Prevention of musculoskeletal complaints in musicians

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presto

Prevention **st**udy **o**n physical complaints in conservatory students

Maastricht UMC+

azM university hospital Maastricht | Maastricht University

Universiteitsfonds Limburg | SWOL |

adelante
haal het beste uit jezelf

Project team UM

- Department of Rehabilitation Medicine
  - Prof. RJEM Smeets
  - Prof. JAMCF Verbunt
  - Dr. MDF van Eijsden-Besseling
- Department of Epidemiology, Musculoskeletal group
  - Prof. RA de Bie
- Participating conservatories:

codarts hogeschool voor de kunsten

Conservatorium Maastricht ZUYD

Fontys Hogeschool voor de Kunsten

Hogeschool voor de Kunsten Utrecht
De kunst van HKU - nieuwe verbindingen, nieuwe toepassingen

Hanzehogeschool Prins Claus Conservatorium

Playing-related musculoskeletal disorders (PRMD)

"pain, weakness, lack of control, numbness, tingling, or other symptoms that interfere with the ability to play the instrument at the level the musician is accustomed to"

(Zaza, Soc Sci Med, 1998)

PRMD

- Epidemiology
  - Prevalence
  - Risk factors
- Prevention
  - Body posture and muscle use
  - Randomized controlled trial

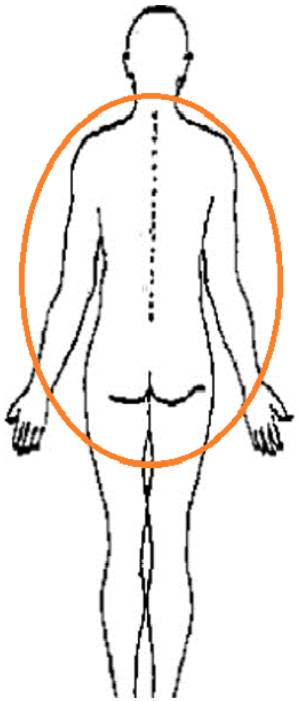
Prevalence

Cross-sectional study

3th/ 4th year conservatory students

N=132 (RR 9.4%)

67% complaints



52% disability

Baadjou e.a., MPPA, 2015

Characteristics of PRMD

- Pain intensity (NRS): 4.73±2.17
- Quality of life (SF-12)
  - Physical component (PCS): 51.67 (44.77-56.38)
  - Mental component (MCS): 43.71 (31.96-49.25)
- Associations:
  - – Pain intensity - PCS and MCS
  - \+ Pain intensity - disability
  - – Quality of life - disability

Risk factors for development of PRMD

- Unknown due to large heterogeneity between current studies and lack of high quality prospective research
- Suggested:
  - Previous injury
  - Music performance anxiety
  - High levels of stress
  - Female playing stringed instrument

Baadjou, Roussel, Verbunt, Smeets, de Bie. 2016. Occup Med.

https://inthestreetwemeet.wordpress.com/2015/11/16/body-talk-a-clarinet-conversation-in-istanbul-turkey/

musculoskeletal complaints

high load right arm/thumb

posture

sound

PLAYING THE CLARINET: INFLUENCE OF BODY POSTURE ON MUSCLE ACTIVITY AND SOUND QUALITY

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MDF van Eijsden-Besseling, MD PhD
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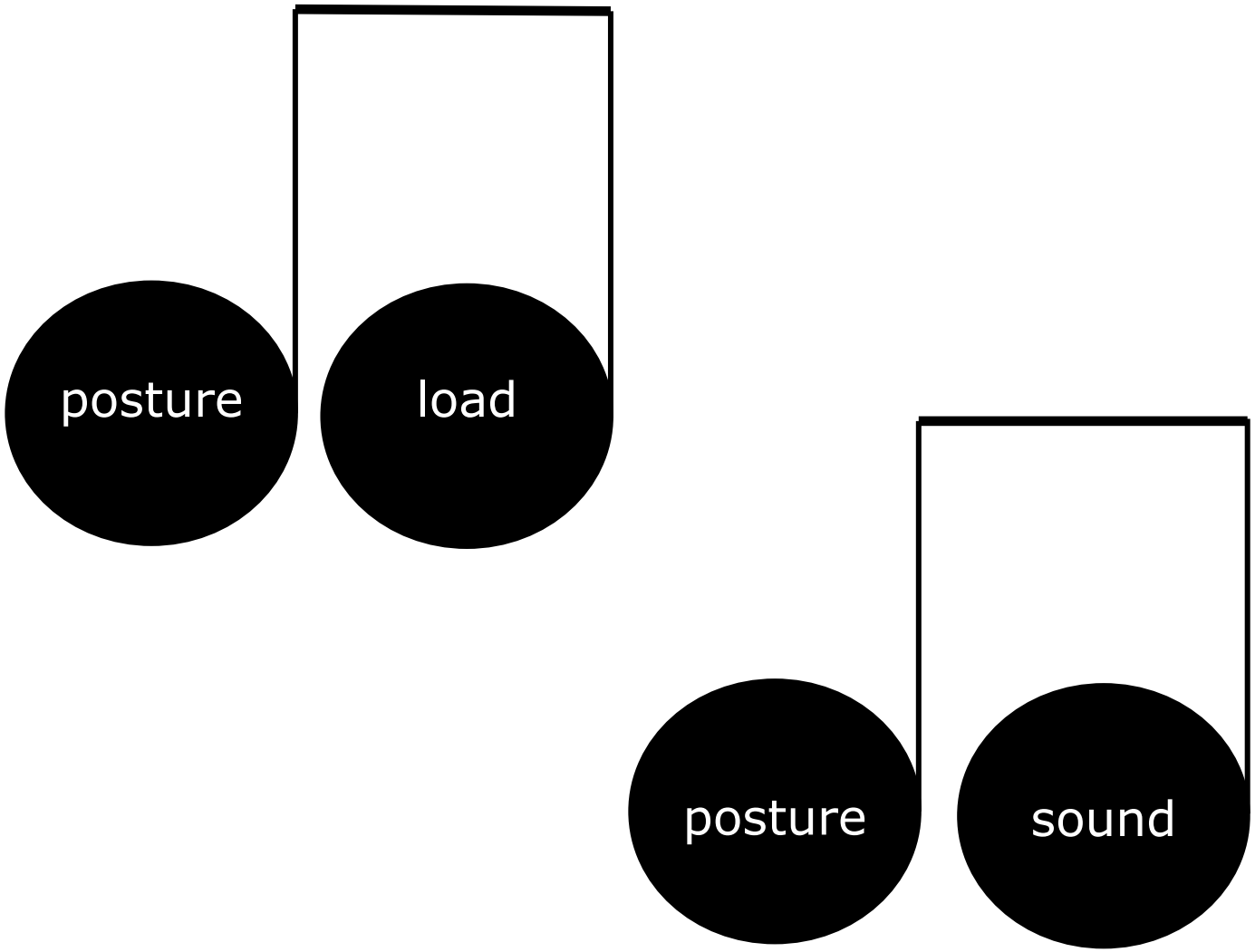
RA de Bie, Phd
RPJ Geers RP, MScEng
RJEM Smeets, MD PhD
HAM Seelen, PhD

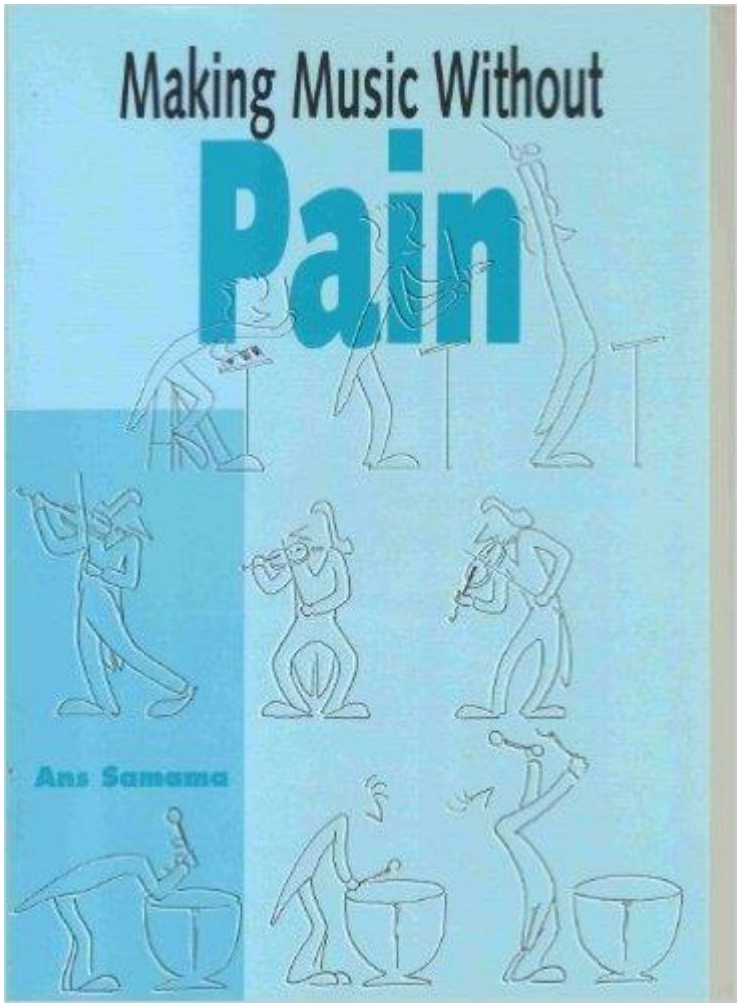
PAMA
PERFORMING ARTS MEDICINE ASSOCIATION


posture
load
posture
sound

Postural exercise therapy according to Mensendieck

Method Samama

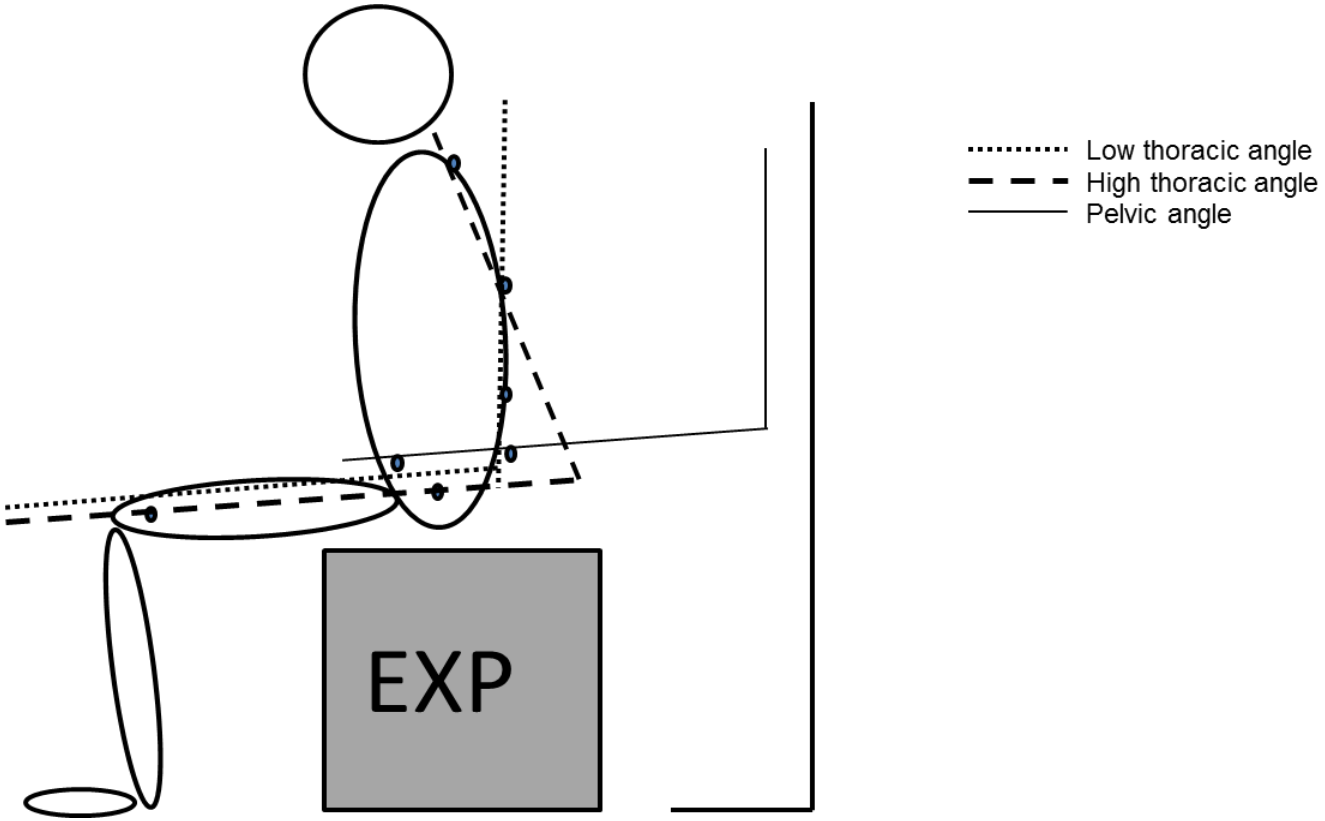
MmS



Mensendieck / Samama

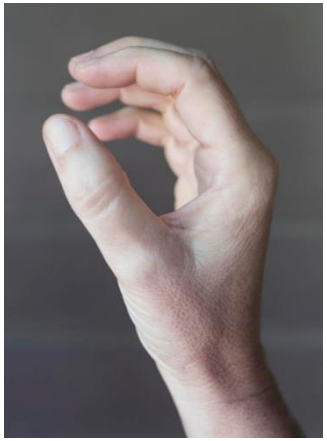
- Balanced posture
  - Prevention of imbalance between muscles providing stability and muscles needed to play the instrument
  - More proximal muscle activity (stability)
  - Less distal muscle activity
- Body awareness (tension/ relaxation)
- Controlled movements
- Functional respiration

Body posture MmS



Samama

- Clarinet specific:
  - Functional hand posture
  - Thumb support
  - Do not raise left elbow and shoulder
  - Instrument to body
  - Breath support



Methods

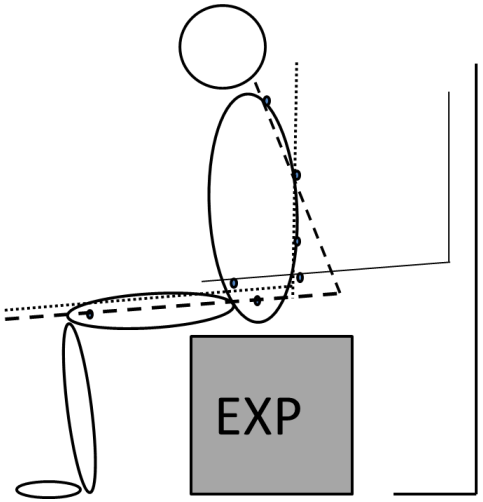
- Cross-sectional study, contrasting two postural conditions while playing clarinet
  - CO: habitual sitting posture
  - EXP: experimental sitting posture = MmS
- Participants: healthy (pre)professional clarinet players, aged 18-60
- Exclusion: musculoskeletal complaints, prior therapy MmS.
- Seating position on standardized chair: adjustable height, flat seat surface, no back support

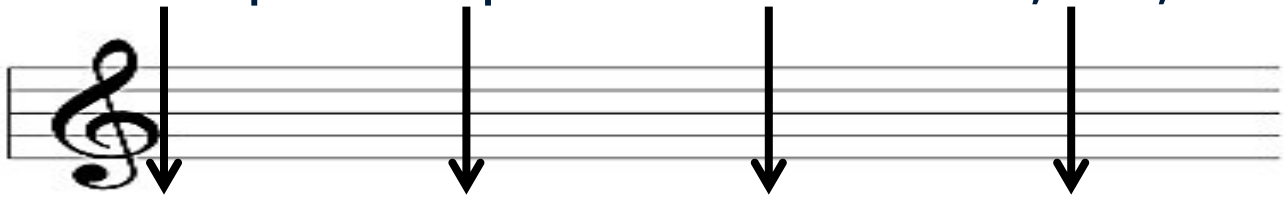
Methods

- Demographics
- Clinical tests: length, weight, joint laxity
- Environmental: weight clarinet, room temperature and humidity, heigth of chair and music stand
- Body posture
- Muscle activity
- Sound quality

Measurements: Body posture

- 2-dimensional goniometric analysis
- Pelvic angle, trunk angle
- Reference points
  - lateral femur condyle
  - greater trochanter
  - anterior superior iliac spine
  - posterior superior iliac spine
  - spinous process levels L2, T7, C7



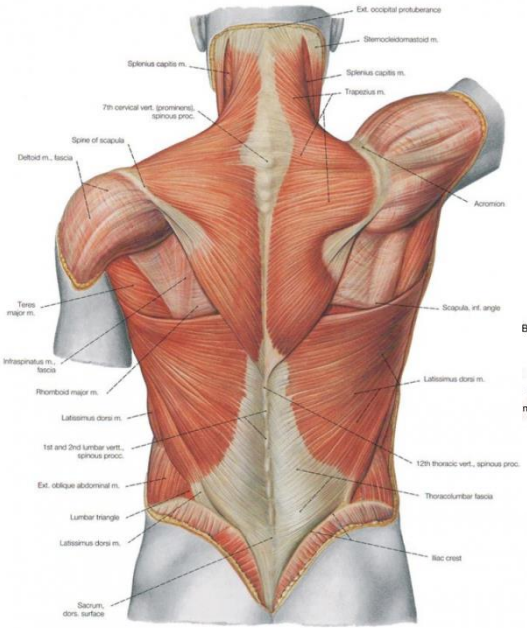


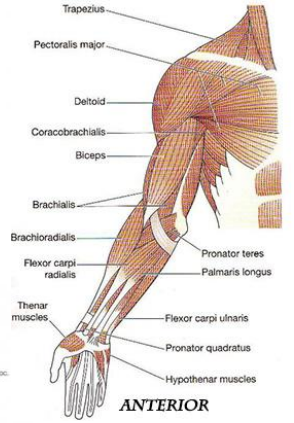
Measurements: Muscle activity

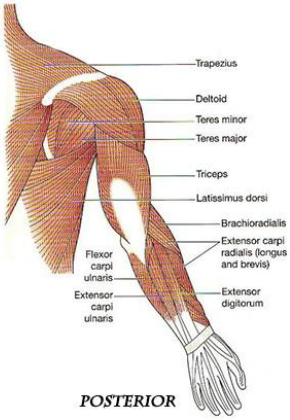
- sEMG according SENIAM guidelines
- Placement confirmed with manual muscle testing
- Raw EMG signals sampled 2000Hz
- Rectified EMG filtered
- Offset determined during rest
- Analysis using Matlab software

Measurements: Muscle activity

- Bilateral recordings of:
  - Erector spinae L3
  - Latissimus dorsi
  - Lower trapezius
  - Pectoralis major
  - Upper trapezius
  - Biceps brachii
  - Brachioradialis







Sound

- Subjective experience participants
- Blinded expert panel
  - 3 assessments per participant
  - Randomized order CO/EXP
  - Pitch, timbre, stability, breathing capacity

Procedure

- Application of measurement equipment
- Warming-up

- 5 * 60 sec. play clarinet CO

- 30 min. instructions MmS

- 5 * 60 sec. play clarinet EXP

Participant characteristics

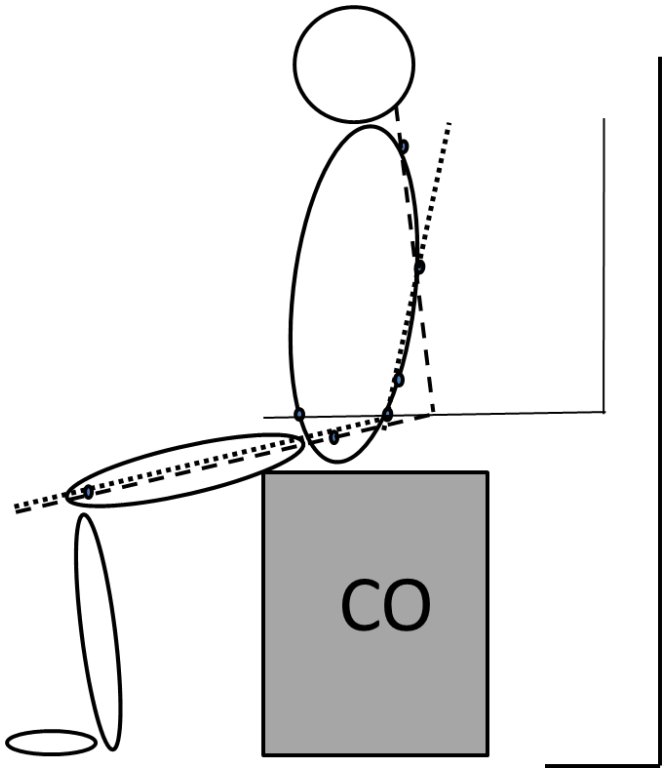
20 clarinettists	
Gender	9 male, 11 female
Mean age	29.25 ± 10.16 years
Mean BMI	24.30 ± 4.90
Experience	9 students, 11 professional
Playing experience	19.4 ± 10.69 years
Hours playing/week	18.90 ± 11.75
Generalized hypermobility	1
Hand joint laxity	6/18

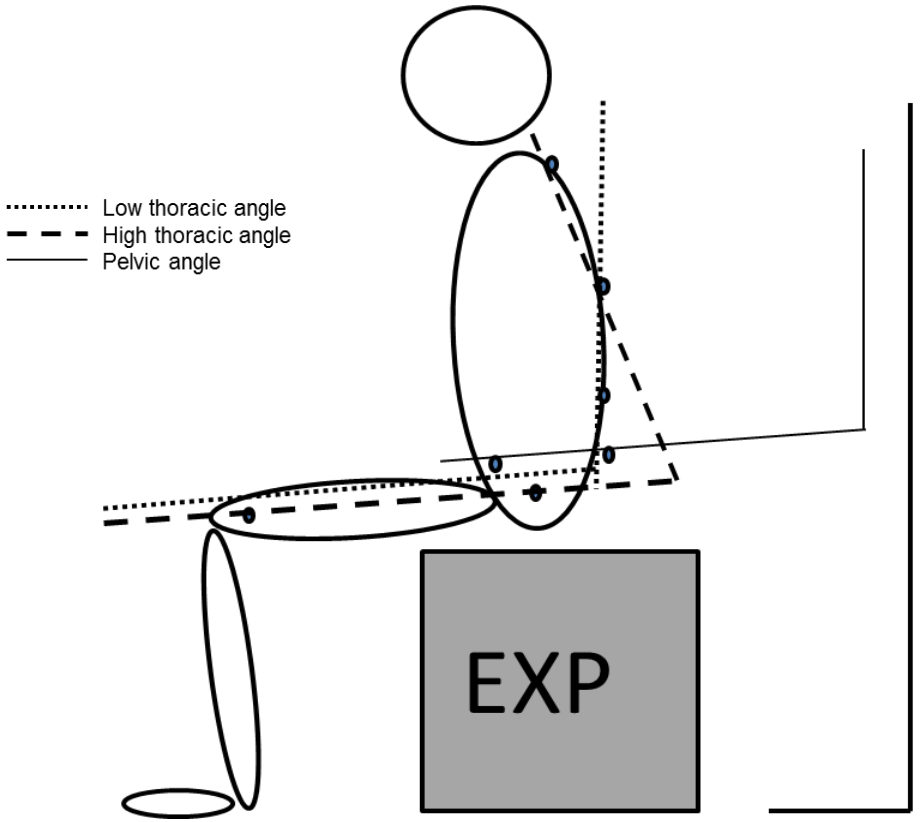
Results: posture

CO

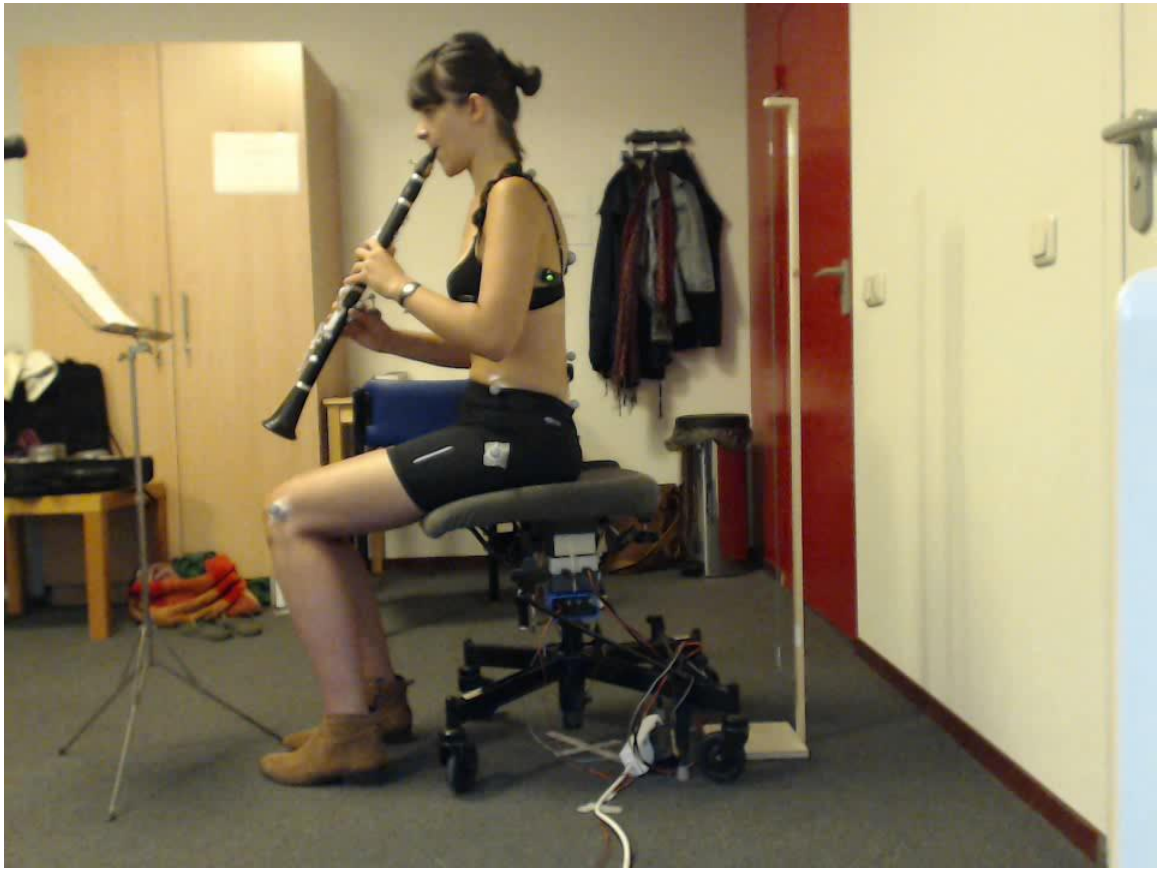
EXP

Body posture

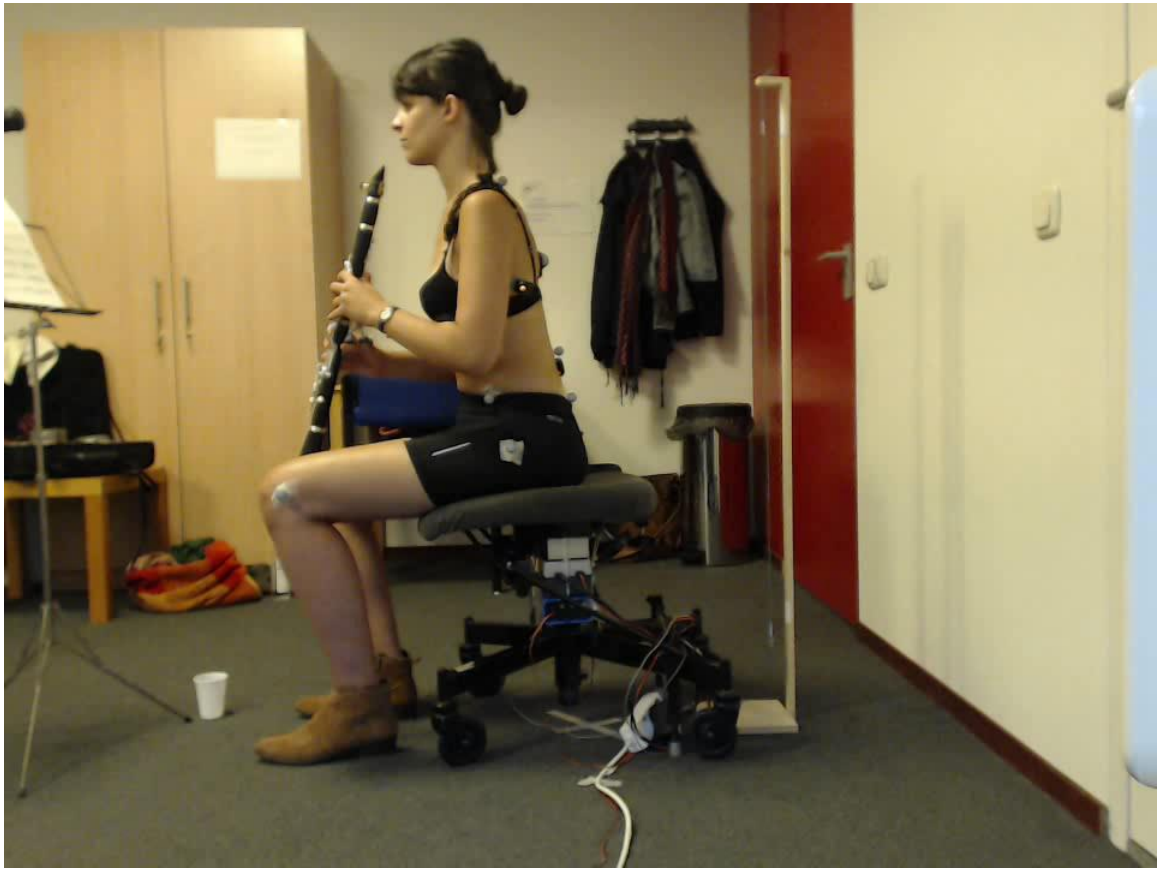




CO



EXP



Muscle activity

Muscle		Hypothesized EXP vs CO	True
Erector spinae L3	R	+	+
	L	+	+
Lat. Dorsi	R	+	
	L	+	
Lower trapezius	R	+	+
	L	+	+
Upper trapezius	R	-	
	L	-	-
Pectoralis major	R	-	
	L	-	
Biceps brachii	R	-	
	L	-	
Brachioradialis	R	-	-
	L	-	

Sound quality

- Subjective experience: 14 EXP> CO

At start:
-Odd playing in EXP
-More tension lower back
-Wearing armor around thorax

Later:
-More space/capacity to breathe
-Easier to support breathing
-Better sound quality

- Reviewers: ambiguous

Discussion

- Change posture → change in muscle activity
  - More activity m. erector spinae
  - More activity lower trapezius muscle
  - Less activity left upper trapezius
  - Less activity right brachioradialis

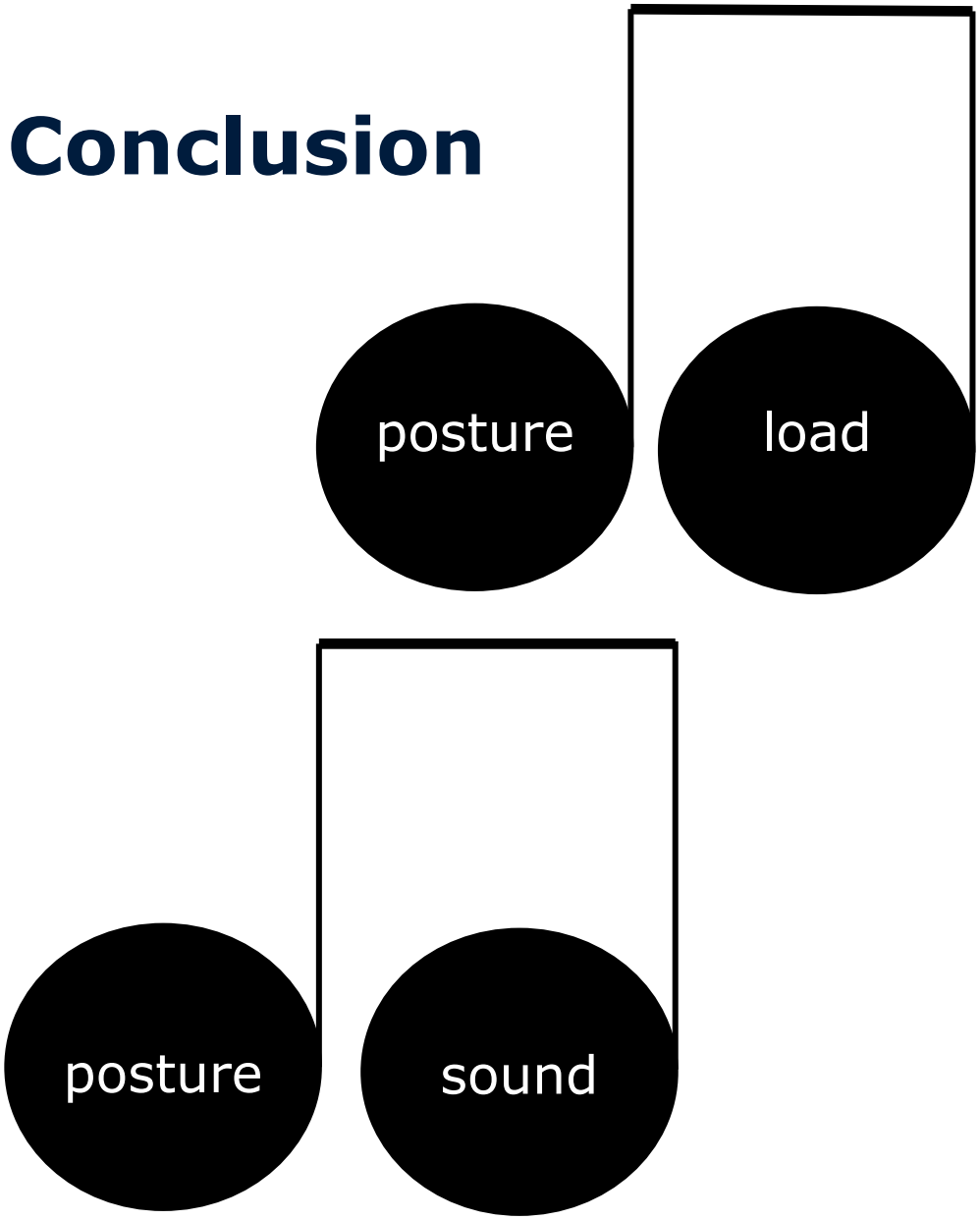
Discussion

- Change posture → change sound
  - Subjective experience good
  - Objective results ambiguous

Discussion

- Posture needs to be generalized
- Prospective studies needed to relate posture to musculoskeletal complaints
- Role of thumb support
- Compensatory muscle use
- Performance related outcome measures as sound worthwhile exploring further

Conclusion


posture
load
posture
sound


PLAY
REST
REPEAT
it's
about
RHYTHM
RHAPSODY

What's next?

- Multicenter RCT
- 5 Dutch conservatories
- Biopsychosocial health promotion and injury prevention vs. physical activity promotion
- Results expected 2018

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Questions