cause de votre état de santé physique</u> ?**



a) <u>Avez-vous accompli moins</u> de choses que vous l'auriez voulu ? ..... ☐1 ..... ☐2 ..... ☐3 ..... ☐4 ..... ☐5

b) Avez-vous été limité(e) dans la <u>nature</u> de vos tâches ou de vos autres activités ? ..... ☐1 ..... ☐2 ..... ☐3 ..... ☐4 ..... ☐5

4. **Au cours des <u>quatre dernières semaines</u>, combien de fois avez-vous eu l'une ou l'autre des difficultés suivantes au travail ou dans vos autres activités quotidiennes <u>à cause de l'état de votre moral</u> (comme le fait de vous sentir déprimé(e) ou anxieux (se)) ?**



a) Avez-vous <u>accompli moins</u> de choses que vous l'auriez voulu ? ..... ☐1 ..... ☐2 ..... ☐3 ..... ☐4 ..... ☐5

b) Avez-vous fait votre travail ou vos autres activités avec <u>moins de soin</u> qu'à l'habitude ? .... ☐1 ..... ☐2 ..... ☐3 ..... ☐4 ..... ☐5

5. **Au cours des 4 dernières semaines, dans quelle mesure la douleur a-t-elle nui à vos activités habituelles (au travail comme à la maison) ?**

Pas du tout	Un peu	Moyennement	Beaucoup	Énormément
☐1	☐2	☐3	☐4	☐5

6. **Ces questions portent sur les 4 dernières semaines. Pour chacune des questions suivantes, donnez la réponse qui s'approche le plus de la façon dont vous vous êtes senti(e). Au cours des 4 dernières semaines, combien de fois:**

	Tout le temps	La plupart du temps	Parfois	Rare-ment	Jamais
a) Vous êtes-vous senti(e) calme et serein(e) ?	☐1	☐2	☐3	☐4	☐5
b) Avez-vous eu beaucoup d'énergie ?	☐1	☐2	☐3	☐4	☐5
c) Vous êtes-vous senti(e) triste et démoralisé(e) ?	☐1	☐2	☐3	☐4	☐5

7. **Au cours des 4 dernières semaines, combien de fois votre état physique ou moral a-t-il nui à vos activités sociales (comme visiter des amis, des parents, etc.) ?**

Tout le temps	La plupart du temps	Parfois	Rarement	Jamais
☐1	☐2	☐3	☐4	☐5

VISITES CHEZ UN OU DES PROFESSIONNEL(S) DE LA SANTÉ

Depuis l'apparition de votre douleur reliée à VOTRE OTM, avez-vous consulté l'un ou l'autre des professionnels de la santé suivants pour ce problème ? Numérotez dans l'ordre chronologique les professionnels que vous avez consultés dans les cases appropriées. Pour les professionnels que vous n'avez pas consulté, laissez les cases vides.

Exemple :

Médecin de famille dans le secteur public	1
Physiothérapeute dans le secteur privé	2
Physiothérapeute dans le secteur public	3
Chirurgien plasticien dans le secteur public	4

	Ordre chronologique
Acuponcteur dans le secteur public (ex. : hôpital, résidence, CLSC)	
Acuponcteur dans le secteur privé (ex. : clinique privée)	
Anesthésiste dans le secteur public (ex. : hôpital, résidence, CLSC)	
Anesthésiste dans le secteur privé (ex. : clinique privée)	
Chiropraticien dans le secteur public (ex. : hôpital, résidence, CLSC)	
Chiropraticien dans le secteur privé (ex. : clinique privée)	
Chirurgien orthopédiste dans le secteur public (ex. : hôpital, résidence, CLSC)	
Chirurgien orthopédiste dans le secteur privé (ex. : clinique privée)	
Chirurgien plasticien dans le secteur public (ex. : hôpital, résidence, CLSC)	
Chirurgien plasticien dans le secteur privé (ex. : clinique privée)	
Ergothérapeute dans le secteur public (ex. : hôpital, résidence, CLSC)	
Ergothérapeute dans le secteur privé (ex. : clinique privée)	
Gériatre dans le secteur public (ex. : hôpital, résidence, CLSC)	
Gériatre dans le secteur privé (ex. : clinique privée)	
Homéopathe dans le secteur public (ex. : hôpital, résidence, CLSC)	
Homéopathe dans le secteur privé (ex. : clinique privée)	
Infirmier dans le secteur public (ex. : hôpital, résidence, CLSC)	

Infirmier dans le secteur privé (ex. : clinique privée)	☐
Kinésiologue dans le secteur public (ex. : hôpital, résidence, CLSC)	☐
Kinésiologue dans le secteur privé (ex. : clinique privée)	☐
Massothérapeute dans le secteur public (ex. : hôpital, résidence, CLSC)	☐
Massothérapeute dans le secteur privé (ex. : clinique privée)	☐
Médecin de famille dans le secteur public (ex. : hôpital, résidence, CLSC)	☐
Médecin de famille dans le secteur privé (ex. : clinique privée)	☐
Naturopathe dans le secteur public (ex. : hôpital, résidence, CLSC)	☐
Naturopathe dans le secteur privé (ex. : clinique privée)	☐
Nutritionniste dans le secteur public (ex. : hôpital, résidence, CLSC)	☐
Nutritionniste dans le secteur privé (ex. : clinique privée)	☐
Orthésiste dans le secteur public (ex. : hôpital, résidence, CLSC)	☐
Orthésiste dans le secteur privé (ex. : clinique privée)	☐
Ostéopathe dans le secteur public (ex. : hôpital, résidence, CLSC)	☐
Ostéopathe dans le secteur privé (ex. : clinique privée)	☐
Pharmacien dans le secteur public (ex. : hôpital, résidence, CLSC)	☐
Pharmacien dans le secteur privé (à la pharmacie)	☐
Physiatre dans le secteur public (ex. : hôpital, résidence, CLSC)	☐
Physiatre dans le secteur privé (ex. : clinique privée)	☐
Physiothérapeute dans le secteur public (ex. : hôpital, résidence, CLSC)	☐
Physiothérapeute dans le secteur privé (ex. : clinique privée)	☐
Psychologue dans le secteur public (ex. : hôpital, résidence, CLSC)	☐
Psychologue dans le secteur privé (ex. : clinique privée)	☐
Radiologiste interventionniste (par ex. pour une infiltration) dans le secteur public (ex. : hôpital, résidence, CLSC)	☐
Radiologiste interventionniste dans le secteur privé (par ex. pour une infiltration) (ex. : clinique privée)	☐
Rhumatologue dans le secteur public (ex. : hôpital, résidence, CLSC)	☐
Rhumatologue dans le secteur privé (ex. : clinique privée)	☐

Travailleur social dans le secteur public (ex. : hôpital, résidence, CLSC)	☐
Travailleur social dans le secteur privé (ex. : clinique privée)	☐
Urgentologue dans le secteur public (ex. : hôpital, résidence, CLSC)	☐
Urgentologue dans le secteur privé (ex. : clinique privée)	☐
Autre S*pécifiez*_____	☐
Autre S*pécifiez*_____	☐
Autre S*pécifiez*_____	☐
Autre S*pécifiez*_____	☐

MEDICATION ACTUELLE CONTRE LA DOULEUR

Veuillez inscrire tous les médicaments, cannabis ou produits naturels (prescrits ou en vente libre) que vous utilisez en ce moment pour soulager la douleur soit pour l'OTM, soit pour AUTRES TYPES DE DOULEUR. Si vous n'en prenez aucun, laissez les boites vides.

Médicaments, cannabis ou produits naturels utilisés	De façon régulière	Au besoin
Pour l'OTM		
Pour autres types de douleur		

MEDICATION UTILISÉE ANTÉRIEUREMENT CONTRE LA DOULEUR RELIÉE À L'OTM

Inscrivez le nom des médicaments, cannabis ou produits naturels utilisés antérieurement pour soulager la douleur reliée à votre OTM dans les cases appropriées. Si vous n'en avez jamais utilisé, laissez les cases en blanc.

Raison(s) de cessation	Médicaments, cannabis ou produits naturels
Effets secondaires	
Coût	
Manque d'efficacité	
N'est plus nécessaire pour le moment	
Ne sait pas ou autre raison	

TRAITEMENTS / STRATÉGIES UTILISÉS POUR SOULAGER LA DOULEUR RELIÉE À L'OTM

Veuillez indiquer, pour chaque traitement (ou stratégie) suivant(e,) si vous l'utilisez actuellement pour soulager votre douleur associée à l'OTM, vous l'avez déjà essayé(e) dans le passé, ou vous ne l'avez jamais utilisé(e).

Traitements ou stratégies	Utilisé(e) actuellement	Utilisé(e) dans le passé mais cessé	Jamais utilisé(e)
1. Injection de cortisone	☐1	☐2	☐0
2. Injection d'acide hyaluronique	☐1	☐2	☐0
3. Technique de relaxation/respiration	☐1	☐2	☐0
4. Méditation	☐1	☐2	☐0
5. Hypnose	☐1	☐2	☐0
6. Imagerie mentale	☐1	☐2	☐0
7. Techniques de distraction	☐1	☐2	☐0
8. Exercices du pouce/de la main	☐1	☐2	☐0
9. Orthèse du pouce	☐1	☐2	☐0
10. Aides techniques (ex. grossisseur de manche qui facilite la prise d'objet)	☐1	☐2	☐0
11. Électrostimulation (ex. TENS)	☐1	☐2	☐0
12. Ultrasons	☐1	☐2	☐0
13. Biofeedback	☐1	☐2	☐0
14. Auto-massage de la main	☐1	☐2	☐0
15. Touché thérapeutique	☐	☐2	☐0
16. Réflexologie	☐1	☐2	☐0
17. Reiki	☐1	☐2	☐0
18. Thérapie magnétique	☐1	☐2	☐0
19. Chaleur ou froid et/ou alternance entre les deux	☐1	☐2	☐0
20. Principes de la protection articulaire (ex. utiliser des grosses articulations pour protéger des articulations plus petites et plus fragiles).	☐1	☐2	☐0
21. Gant compressif	☐1	☐2	☐0
22. Autre (*Spécifiez)*	☐1	☐2	☐0

INFORMATIONS SOCIO-DÉMOGRAPHIQUES

1. MOIS ET ANNÉE DE NAISSANCE : ☐☐☐☐ - ☐☐☐☐

Mois (ex. : JUIN) Année

2. SEXE : ☐1 Femme ☐2 Homme

3. MAIN DOMINANTE : ☐1 Droite ☐2 Gauche

4. POIDS : _____ ☐0 Kilogrammes ☐1 Livres (**ex** : 80 kg, 176 lbs)

5. TAILLE : _____ ☐0 Centimètres ☐1 Pieds (**ex :** 180 cm, 5.9 pi)

6. ETHNICITÉ : Cochez la (les) case(s) appropriée(s).

☐0 **Blanc** (personne ayant des ancêtres originaires d'Europe, Afrique du Nord ou Moyen Orient)

☐1 **Noir** (personne ayant des ancêtres originaires d'Afrique ou d'ethnicité noire)

☐2 **Amérindien** (personne ayant des ancêtres originaires d'un groupe ou tribu des premières nations d'Amérique du Nord)

☐3 **Hispanique** (Mexicain, Porto Ricain, Cubain, Amérique centrale ou du Sud)

☐4 **Asiatique** (personne ayant des ancêtres originaires d'Orient, d'Asie, d'Inde, Iles du Pacifique, c.-à-d., Chine, Japon, Philippines, Corée, Samoa, etc.)

☐5 **Autres** : (spécifiez) _____

7. **SCOLARITÉ :** Cochez le plus haut niveau de scolarité complété.

☐0 Aucune

☐1 Primaire

☐2 Secondaire

☐3 École technique ou CEGEP

☐4 Universitaire

8. ÉTAT CIVIL : Cochez un seul choix.

☐ 1 Célibataire

☐ 2 Marié(e) ou union libre

☐ 3 Séparé(e) ou divorcé(e)

☐ 4 Veuf (ve)

9. CONDITION DE VIE ACTUELLE : Avec qui habitez-vous ? Cochez la (les) case(s) appropriée(s).

☐ 0 Seul (e)

☐ 1 Conjoint (e)

☐ 2 Enfant (s)

☐ 3 Petits-enfants

☐ 4 Parent (s)

☐ 5 Frère, sœur, etc.

☐ 6 Colocataire (s)

☐ 7 Pas de condition de vie stable

☐ 8 Institution (CHSLD, communauté religieuse, prison, etc.)

10. OCCUPATION : Quel est votre statut d'emploi <u>actuel</u> ?

☐ 1 Travail à temps complet

☐ 2 Travail à temps partiel

☐ 3 À la maison

☐ 4 Étudiant(e)

☐ 5 Retraité(e)

☐ 6 Invalidité temporaire

☐ 7 Invalidité permanente

☐ 8 Sans emploi

☐ 9 Mise à pied

☐ 10 Bénévole

10a. Veuillez indiquer le(s) métier(s) ou profession(s) que vous exerciez auparavant ou que vous exercez maintenant.

☐ 1 Auparavant _____

☐ 2 Maintenant _____

☐ 0 Je n'ai jamais travaillé.

10b. Si vous êtes employé(e), est-ce que votre OTM vous fait courir le risque de perdre votre travail ?

☐ 1 Oui

☐ 2 Non

☐ 0 Non applicable

10c. Avez-vous perdu ou changé d'emploi à cause de votre OTM ?

☐ 1 Oui

☐ 2 Non

☐ 0 Non applicable

11. REVENU FAMILIAL : Quelle catégorie représente le mieux votre revenu familial annuel avant les déductions ? *(A noter que toutes les informations recueillies dans ce questionnaire demeureront strictement confidentielles et seront traitées sur une base anonyme).*

☐ 0 Moins de 20 000$

☐ 1 20 000 – 34 999$

☐ 2 35 000 – 49 999$

☐ 3 50 000 – 64 999$

☐ 4 65 000 – 79 999$

☐ 5 80 000 – 99 999$

☐ 6 100 000 – 119 999$

☐ 7 120 000$ and more

☐ 8 Je ne désire pas répondre

12. RÉGION : Dans quelle région du Québec habitez-vous présentement ?

☐ 01 Bas-Saint-Laurent

☐ 02 Saguenay—Lac-Saint-Jean

☐ 03 Capitale-Nationale

☐ 04 Mauricie-et-Centre-du-Québec

☐ 05 Estrie

☐ 06 Montréal

☐ 07 Outaouais

☐ 08 Abitibi-Témiscamingue

☐ 09 Côte-Nord

☐ 10 Nord-du-Québec

☐ 11 Gaspésie-Îles-de-la-Madeleine

☐ 12 Chaudière-Appalaches

☐ 13 Laval

☐ 14 Lanaudière

☐ 15 Laurentides

☐ 16 Montérégie

☐ 17 Nunavik

☐ 18 Terres-Cries-de-la-Baie-James

☐ 19 Autre

13. AUTRE(S) DOULEUR(S) CHRONIQUE(S) : Souffrez-vous présentement de douleur(s) chronique(s) autre(s) que l' OTM ?

	Non	**Oui**
Autre(s) ostéoarthrose(s) que l'OTM	☐$_0$	☐$_1$
Douleur(s) chronique (s) autre(s) que l'ostéoarthrose	☐$_0$	☐$_1$

14. HISTOIRE FAMILIALE D'OTM : Y a-t-il quelqu'un dans votre famille qui souffre d'OTM ou qui a déjà souffert d'OTM dans le passé ?

	Ne sait pas	**Non**	**Oui**
1. Père	☐$_2$	☐$_0$	☐$_1$
2. Mère	☐$_2$	☐$_0$	☐$_1$
3. Frères ou sœurs	☐$_2$	☐$_0$	☐$_1$

AUTRES MALADIES

SVP cochez la case de la ou des maladie(s) dont vous souffrez présentement.

- ❑ Insuffisance cardiaque
- ❑ Arythmies cardiaques
- ❑ Cardiopathie valvulaire
- ❑ Troubles de circulation pulmonaire
- ❑ Maladie vasculaire périphérique
- ❑ Hypertension
- ❑ Paralysie
- ❑ Autres affections neurologiques
- ❑ Maladie chronique pulmonaire
- ❑ Diabète sans complication
- ❑ Diabète avec complication (ex. : avec affections rénales, neurologiques, circulatoires périphériques, et/ou non spécifiques)
- ❑ Hypothyroïdie
- ❑ Insuffisance rénale
- ❑ Maladie hépatique
- ❑ Ulcère gastroduodénal sans saignement
- ❑ Syndrome d'immunodéficience acquise (SIDA)
- ❑ Lymphome
- ❑ Cancer métastatique
- ❑ Tumeur solide sans métastase
- ❑ Arthrite rhumatoïde /maladie vasculaire du collagène
- ❑ Coagulopathie
- ❑ Obésité
- ❑ Perte de poids
- ❑ Troubles hydro-électrolytiques
- ❑ Anémie secondaire à une perte de sang ou anémie par carence en fer
- ❑ Autres anémies par carences
- ❑ Abus d'alcool
- ❑ Abus de drogue(s)
- ❑ Psychoses
- ❑ Dépression
- ❑ Autre (spécifiez_____)
- ❑ Aucune

HABITUDES DE CONSOMMATION

CIGARETTES : Quel énoncé décrit le mieux vos habitudes par rapport à la cigarette ?

☐₀ Je n'ai jamais fumé
☐₁ J'ai déjà fumé mais je ne fume plus
☐₂ Je suis un fumeur

ALCOOL : La question suivante porte sur votre consommation d'alcool. Au cours des 12 derniers mois, à quelle fréquence avez-vous consommé des boissons alcoolisées ? Lorsqu'on parle de « boisson alcoolisée », on entend : «Une bouteille ou une canette de bière, ou un verre de bière en fût; ou un verre de vin ou de boisson rafraîchissante au vin « cooler »; ou un verre ou un cocktail contenant 1½ once de spiritueux.»

☐₀ Jamais	☐₄ Une fois par semaine
☐₁ Moins d'une fois par mois	☐₅ 2 à 3 fois par semaine
☐₂ Une fois par mois	☐₆ 4 à 6 fois par semaine
☐₃ 2 à 3 fois par mois	☐₇ Tous les jours

DROGUES : Au cours des 12 derniers mois, à quelle fréquence avez-vous pris l'une ou l'autre des substances suivantes?

	Jamais	Moins d' une fois par mois	1 à 3 fois par mois	Une fois par semaine	Plus d' une fois par semaine	Chaque jour
Marijuana, cannabis ou hashish	☐₀	☐₁	☐₂	☐₃	☐₄	☐₅
Cocaïne ou crack	☐₀	☐₁	☐₂	☐₃	☐₄	☐₅
Héroïne	☐₀	☐₁	☐₂	☐₃	☐₄	☐₅
Autres: *LSD, Mescaline, PCP, Acide, Ecstasy…*	☐₀	☐₁	☐₂	☐₃	☐₄	☐₅

Merci beaucoup d'avoir complété ce questionnaire.

Lorsque la complétion entière de votre questionnaire sera confirmée, vous serez éligible à notre tirage (10 cartes-cadeaux Visa® prépayées d'une valeur de 75$). Le tirage au sort sera réalisé à la fin du recrutement des participants au CRCHUM sous la supervision du chercheur responsable et d'un témoin indépendant au projet de recherche.

Les gagnants seront contactés par un membre de l'équipe de recherche par courriel ou par téléphone. Si vous gagnez un prix, nous vous demanderons de confirmer votre identité grâce à une copie d'une facture de service (ex. téléphone, internet, électricité) qui devra nous être envoyée. Sur réception de cette preuve d'identité, nous vous ferons parvenir votre prix par la poste.

Merci encore de votre participation à l'étude !