Measurement of Pain in claimants undergoing an Independent Medical Examination - A gender perspective.

On behalf of Irene Lund
Iréne Lund *and Thomas Lundeberg^ 

Department of Physiology and Pharmacology, Karolinska Institutet

^Specialist Regional Insurance Medicine Center
Department of Rehabilitation Medicine Stockholm
Danderyds University Hospital

Stockholm, Sweden
SEX biological aspects (animals and humans)

GENDER socio-cultural aspects (humans)
Before 1993 – women were excluded from pharmacological studies! The male sex has been the norm even in animal studies.
Hippocampus -
size \( \varnothing > \sigma \)
affinity of glucocorticoid receptors half in women than in men

Amygdala -
size \( \sigma > \varnothing \)
left amygdala activated in women and right in men

Prefrontal cortex -
left activated in women, right in men

"Specifically, men seem to have more access to an amygdale-mediated recruitment of the endogenous pain inhibitory system."

Stress

♀  \[\uparrow \text{stroke volume, cardiac output}\]

♂  \[\uparrow \text{vascular resistance (adrenergic sensitivity)}\]
\[\uparrow \text{release of cortisol}\]

Girdler and Light, 1994
Meh and Denislic, 1994
Zimmer 2003
Different emotional memories?

Canli et al. Sex differences in the neural basis of emotional memories. PNAS 2002;99:10789–10794
Clinical pain

- Higher level of perceived pain
- Pain from more body regions
- Longer duration of pain
- Higher prevalence in painful conditions

* e.g. knee-osteoarthritis pain, fibromyalgia, TMD, migraine, RA, IBS, post-traumatic stress syndrome (PTSD), depression

Fillingim RB. Sex, Gender and Pain. Progress in pain research and management, vol 17. IASP press 2000
# Epidemiology

"Married women suffer from more pain than unmarried"

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Over weight</td>
<td>Over weight</td>
</tr>
<tr>
<td></td>
<td>Unemployment</td>
<td>Anxiety about economy</td>
</tr>
<tr>
<td></td>
<td>Long-term sick-leave</td>
<td>Half time work</td>
</tr>
<tr>
<td></td>
<td>Jogging</td>
<td>Hard work</td>
</tr>
<tr>
<td></td>
<td>Highly educated</td>
<td>Single, divorced</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Long-term sick-leave</td>
</tr>
</tbody>
</table>


## Analgesic use

**Women vs Men**  
♀ > ♂

**younger ♀ > older ♀**

Mechanisms

Biological

Genetics
Gonadal hormones
Endogenous pain inhibition

Socio-cultural
Age, Ethnicity
Family history
Sex roles

Psychological
Anxiety, Depression
Cognition factors
Behavioral factors

Gender differences in pain: do emotions play a role?

Differences in the experience and processing of emotions – differently altering pain processing

♀ more sensitive to negative stimuli (threat related)
♂ more sensitive to positive stimuli (sexual/erotic)

The gender of the examiner – does it matter?


Endogenous pain inhibition
Differences in pain regulating systems

Increased number of NMDA receptors in women as compared to men?
NMDA receptors activated by female gonadal hormones
Sensitized pain system due to repeated visceral pain (menses, labour)?
Wind-up present to a higher degree in women than in men (thermal skin pain)

Cairns. The influence of gender and sex steroids on carniofacial nociception. Headache Curr 2007 feb. 319-324
Fillingim et al. Sex differences in temporal summation but not sensory-discriminative processing of thermal pain. Pain 1998;75.121-127
Perceived pain, quality of life and function can be assessed by rating but is difficult/impossible to measure---despite that, the information from what is perceived is needed to describe data on individual and group level being the basis for
diagnosis and choice of therapy
evaluation of the effect of different therapies
Rated experiences of pain

Ratings of pain – different aspects

- Intensity
- Unpleasantness
- Cognitions

Rated “type” and when

- Right now
- “The most common”
- “The mildest”
- “The worst”
- The last week

Rated change

- Very much worse
- Much worse
- Somewhat worse
- Unchanged
- Somewhat better
- Much better
- Very much better

Ex Patient Global Impression of Change, PGIC
Verbal descriptive scale (VDS)

- How much....
  - [ ] none
  - [ ] very mild
  - [ ] mild
  - [ ] moderate
  - [ ] severe
  - [ ] very severe

Numeric rating scale (NRS)

- How much...?
  - [ ] no pain
  - [ ] moderate
  - [ ] severe

Visual analogue scale (VAS)

- no .......................................... extremely

labels: (-) (+) (++)
How?
Production of data from...

Objective measurements
based on physical, chemical properties
Eg. blood analyses, alko-testing, weight, length, amount

Subjective assessments
based on ratings on scales or other type of categorization according to specification

→ Quantitative data

→ Category data

Categorical data
### Measuring level - ORDINAL DATA

#### Properties of ordinal data

- **Only order**: (1, 2, 3, a, b, c, +, ++, +++)
- **Numbers ≠ Figures**: are only labels without mathematical properties
- **No standardized distance between categories**
- **No defined size (magnitude)**

---


---

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

- None
- Mild
- Moderate
- Sever

- No pain
- Worst possible pain
The operational definition of the variable decide the level of measurement of the data

<table>
<thead>
<tr>
<th>Level of measurement</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dichotomus data</td>
<td>Hypertoni/no hypertoni, painfree, not painfree (+) (-)</td>
</tr>
<tr>
<td>Categorical data (nominal data)</td>
<td>Diagnosis</td>
</tr>
<tr>
<td></td>
<td>Type of drug</td>
</tr>
<tr>
<td>Categorical data with order structure</td>
<td>None, light, moderate, strong pain</td>
</tr>
<tr>
<td>(ordinal data)</td>
<td>Low, normal, high blood pressure</td>
</tr>
<tr>
<td></td>
<td>Completely agree, partly agree, do not agree at all</td>
</tr>
<tr>
<td></td>
<td>Always, often, sometimes, seldom, never</td>
</tr>
<tr>
<td>Quantitative numerous data</td>
<td>Number of painful locations, Heart rate (beats/minute)</td>
</tr>
<tr>
<td>Continuous quantitative data</td>
<td>Blood pressure (mmHg), temperature, body weight (kg), S-kolesterol (mmol/l)</td>
</tr>
</tbody>
</table>
ORDINAL DATA

Order

Ranges
Percentiles:
Median
Quartiles

Quantitative data

Distance and magnitude

Sum, Differences
Quote
Distance
Mean value
Standard deviation
Assessments (ratings) with visual analogue scale (VAS) only indicates the estimate's position on the scale and also produces ordinal data.

**EX: Pain intensity VAS,**  
*Mean* 25.3 (SD 22.8)

Interpretation? **CHOICE AND CONSEQUENCE!!**
Subvariable pain from Foot and Ankle Outcome Score, FAOS

Pain
P1. How often do you experience foot/ankle pain?
   - Never
   - Monthly
   - Weekly
   - Daily
   - Always

What amount of foot/ankle pain have you experienced the last week during the following activities?

P2. Twisting/pivoting on your foot/ankle
   - None
   - Mid
   - Moderate
   - Severe
   - Extreme

P3. Straightening foot/ankle fully
   - None
   - Mid
   - Moderate
   - Severe
   - Extreme

P4. Bending foot/ankle fully
   - None
   - Mid
   - Moderate
   - Severe
   - Extreme

P5. Walking on flat surface
   - None
   - Mid
   - Moderate
   - Severe
   - Extreme

P6. Going up or down stairs
   - None
   - Mid
   - Moderate
   - Severe
   - Extreme

P7. At right while in bed
   - None
   - Mid
   - Moderate
   - Severe
   - Extreme

P8. Sitting or lying
   - None
   - Mid
   - Moderate
   - Severe
   - Extreme

P9. Standing upright
   - None
   - Mid
   - Moderate
   - Severe
   - Extreme

FAOS responsiveness has been confirmed in patients undergoing treatment for Achilles tendinosis (see below) and plantar fasciitis (work in progress).
A User's Guide to:
Foot and Ankle Outcome Score
FAOS

1. PAIN
   \[ 100 - \frac{\text{Total score P1-P9} \times 100}{36} = \frac{100 - \_\_\_\_}{36} = \_\_\_\_ \]

2. SYMPTOMS
   \[ 100 - \frac{\text{Total score S1-S7} \times 100}{28} = \frac{100 - \_\_\_\_}{28} = \_\_\_\_ \]

3. ADL
   \[ 100 - \frac{\text{Total score A1-A17} \times 100}{68} = \frac{100 - \_\_\_\_}{68} = \_\_\_\_ \]

4. SPORT&REC
   \[ 100 - \frac{\text{Total score SP1-SP5} \times 100}{20} = \frac{100 - \_\_\_\_}{20} = \_\_\_\_ \]

5. QOL
   \[ 100 - \frac{\text{Total score Q1-Q4} \times 100}{16} = \frac{100 - \_\_\_\_}{16} = \_\_\_\_ \]
Statistical toolkit

- what analyses tool could be used?

Independent data

• Differences between groups, Mann Whitney U test

Dependent data from paired assessments

• Association, Spearman rank-order correlation, Svensson method

• Change before/after (effect), Sign test (differences between paired proportions), Svensson’s rank-based method (designed for pairs of ordinal data from all types of ordered assessments: separates systematic disagreement between two assessments, group based, from individual variations, noise, in assessments)

• Agreement, inter-/intra-assessments, Svensson method

Does 2 different instruments say the same?

Worst possible pain
Severe pain
Moderate pain
Mild pain
No pain


Worst possible pain
Severe pain
Moderate pain
Mild pain
No pain

Knee-osteoarthritis pain

Women report more load-related pain and reduced function

Sluka et al. Neural and psychosocial contributions to sex differences in knee osteoarthritic pain. Biology of Sex Differences 2012, 3:26
Boyan et al. Hormonal modulation of connective tissue homeostasis and sex differences in risk for osteoarthritis of the knee Biology of Sex Differences 2013, 4:3
Tonelli et al. Women with knee osteoarthritis have more pain and poorer function than men, but similar physical activity prior to total knee replacement. Biology of Sex Differences 2011;2:12
Sex/Gender gap – females/women are still underrepresented in animal and human studies

Zucker I, Beery AK. Nature. 2010 Jun 10;465(7299):690

CONCLUSION

• Pain appears differently in men and women - ranging from neurobiological to socio-cultural aspects

• Women are reported to suffer from pain more than men

• Observations on males/men cannot be generalized indiscriminately to females/women and vice versa.

In order to increase our knowledge

• Influence of sex/gender related effects should be considered when designing, analyzing and reporting acupuncture studies

• Sex/gender differences when only one sex is studied, could be indicated in article titles.

• More studies separating the two sexes/genders are needed
• Study of mechanisms underlying sex differences should be a high priority.