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Declaration Of Interests

Anthony Teoli is the President & Founder of InfoPhysiotherapy, and provides an online course on the assessment and management of knee osteoarthritis.
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Dog Lover
Meet Bailey
Knee Osteoarthritis Myths

Fact or Fiction?
FACT OR FICTION?

“Knee OA is just wear and tear”
FICTION
Knee OA is not just wear and tear
Cartilage health is dependent on the integrated behavior of biological, mechanical and structural components.

Adapted from Figure 1 - Andriacchi et al., 2015
Introducing a “risk factor” (i.e. joint injury) moves one or more components (and the system) out of the normal range, and homeostasis.

The OA Systems Model

Adapted from Figure 1 - Andriacchi et al., 2015
Susceptibility of joints to damage and failure to repair

Systemic Factors
(age, sex, obesity, inactivity, genetics)

Mechanical Factors
(obesity, joint load, morphology and alignment, muscle weakness, injury)

Symptomatic Knee OA

Adapted from Figure 1 - Roos & Arden, 2016
Susceptibility of joints to damage and failure to repair

Systemic Factors
(age, sex, obesity, inactivity, genetics)

Mechanical Factors
(obesity, joint load, morphology and alignment, muscle weakness, injury)

Comorbidities, psychological and pain-related factors

Symptomatic Knee OA

Adapted from Figure 1 - Roos & Arden, 2016
Osteoarthritis is a disease of the whole person!
Who is more at risk of developing knee OA?

Non-Modifiable Risk Factors
- Age
- Sex (Silverwood et al., 2015)
- Genetics (Ryder et al., 2008)

Modifiable Risk Factors
- Obesity
- Previous knee injury
- ↑ or abnormal knee joint loading (Sharma et al., 2006)
- ↓ knee extensor muscle strength (Oiestad et al., 2015)
Obesity Is A Robust Risk Factor For Knee OA
Obesity & Knee OA

- Knee OA risk increased almost exponentially according with the increase of BMI (Zhou et al., 2014)

- Each 8 kg ↑ in weight as a young adult was associated with a 70% increase in risk of clinical knee OA more than 30 years later (Gelber et al., 1999)

- Risk of knee OA was 7 times greater for people with BMI > 30 kg/m² vs. control group with a BMI <25 (Toivanen et al., 2010)
Previous Knee Injury Is A Robust Risk Factor For Knee OA

Approximately 50% of individuals diagnosed with ligaments and/or meniscal injuries will have knee OA 10 to 20 years later, with pain and functional impairment.

Lohmander et al., 2007
Knee OA is a complex and multifactorial disease!
FACT OR FICTION?

“Knee osteoarthritis is just wear and tear”
FACT OR FICTION?

“Knee osteoarthritis is a disease of the elderly”
Knee osteoarthritis is not just a disease of the elderly
DID YOU KNOW?

- Young adults and adolescents who have previously sustained knee injuries are prone to develop knee OA before they reach age 40 (Oiestad et al., 2010)

- More than half of all people with symptomatic knee OA are younger than age 65 (Deshpande et al., 2016)

- OA is ranked among the top 20 diseases in the 40–45 years age group (Institute for Health Metrics and Evaluation, 2015)
FACT OR FICTION?

“Knee osteoarthritis is a disease of the elderly”

BUSTED!
FACT OR FICTION?

“Knee osteoarthritis can be prevented”
FACT
Knee osteoarthritis can be prevented
Knee Osteoarthritis Can Be Prevented!

Non-Modifiable Risk Factors

- Age
- Sex (Silverwood et al., 2015)
- Genetics (Ryder et al., 2008)

Modifiable Risk Factors

- Obesity
- Previous knee injury
- ↑ or abnormal knee joint loading (Sharma et al., 2006)
- ↓ knee extensor muscle strength (Oiestad et al., 2015)
Prevention of Knee OA

- **Primary prevention** → prevention of knee injuries and obesity during adolescence.

- Achieved via risk reduction.

- Focus on altering behaviours or exposures that can lead to disease, or by enhancing resistance to the exposure to a disease.

Roos & Arden, 2016
Prevention of Knee OA

- **Secondary prevention** includes detection and treatment of risk factors for progression in individuals who are already at risk.

- **Example**: optimizing exercise/physical activity levels and diet in individuals who are overweight or obese, have impaired muscle function or prior joint injury.

Roos & Arden, 2016
Prevention of Knee OA

- **Tertiary prevention** involves early treatment of OA to prevent progression of the disease.

- **Example:** encouraging individuals with knee OA to be active and manage their weight in order to optimize physical function, quality of life, etc.

  Roos & Arden, 2016
FACT OR FICTION?

“Knee osteoarthritis can be prevented”

CONFIRMED
FACT OR FICTION?

“The clinical diagnosis of knee osteoarthritis can be made without a radiograph”
FACT

According to several best practice guidelines, a radiograph is not required for the clinical diagnosis of knee osteoarthritis. A clinical diagnosis of knee osteoarthritis can be made using the individual’s age, symptoms and clinical findings.
<table>
<thead>
<tr>
<th>Criteria for the Clinical Diagnosis of Knee OA</th>
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<tbody>
<tr>
<td><strong>Symptoms</strong></td>
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<tr>
<td>- <strong>Activity/Usage-Related Joint Pain</strong></td>
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<tr>
<td>- <strong>No EMS, or EMS ≤ 30 Mins</strong></td>
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<tr>
<td>- <strong>Functional Limitation</strong></td>
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<td><strong>Clinical Signs</strong></td>
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<tr>
<td>- <strong>Crepitus</strong></td>
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<td>- <strong>Restricted ROM</strong></td>
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<tr>
<td>- <strong>Bone Enlargement</strong></td>
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<tr>
<td>- <strong>Bone Margin Tenderness</strong></td>
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<tr>
<td>- <strong>No Palpable Warmth</strong></td>
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**Criteria Details:**
- **Age:**
  - NICE: ≥ 45
  - EULAR: ≥ 40
  - ACR: ≥ 50
- **Symptoms:**
  - NICE: Yes
  - EULAR: Yes
  - ACR: Yes
- **Clinical Signs:**
  - NICE: Yes
  - EULAR: Yes
  - ACR: Yes

**Minimum Criteria:**
- All NICE criteria plus
- NICE: ≥ 1
- EULAR: ≥ 3
- ACR: Yes
FACT OR FICTION?

“The clinical diagnosis of knee osteoarthritis can be made without a radiograph”
FACT OR FICTION?

“Individuals with osteoarthritis report higher levels of pain”
FICTION
The presence of osteoarthritis correlates poorly with pain
Symptomatic vs. Radiographic Knee OA

- 15–76% of patients with knee pain were found to have radiographic OA.
- 15–81% of those with radiographic knee OA had pain.
- Discordance between radiographic and symptomatic knee OA.

Bedson & Croft, 2008
Radiographic Knee OA vs. Pain Intensity

- Weak correlation (Lawrence et al., 1966; Bedson & Croft, 2008)

- Strong correlation (Duncan et al., 2007; Neogi et al., 2009; Laxafoss et al., 2010; Murphy et al., 2011; Wang et al., 2018)

- Discordance between knee OA severity and pain intensity (Hannan et al., 2000, Bedson & Croft, 2008; Finan et al., 2013)
WHY does there seem to be no consensus?
FACT OR FICTION?

“Individuals with more severe osteoarthritis report higher levels of pain”
FACT OR FICTION?
“Loading is bad for the knee”
Load is not inherently bad. It is the load you are not prepared for, or adapted to, that may lead to “excessive” or “abnormal”.

What is deemed to be excessive or abnormal is specific to the individual.

Loading the knee is important for maintaining normal knee joint and muscle function!
The body can adapt as long as the mechanical stress applied is not greater than the body’s capacity to adapt to it!
QUANTIFYING MECHANICAL STRESS

THE BODY WILL ADAPT!
As long as the applied stress is not greater than the body's capacity to adapt, it will. Daily quantification of the applied mechanical stress is the best way to avoid injury.

Over-stepping your maximum capacity to adapt will result in:
1. Pain during your effort
2. Pain after
3. Morning stiffness

Adaptation
Appropriate stimulation will increase the body's capacity to sustain mechanical stress

100% Max. adaptation capacity
Min. stress required to create adaptations
Level of daily stress (activities)
0% No mechanical stress

Under-stimulation
No stress = No adaptation!
FACT OR FICTION?

“Loading is bad for the knee”
FACT OR FICTION?

“Running Causes Knee OA”
FICTION
Running Does Not Cause Knee OA!
45 long distance runners, 53 controls

CONCLUSION
By the end of the study, runners did not have more prevalent OA nor more cases of severe OA than did controls.

Chakravarty et al., 2008
Systematic review of 22 studies
> 100 000 pooled participants

Overall prevalence of hip and knee OA

10% in controls or non-runners
3.5% in recreational runners
13% in competitive runners

Alentorn-Geli et al. 2017
FACT OR FICTION?
Running Causes Knee Osteoarthritis

BUSTED!
Knee Osteoarthritis Best Practice in Physiotherapy
A recent systematic review demonstrated that only 36% of patients with OA received appropriate non-pharmacological care according to the guidelines.
Core Treatments
Appropriate for all individuals
- Land-based exercise
- Weight management
- Strength training
- Water-based exercise
- Self-mgmt and education

Recommended treatments*
Appropriate for the following OA types:

Knee-only OA without co-morbidities:
- Biomechanical interventions
- Intra-articular Corticosteroids
- Topical NSAIDs
- Walking Cane
- Oral COX-2 Inhibitors (selective NSAIDs)
- Capsaicin
- Oral Non-selective NSAIDs
- Duloxetine
- Acetaminophen (Paracetamol)

Knee-only OA with co-morbidities:
- Biomechanical interventions
- Walking Cane
- Intra-articular Corticosteroids
- Topical NSAIDs

Multi-joint OA without co-morbidities:
- Oral COX-2 Inhibitors (selective NSAIDs)
- Intra-articular Corticosteroids
- Oral Non-selective NSAIDs
- Duloxetine
- Biomechanical interventions
- Acetaminophen (Paracetamol)

Multi-joint OA with co-morbidities:
- Balneotherapy
- Biomechanical interventions
- Intra-articular Corticosteroids
- Oral COX-2 Inhibitors (selective NSAIDs)
- Duloxetine

Figure 1 - McAlindon et al., 2014
Evidence for Exercise in Knee OA

“As of 2002, sufficient evidence had accumulated to show significant benefit of exercise over no exercise in patients with osteoarthritis, and further trials are unlikely to overturn this result.

An approach combining exercises to increase strength, flexibility, and aerobic capacity is likely to be most effective in the management of lower limb osteoarthritis.”

Uthman et al., 2013
Exercise is the ONLY intervention for patients with painful knee OA whose efficacy is supported by:

- More than 50 randomized, controlled trials (Fransen et al., 2015)

AND

- Strongly recommended by several best-practice guidelines
  - ACR - Hochberg et al., 2012
  - EULAR - Fernandes et al., 2013
  - OARSI - McAlindon et al., 2014
  - National Institute for Health & Care Excellence (NICE), 2014
  - Ottawa Panel Clinical Practice Guidelines - Brosseau et al., 2017
GUYS...I THINK WE'RE ONTO SOMETHING HERE
What Type of Exercise or Physical Activity is Best?
What Exercise or Physical Activity Is Recommended in the Management of Knee OA?

**Tai Chi**
- SR - Lauche et al., 2013
- SR - Kong et al., 2016
- CPG - Brosseau et al., 2017

**Yoga**
- SR - Kan et al., 2016
- CPG - Brosseau et al., 2017

**Cycling**
- RCT - Salacinski et al., 2016
- RCT - Lund et al., 2017
- CPG - Brosseau et al., 2017

**Walking**
- CPG - Loew et al., 2012
- CPG - Fernandes et al., 2013
- CPG - Brosseau et al., 2017

**Aquatic Exercise**
- SR - Bartels et al., 2016
- CPG - Fernandes et al., 2013
- CPG - McAlindon et al., 2014

**Strength Training**
- SR - Jansen et al., 2011
- SR - Fransen et al., 2015
- CPG - McAlindon et al., 2014

**Neuromuscular Training**
- Ageberg et al., 2013
- RCT - Bennel et al., 2014
- RCT - Villadsen et al., 2014
- Skou et al., 2017
REMEMBER
The best exercises are those that get done!
Still having difficulty with patient exercise adherence?

JUST WORKIN’ ON MY CORE...
I will look for you, I will find you
and I will make you do your home exercises
Is exercise appropriate for all individuals with knee OA?
YES!

Exercise is appropriate for all individuals with knee OA. It is also feasible and effective in patients at all severity levels of OA, even in those with moderate to severe OA eligible for total knee and total hip replacement.
Will all individuals with knee OA respond to or get better with exercise?
NO!

Although exercise is strongly recommended as part of the first-line treatment for patients with knee OA, not every patient will respond or get better with exercise. Other interventions may need to be considered to best manage the patient’s pain and help improve physical function and quality of life.
The authors identified four different trajectories in a cohort of 171 participants with symptomatic knee OA

<table>
<thead>
<tr>
<th>Lower Pain Level-Early Improvement (43%)</th>
<th>Higher Pain Level-Delayed Improvement (15%)</th>
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<tbody>
<tr>
<td>- Lower initial WOMAC pain scores</td>
<td>- Higher initial WOMAC pain scores</td>
</tr>
<tr>
<td>- Decline in pain that plateaued after 5 weeks</td>
<td>- Small improvement through 4-5 weeks</td>
</tr>
<tr>
<td></td>
<td>- Large improvement after 5-11 weeks of intervention</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Moderate Pain Level-Early Improvement (32%)</th>
<th>Higher-No Improvement (10%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Moderate initial WOMAC pain scores</td>
<td>- Higher initial WOMAC pain scores</td>
</tr>
<tr>
<td>- Decline in pain over 5 weeks</td>
<td>- No improvement throughout intervention</td>
</tr>
</tbody>
</table>

Lee et al., 2018
Clinical Relevance?

- Large amount of heterogeneity with regards to trajectories of pain and function in response to 12 weeks of exercise interventions among adults with symptomatic knee OA.

- Simply put, no two patients will respond the same way to any one intervention, including exercise.
Clinical Relevance?

- 10% of patients did not improve with exercise. Need to find out **WHY**. Was it due to:
  - Exercise adherence?
  - Psychosocial factors?
  - Perceptions & beliefs?

- 15% of patients had delayed improvement
  - Important for **managing patient expectations**
  - **It is a process** that can take time before an improvement is seen. Does not occur overnight.
Weight Management & Knee OA
Why Weight Loss?

- Being overweight or obese is a modifiable risk factor for knee OA initiation and progression.

- Those who are obese tend to have total knee arthroplasty at an earlier age, with worse post-operative outcomes (Xu et al., 2018)
Why Weight Loss?

Weight loss has the potential to:

- Reduce the risk (Felson et al., 2004) and progression of knee OA (Gersing et al., 2017)
- Reduce peak knee load (Aaboe et al., 2011)
- Improve pain and function (Messier et al., 2004, Messier et al., 2013; Christensen et al., 2007)
- Reduce inflammatory mediators (Messier et al., 2013)
Patient education is crucial in the management of knee OA!
Patient Education

- What is knee OA?
- Identify and address perceptions of disease and beliefs
- Discuss importance of exercise, diet and weight management
- Explain quantification of mechanical stress and proper dosing of physical activity/exercise
- Reassure, reassure, reassure!
- Discuss/manage expectations, goals, etc.
- Discuss treatment plan
We need to be mindful of the words we use when explaining osteoarthritis to our patients!
“Degenerative or chronic disease”

Perceived to have no treatment or prevention.

Words Matter!

Pouli et al., 2014
Words Matter!

“It’s a normal part of aging. It’s just wear and tear”

Dismissive in nature. Tend to link getting older with inevitably poor prognosis.

Pouli et al., 2014
Words Matter!

“Bone on bone”

↓

Provides an inaccurate depiction of what is occurring at the knee joint with movement. Highly nocebic, may ↑ fear avoidance.

Pouli et al., 2014
Words Matter!

- Illness perceptions are associated with, and predict future disability

- Patients’ cognitive representations of their illness determine their emotional responses and guide coping strategies

- Crucial to help the patient improve understanding of the disease, benefits of exercise, importance of exercise adherence, etc.
Words Matter!

These words tend to:

- ↓ decrease patient self-efficacy and perceived control over their pain.
- Provides a false representation of knee OA as a disease that has no treatment and a poor prognosis.
- Create a sense of helplessness.

Pouli et al., 2014
Putting It All Together
Take-Home Messages

- Knee OA is a complex, multifactorial disease.

- Knee OA is a disease of the whole person. It is not just “wear and tear”, nor is it just a simple consequence of aging.

- Not all patients with radiographic knee OA will experience knee pain, and many of them will not progress to require surgery.
Take-Home Messages

- Obesity and previous joint injury are important risk factors for knee OA initiation and progression.

- Educating patients about the importance of addressing modifiable risk factors is crucial for disease prevention.
Take-Home Messages

- Addressing knee OA perceptions and beliefs, fear-avoidance behaviours, and patient expectations is key to optimizing rehabilitation.

- **Words matter**! Be mindful of the words you choose to use when educating your patients about their knee OA.
Take-Home Messages

- Exercise, weight management, self-management and patient education are first line treatment for patients with knee OA.

- Exercise is appropriate for individuals at all severity levels of OA.

- Manual therapy, medications and/or injections are considered second-line treatment and are adjuncts to the core treatments above.
thank you
Questions?


References


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