

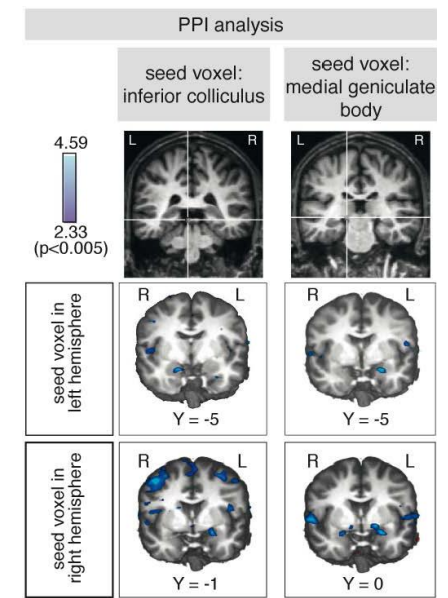
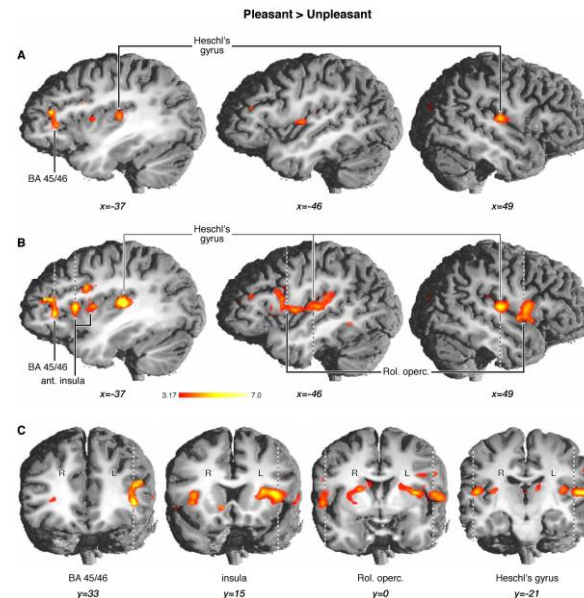
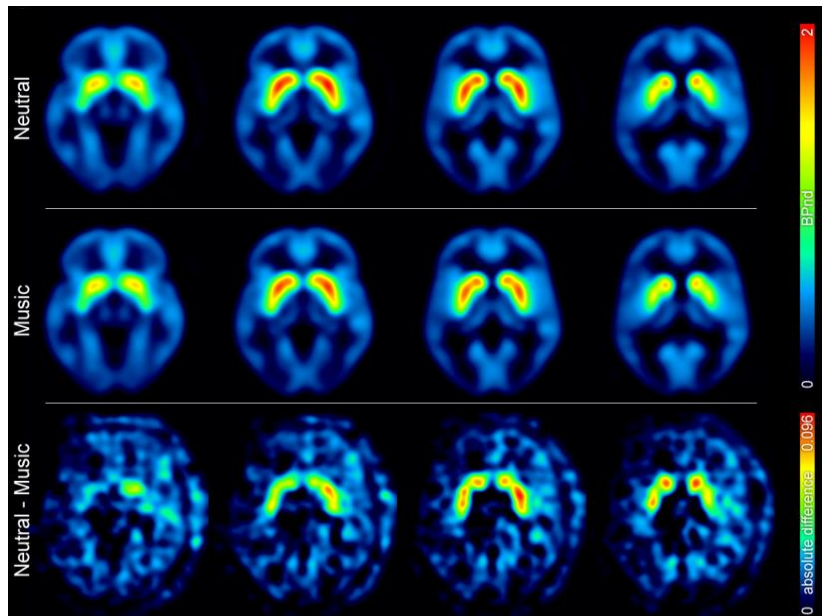
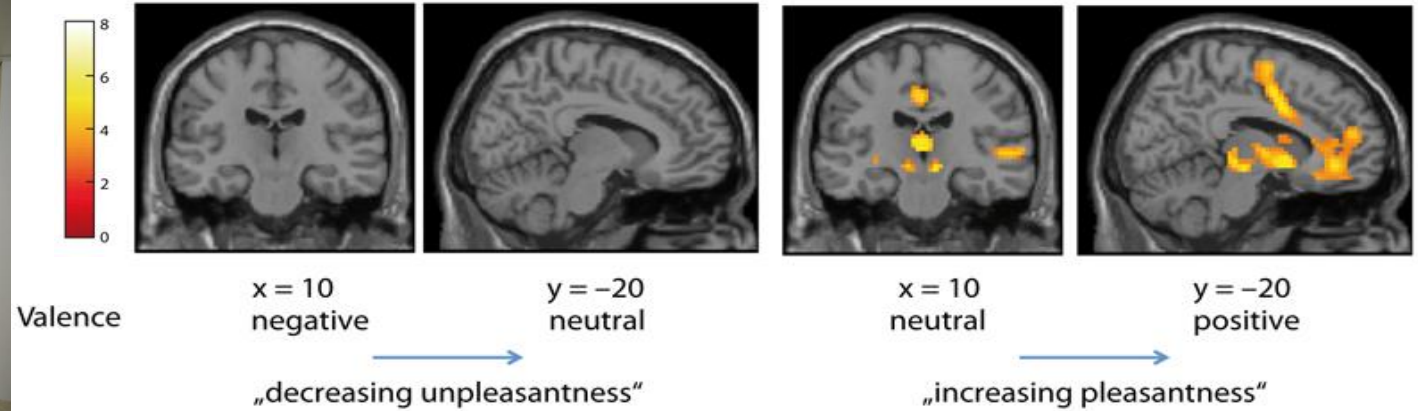
Technology transfer from the ancient past

Maximizing Effects of Music in Sports and Rehabilitation



Prof. Dr. Thomas Hans Fritz, Psych. Lydia Schneider

„Music Evoked Brain Plasticity Group“, MPI



Physical Map of the World, April 2001

AUSTRALIA Independent state
Bermuda Dependency or area of special sovereignty
City / AZORES Island / island group
★ Capital
Scale 1:25,000,000
Robinson projection
Standard parallels 30°N and 30°S



April 2001
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Dr. Thomas Fritz

Mafa flute music



Houdok

Chechega

Paleyga

Mbege

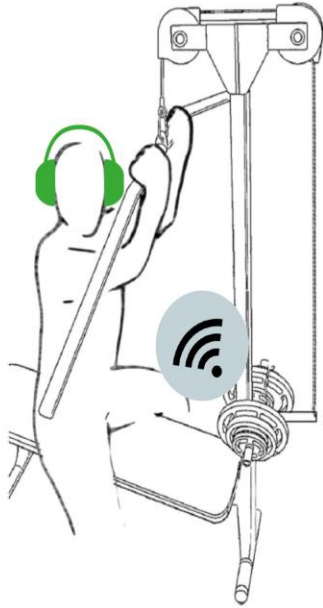
Maill

Gsa

Tcegem

Mdegem

Fritz et al., *Current Biology*, 2009

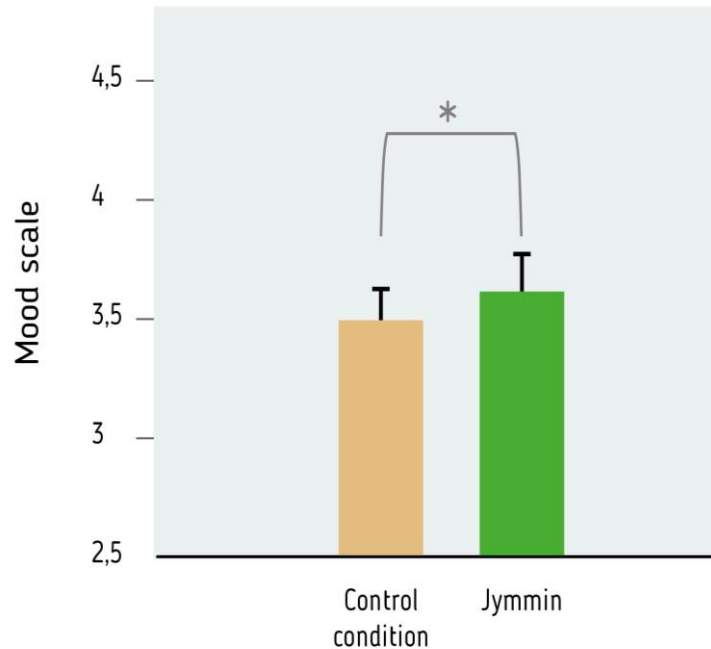


JYMMiN

jammin in the gym

- Scientifically validated
- Combining neuro-plasticity effects of both music and sports
- Increasing the motivation for both physical workout and social interaction

“RUNNERS HIGH” IN 10 MINUTES



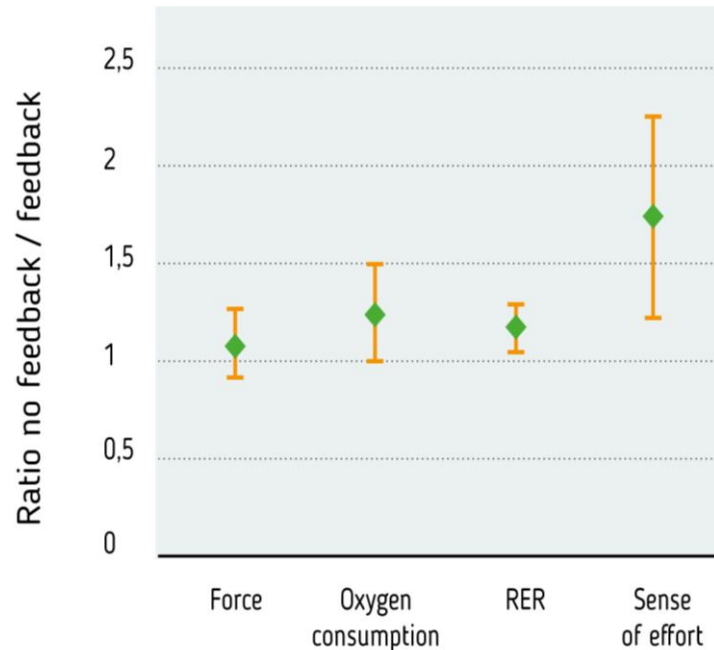
→ Enhanced mood
after 10 minutes of Jymmin

Information on study:

- $N = 52$ (27 males)
- Participants: non-athletes, non-musicians
- Multidimensional Mood Questionnaire
- Significance: $p < .05$

Fritz et al., *Frontiers in Psychology*, 2013

REDUCED PERCEIVED EXERTION



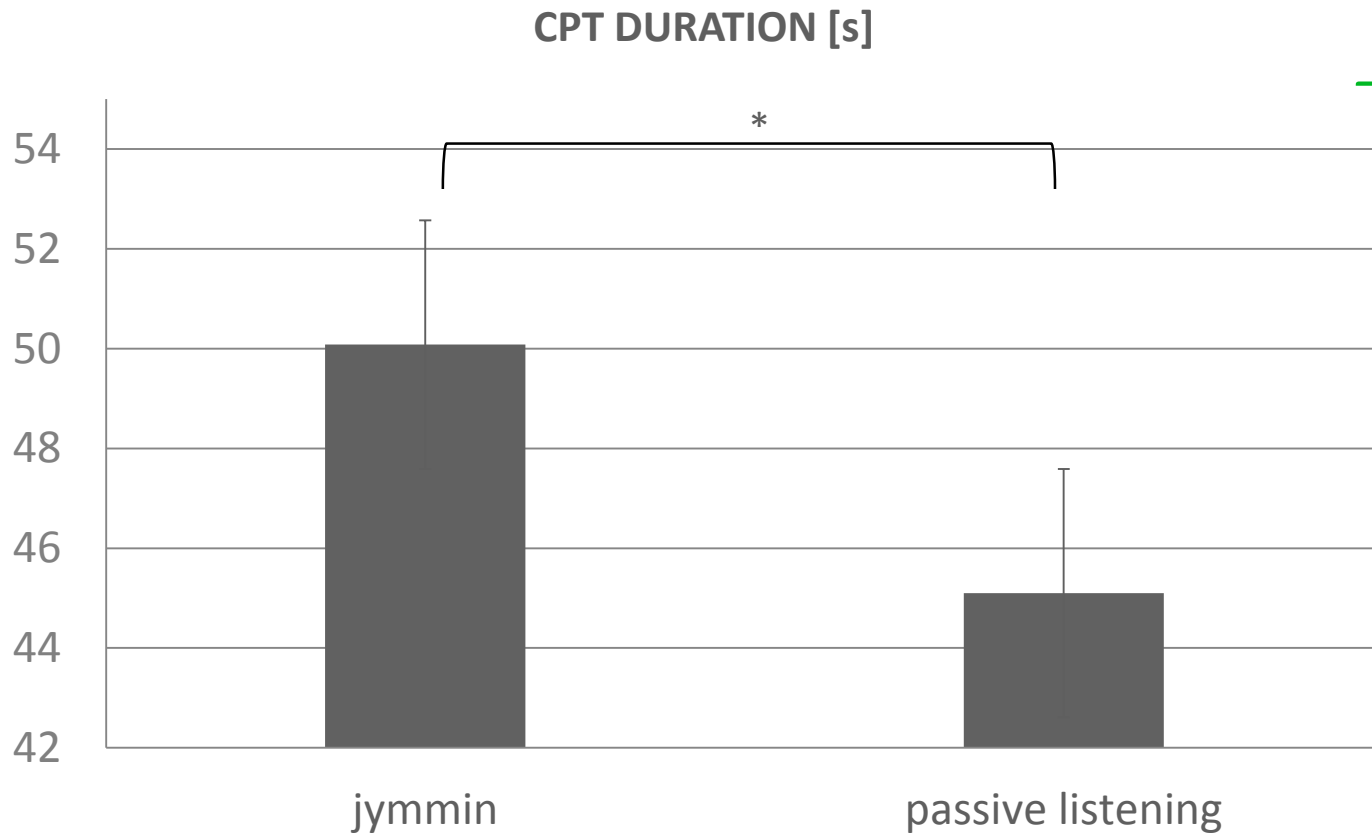
- Less exertion
- More relaxed muscles
- Combines positive effects of isometric and isotonic contraction

Information on study

- $N = 63$ (42 men)
- Participants: non-athletes, non-musicians
- 6 minute exercise, rhythms and beats at 130 bpm
- Significance sense of effort: $p < 0.001$

Fritz et al., PNAS, 2013

REDUCED ACUTE PAIN

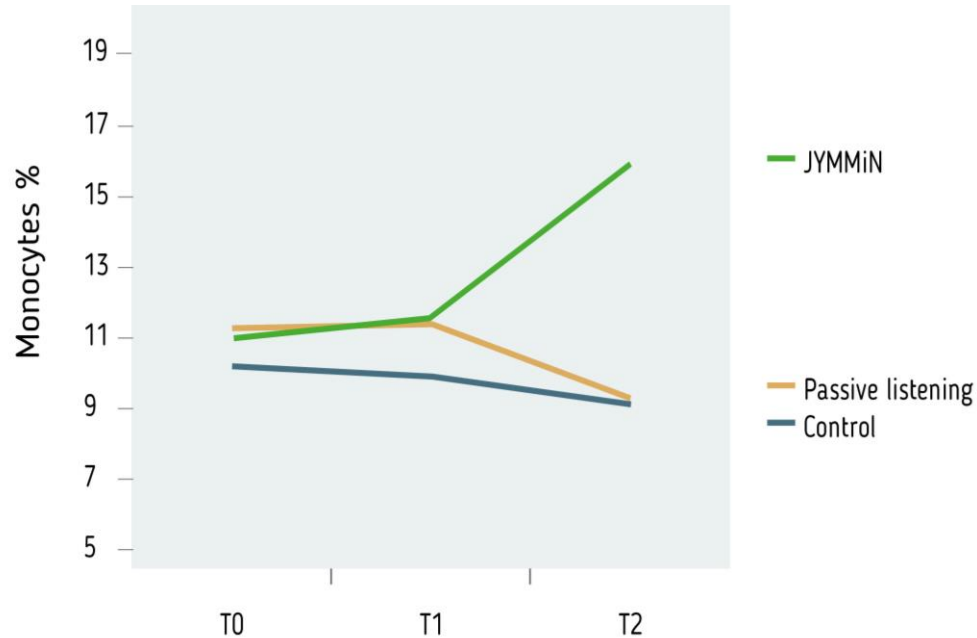


→ endorphin release

$p = .028$; $\eta^2 = .299$

Fritz et al., *in revision*

MOBILIZES THE IMMUNE SYSTEM



→ Increased white blood cells count (monocytes) after 1h

Information on study

- N = 13 (7 males)
- Significance: $p = .029$
- Main effect of conditions (repeated measures ANOVA)

PATIENT STUDIES

CHRONIC PAIN

Description of a patient with chronic pain:

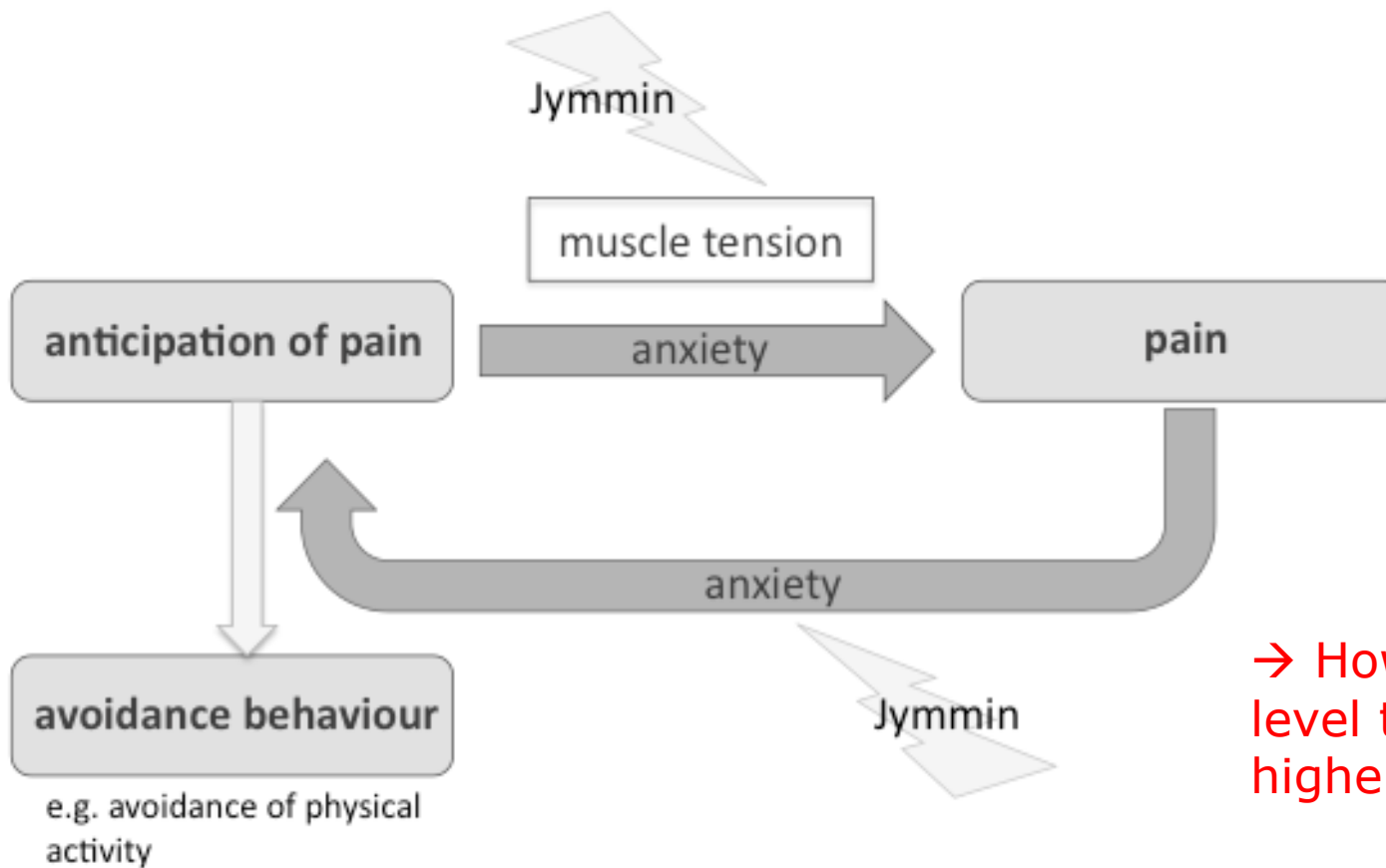
- 56 years old woman
- got divorced recently and moved to another city
- started to feel first acute neck and back pain; after several month the pain intensifies
- went to several doctors and underwent various medical treatments
- advised by medical staff to be careful which movements are “good or bad”
- after months to years!, without successful treatment she is advised by the doctor to consult a psychotherapist



- Focus on pain
- Fear of movement
- Reduced activity level, incl. social interactions
- Depressed mood

CHRONIC PAIN

Anxiety Loop of Pain (vicious cycle)

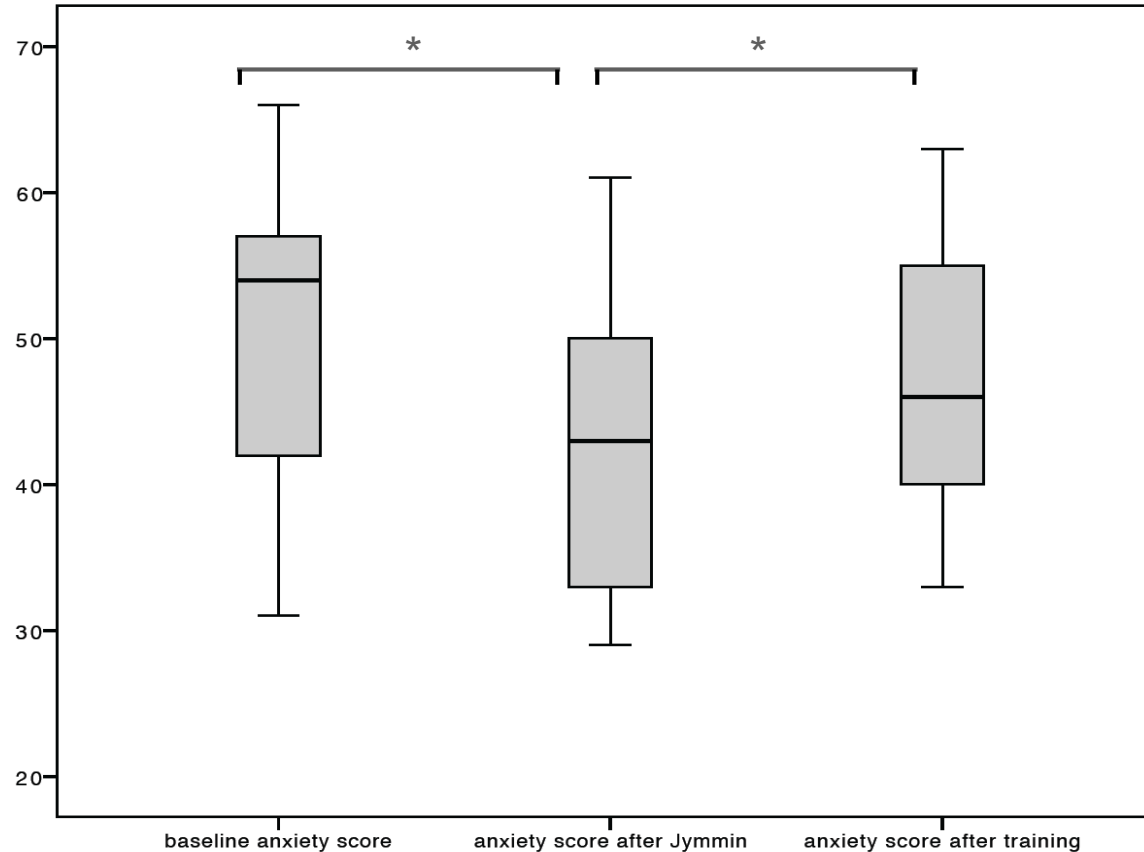


→ How to regain an activity level that corresponds to a higher quality of life?

CHRONIC PAIN

→ Decreased anxiety

- 17 patients with chronic pain
- Anxiety levels were measured before and after each condition of the experiment

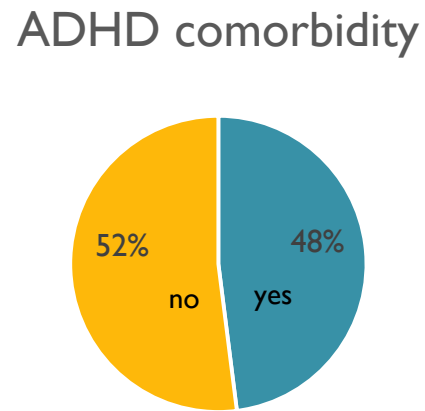
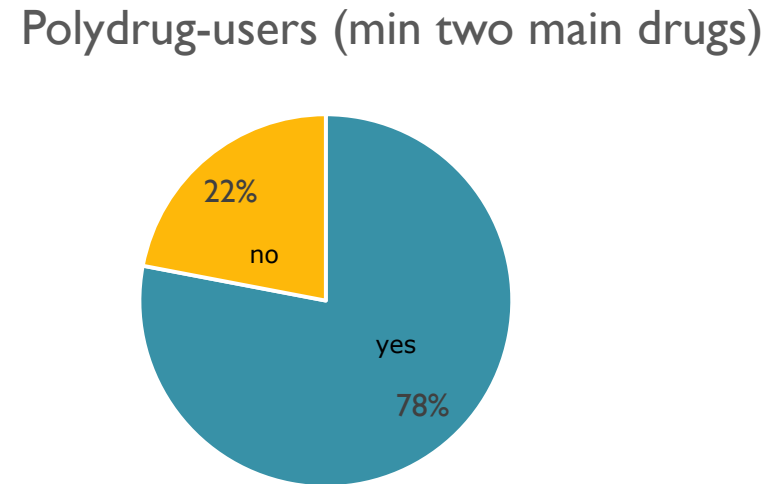
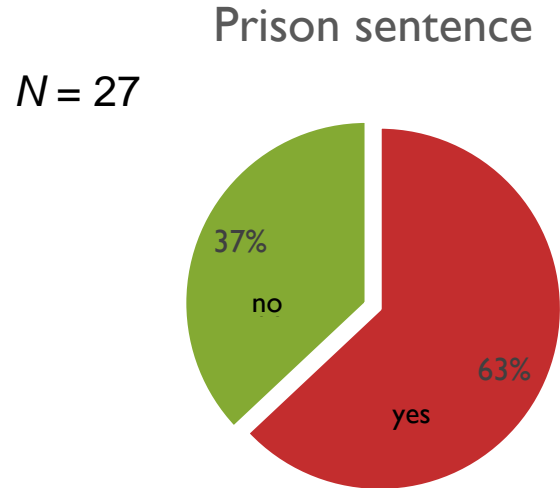


Main effect of conditions
 $p = .010$

Post-hoc comparison
baseline vs. Jymmin:
 $p = .008$

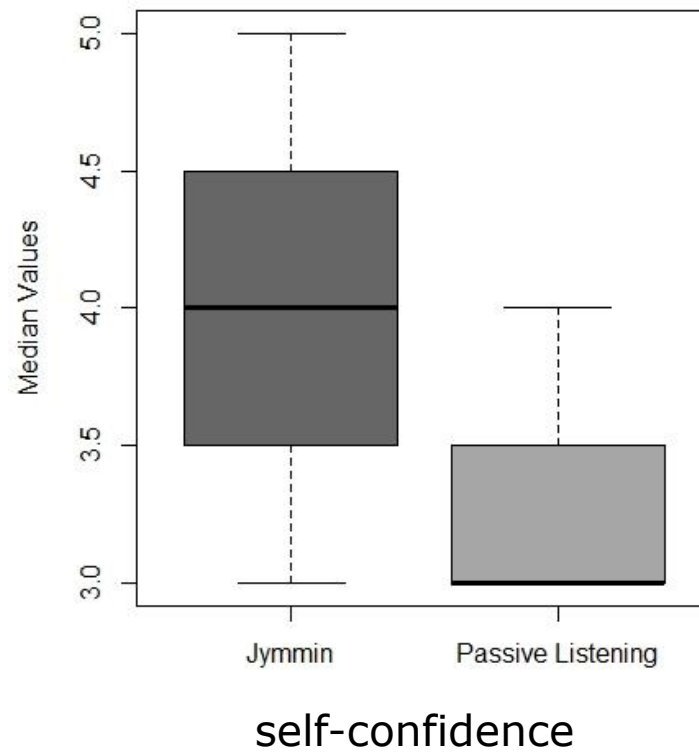
Post-hoc comparison
training vs. Jymmin:
 $p = .012$

DRUG ABUSE REHABILITATION



DRUG ABUSE REHABILITATION

→ Increase of self-confidence



DRUG ABUSE REHABILITATION

→ Benefits of listening to a recording of euphoric joint music making

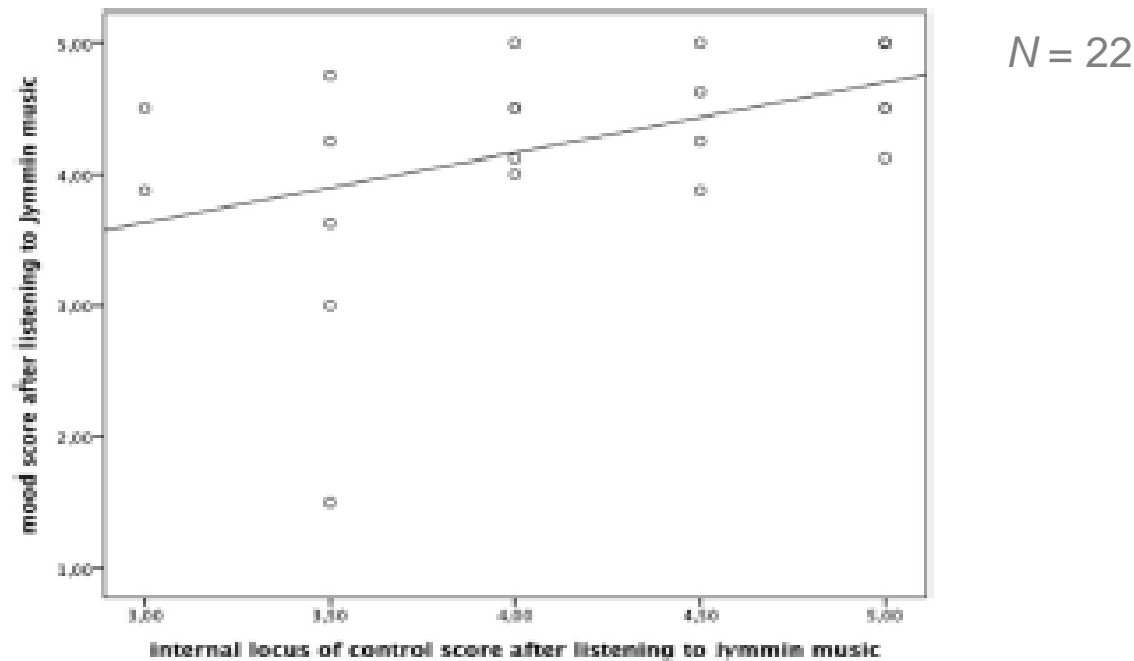
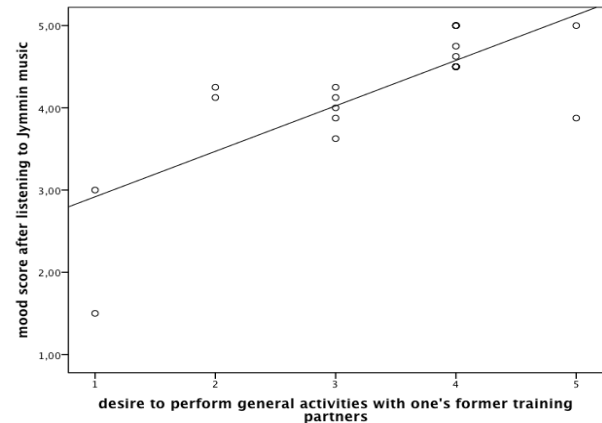
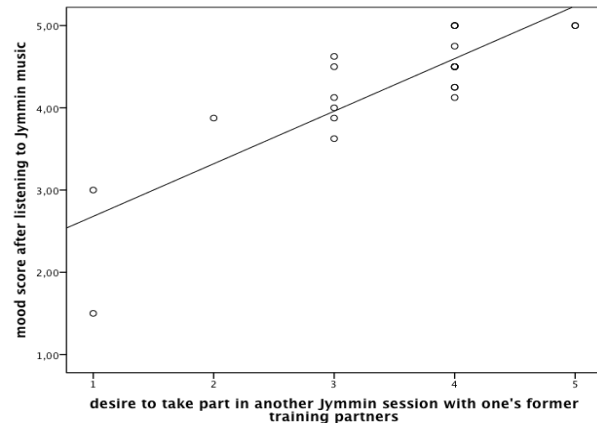
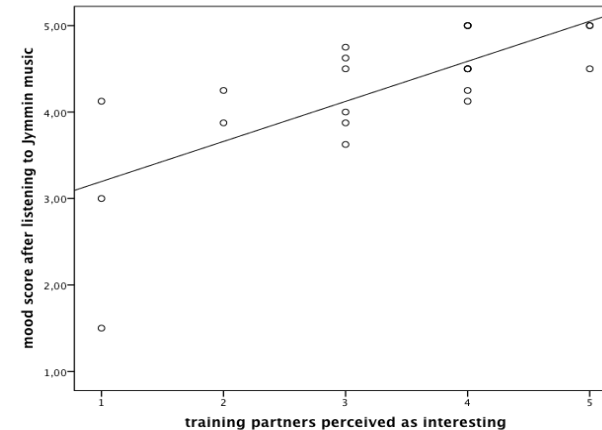
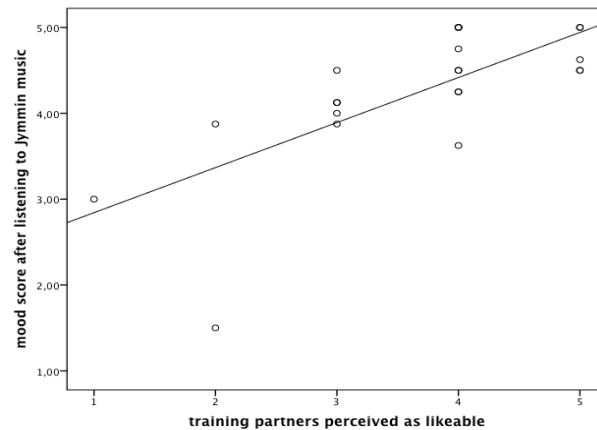


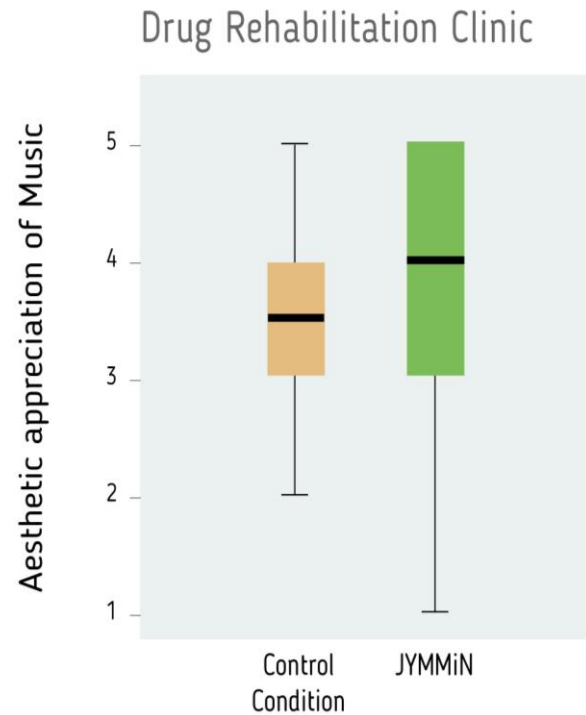
FIGURE 4 | The figure depicts Spearman's correlations between participant's mood (MDMQ score) and the internal locus of control after listening to the Jymmin recording.

DRUG ABUSE REHABILITATION

→ Benefits of listening to a recording of euphoric joint music making



POSITIVITY BIAS

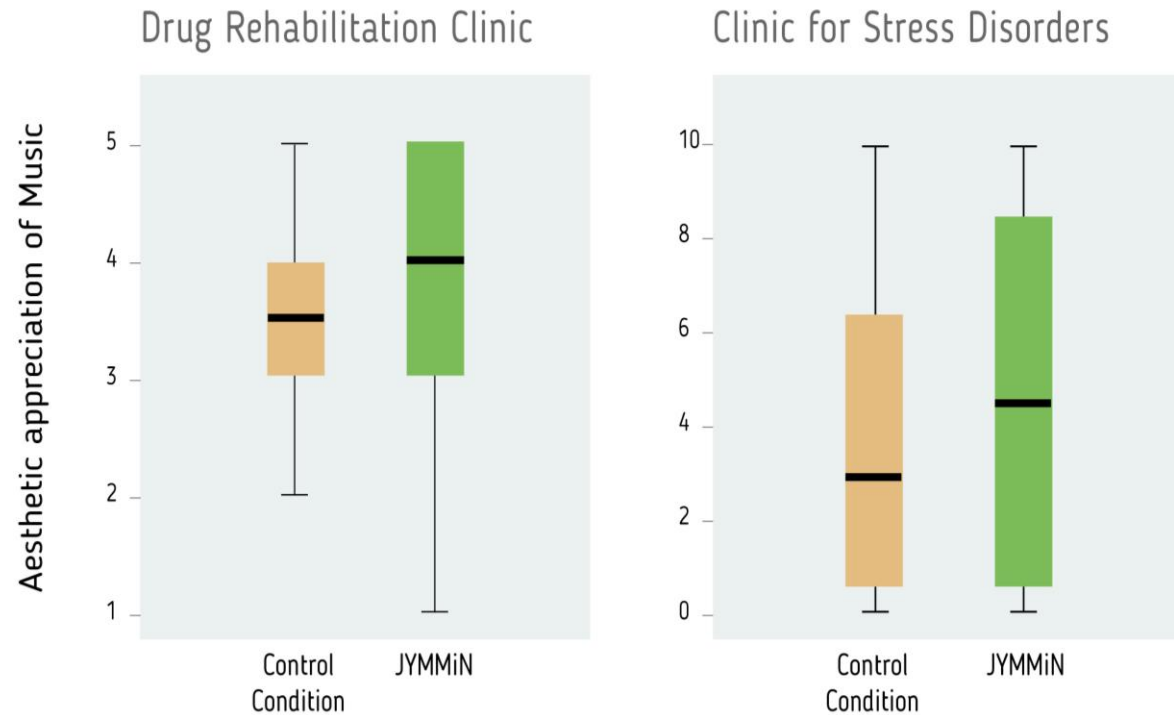


N = 26

5-point Likert-scale,

$p = .012$, $r = .49$

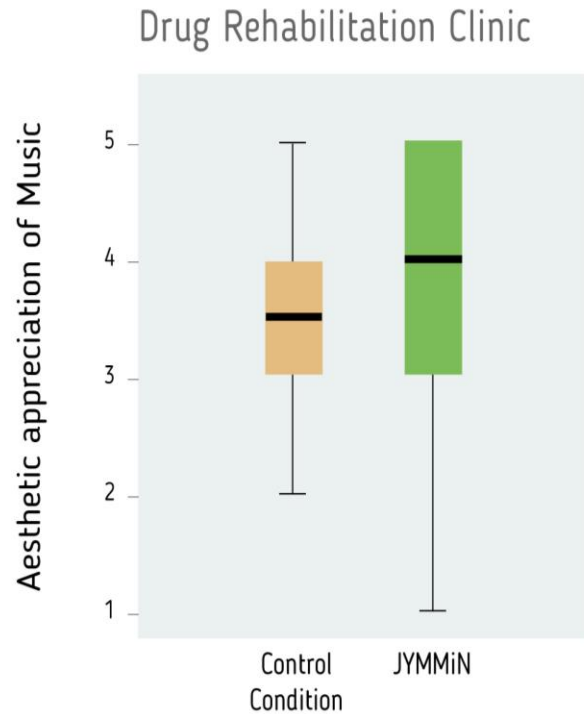
POSITIVITY BIAS



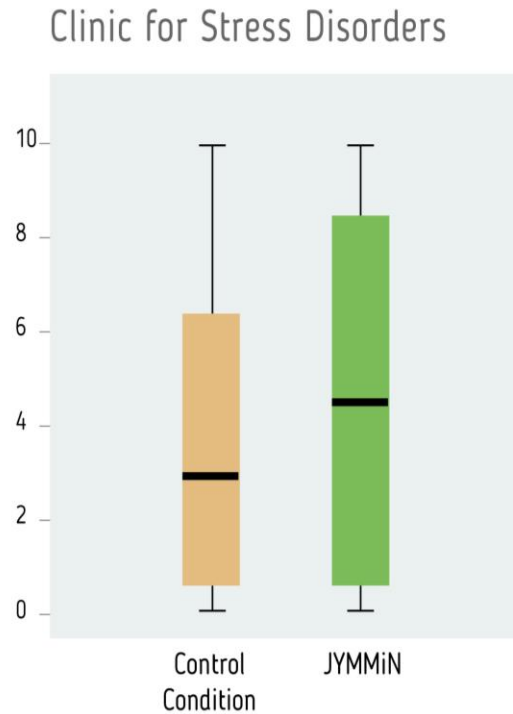
N = 26
5-point Likert-scale,
 $p = .012$, $r = .49$

N = 23
Visual Analogue Scale,
 $p = .006$, $r = .41$

POSITIVITY BIAS



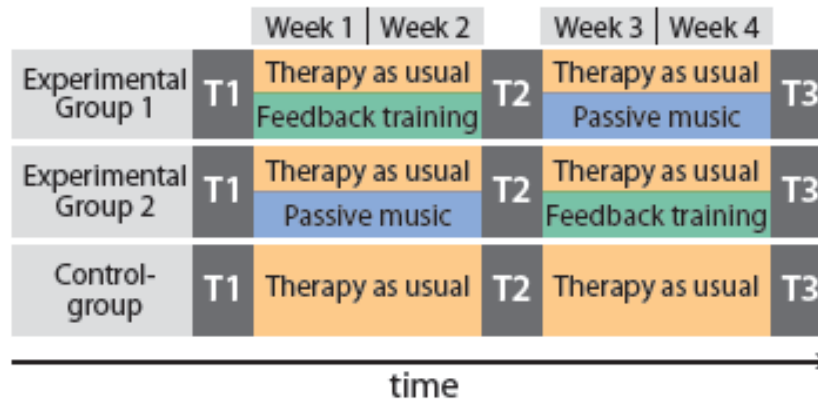
N = 26
5-point Likert-scale,
 $p = .012$, $r = .49$



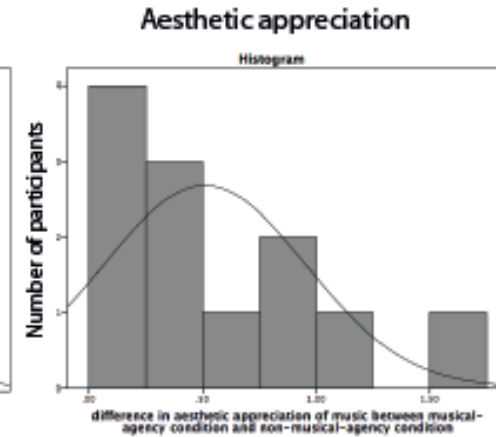
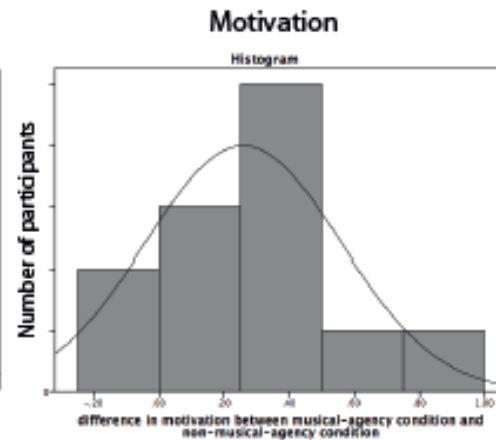
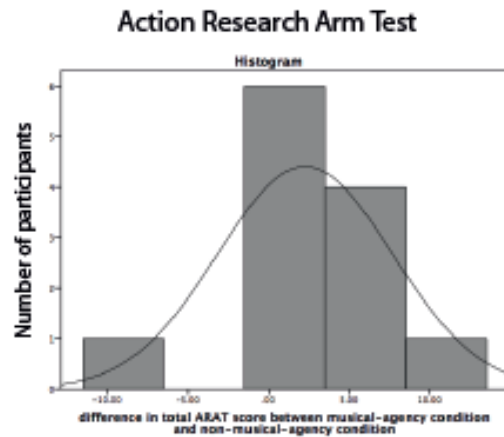
N = 23
Visual Analogue Scale,
 $p = .006$, $r = .41$

Musical style
irrelevant
for therapeutic
success

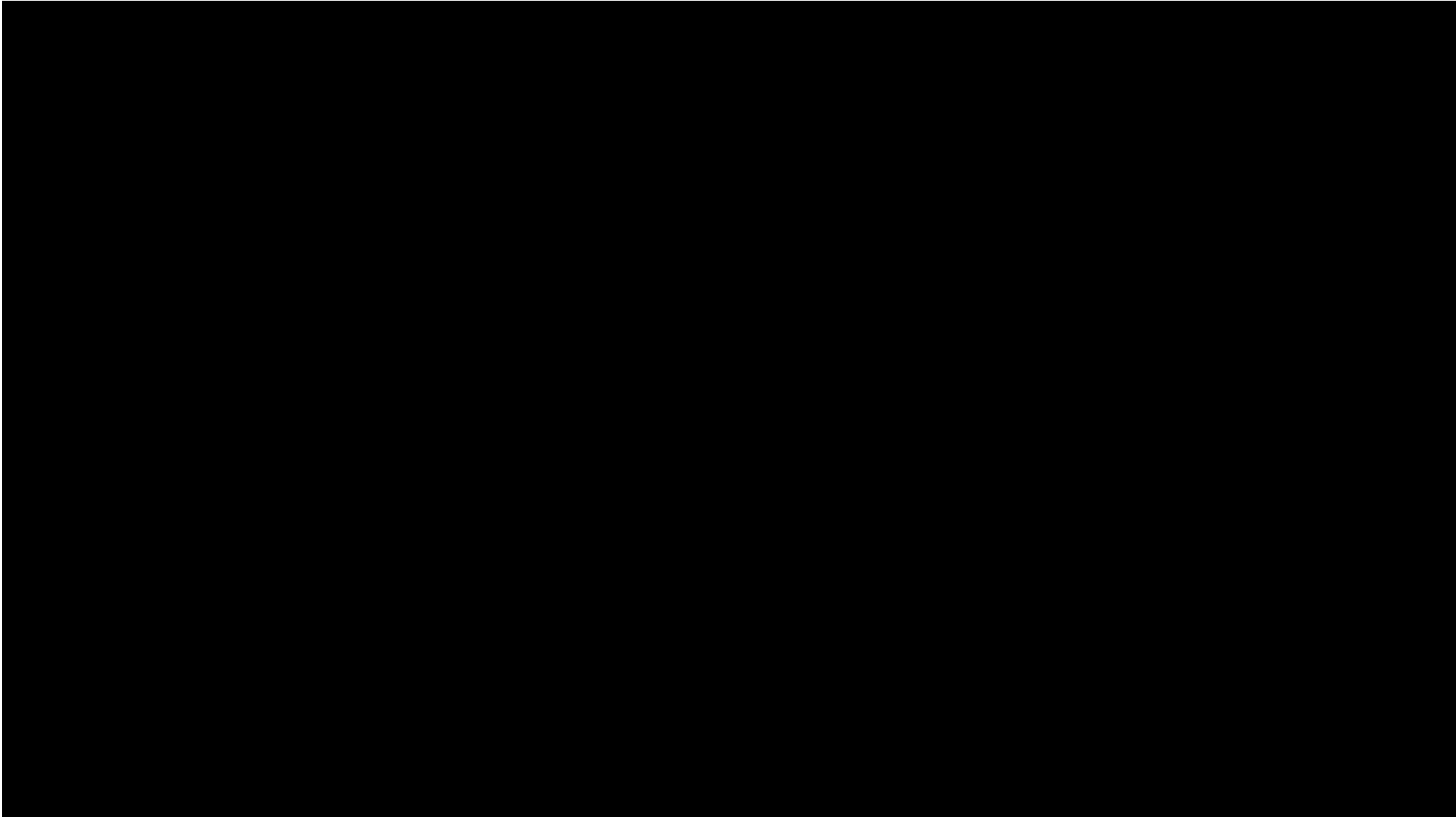
STROKE REHABILITATION



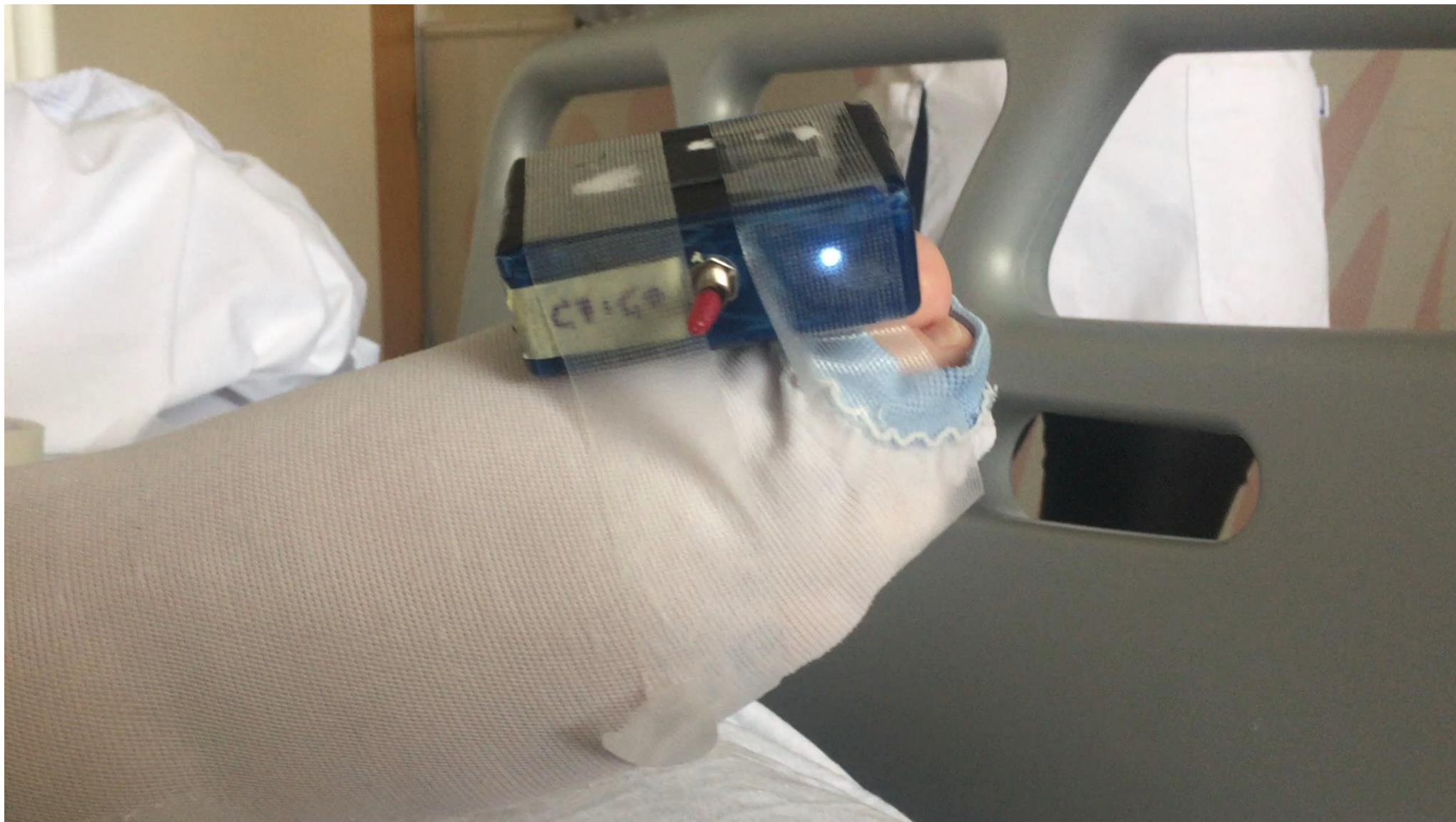
Ongoing study, currently N = 12



Jymmin with Alzheimer's patients – ongoing study



Jymmin with minimal consciousness patients – ongoing study



MEDIA COVERAGE

THE  TIMES

Music boosts working out in the gym

Frankfurter Allgemeine

Glücksfolter

16.10.2013 · Mit der richtigen Musik wird sogar das schweißtreibendste Training im Fitness-Center zum Kinderspiel. Noch viel besser werden die Leibesübungen, wenn man mit seinem Trainingsgerät selbst die Töne und Rhythmen produziert, glauben zumindest Neuroforscher aus Leipzig.

The New York Times

PHYS ED | OCTOBER 23, 2013, 12:01 AM | 59 Comments

How Music Can Boost Our Workouts

By GRETCHEN REYNOLDS

Pourquoi la musique adoucit l'effort

Mots clés : sport, Musique, Effort
Par Damien Mascret - le 22/10/2013

LE FIGARO · fr
SANTÉ

Les muscles consomment moins d'énergie lorsque l'on fait un effort physique en musique, selon une étude germano-belge

The Telegraph

Music makes exercise easier, researchers find

Anyone who needs an upbeat tempo or a heavy baseline on their MP3 to keep them motivated while they exercise will have long suspected it.

NATIONAL GEOGRAPHIC

ONLY HUMAN: October 15, 2013

Why Does Music Help Us Exercise?

by Virginia Hughes

Several years ago, cognitive scientist [Tom Fritz](#) spent some time in northern Cameroon, a mountainous and culturally isolated region in the middle of Africa. He was observing the people who live there, the Mafa, who (from our western perspective, anyway) have some fascinating musical rituals.

DIE WELT

Home Rubrican Suche Weiter

Fitness 2

Effektives Training durch Musikmachen beim Sport



Das dürfte für Hanteltarler von Fitnessgeräten interessant klingen. Wenn Sportler Fitnessgeräten Töne oder Rhythmen antönen können, wird das Training effektiver

Felix dpa



MDR
SACHSENSPIEGEL



arte

PATENT APPLICATIONS FILED



MAX-PLANCK-GESELLSCHAFT

Licensor: Max Planck Society (via Max Planck Innovation GmbH)

European Patent application EP2575981A1

- Publication number EP2389992A1
- Priority date 05/26/2010
- Training apparatus and system with musical feedback

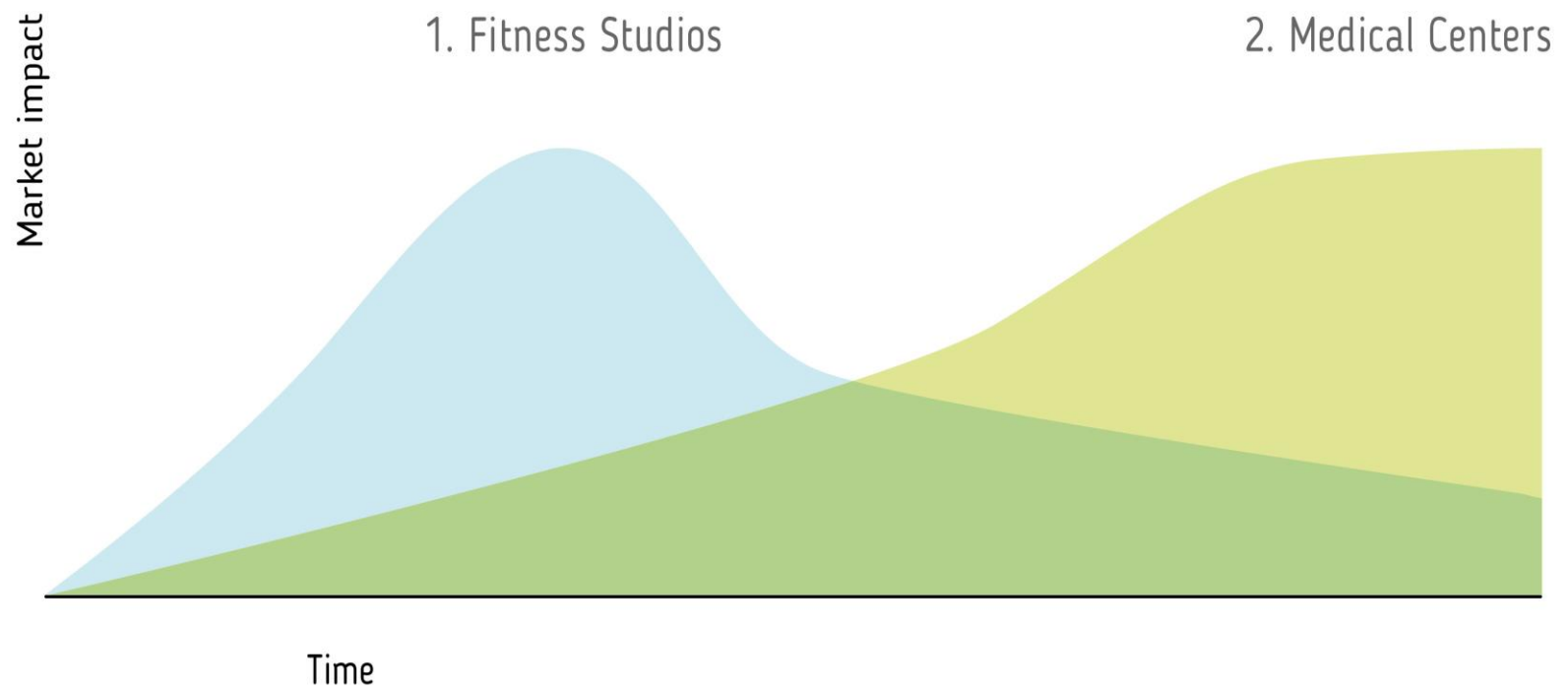
US Patent application 20130116091

- Publication date 05/09/2013

Jymmin Trademark

- Registered 21th of July in 2014 at WIPO (Registration no: 1229967), Germany (Registration no: 302014000525), USA (Serial no: 79157957), in process in Canada, China, Japan

Two further patent applications in preparation (publication summer 2017)



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Schering Stiftung

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→ **Dr. Thomas Thestrup**
CEO, Venture capital funding

→ **Prof. Thomas Fritz**
Inventor, founder and technical management
Harvard Medical School (visiting scientist)
Max Planck Institute for Human Cognitive and Brain
Sciences (group leader)

