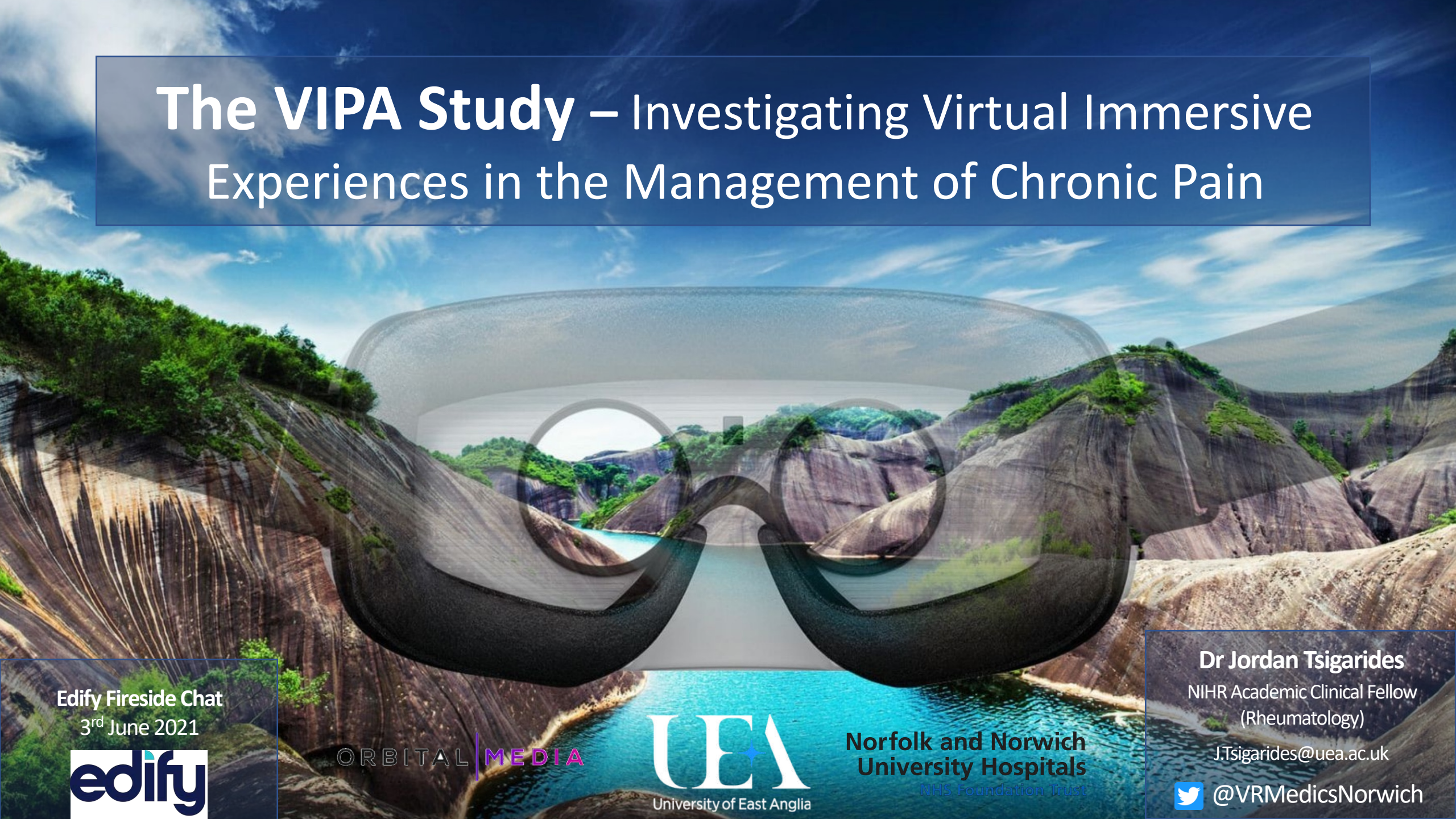
The VIPA Study – Investigating Virtual Immersive Experiences in the Management of Chronic Pain



Edify Fireside Chat
3rd June 2021

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UEA
University of East Anglia

Norfolk and Norwich University Hospitals
NHS Foundation Trust

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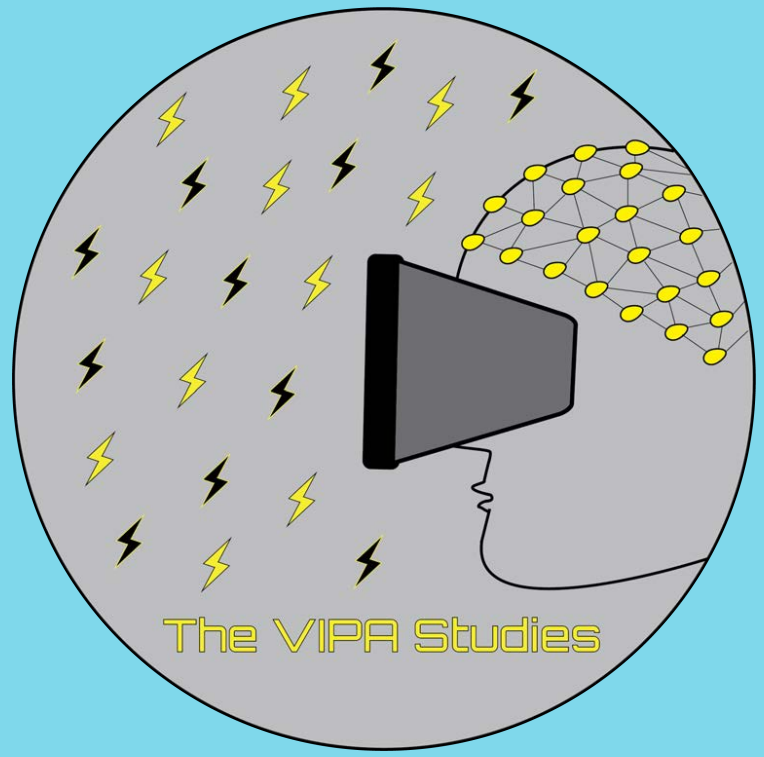
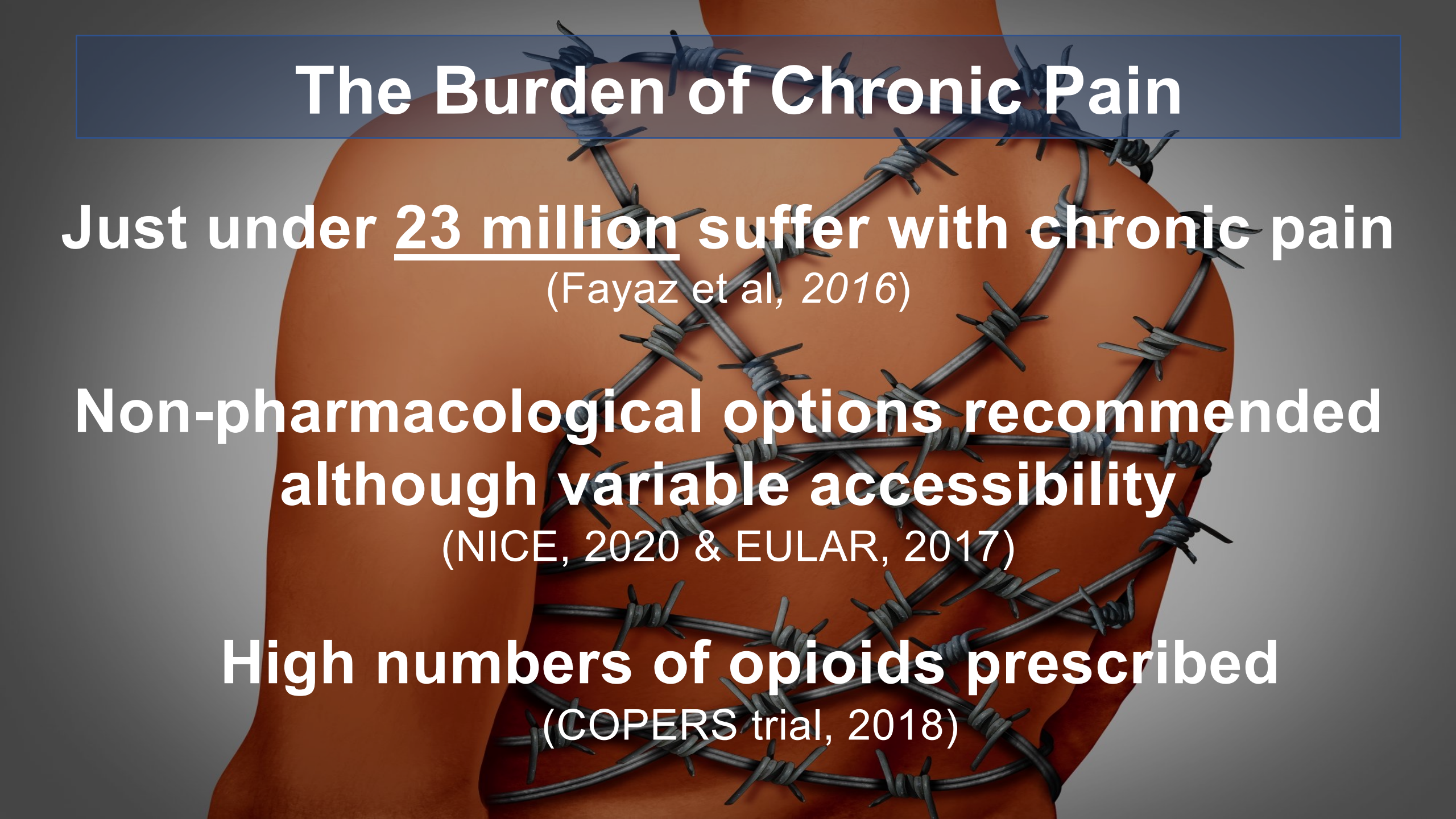
Agenda For Today's Talk

1. **The Burden of Chronic Pain**
2. **Virtual Reality for Pain**
3. **The VIPA Methodology**
4. **Our Preliminary Results**
5. **The Participant Experience**





The Burden of Chronic Pain

Just under 23 million suffer with chronic pain

(Fayaz et al, *2016*)

Non-pharmacological options recommended although variable accessibility

(NICE, 2020 & EULAR, 2017)

High numbers of opioids prescribed

(COPERS trial, 2018)

What is Virtual Reality? (VR)

Why might it be useful for pain?

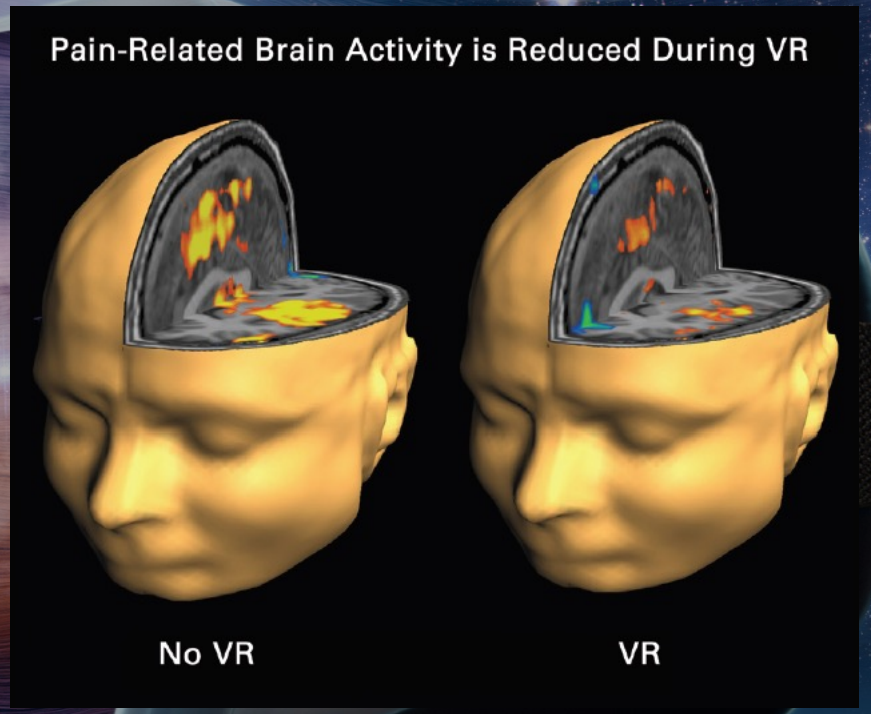
- Accessible treatments at home
- Unique possibilities through immersion
- 'Hijack' the brain through feelings of presence

Evidence in Acute Pain

Spiegel et al (2019): n=120

Greater reduction in pain with VR compared to a 2D video (p<0.04)

Significant results persisted at 72-hours (p=0.04)



Hoffman et al (2004): n=8

Reduction in pain-related brain activity during VR (p<0.002)

Evidence in Chronic Pain

- A Different Entity – The Biopsychosocial Model
- Multiple Chronic Pain Conditions – Different Phenotypes & Mechanisms
- Only small pilot studies with heterogenous groups reported

Jones et al (2016)

Reduction in pain from pre to post VR session by 33%
($p<0.002$)
Heterogenous groups, small sample size(n=30)

The VIPA Study

Industry-Academic collaboration over the last 2 years: Co-development

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Fusion of different expertise:
Pain expertise, Computer Sciences, Neurosciences, Game Design, Psychology

Multiple sources of competitive funding

EiRA

ActionArthritis

British Society for Rheumatology

The Experiments

Acceptability and Influence on Pain

~ 30 Participants with Fibromyalgia/Post-TKR Chronic Pain

OP Clinics at NNUH & Addenbrookes

1. Four VR Systems
2. Two VR Environments
3. Four VR Cognitive Tasks
4. A Brain-Computer Interface

Data Collection – Experiment 1

1. Four VR Systems

Gear VR

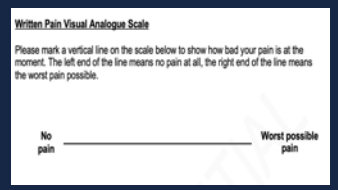
Oculus Go

Oculus Quest

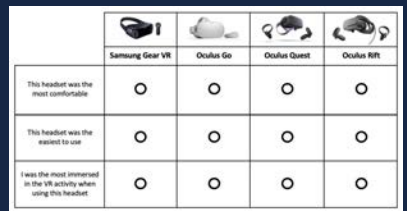
Oculus Rift S

McGill Pain Questionnaire (Short Form)

Pain VAS (written, before/after)

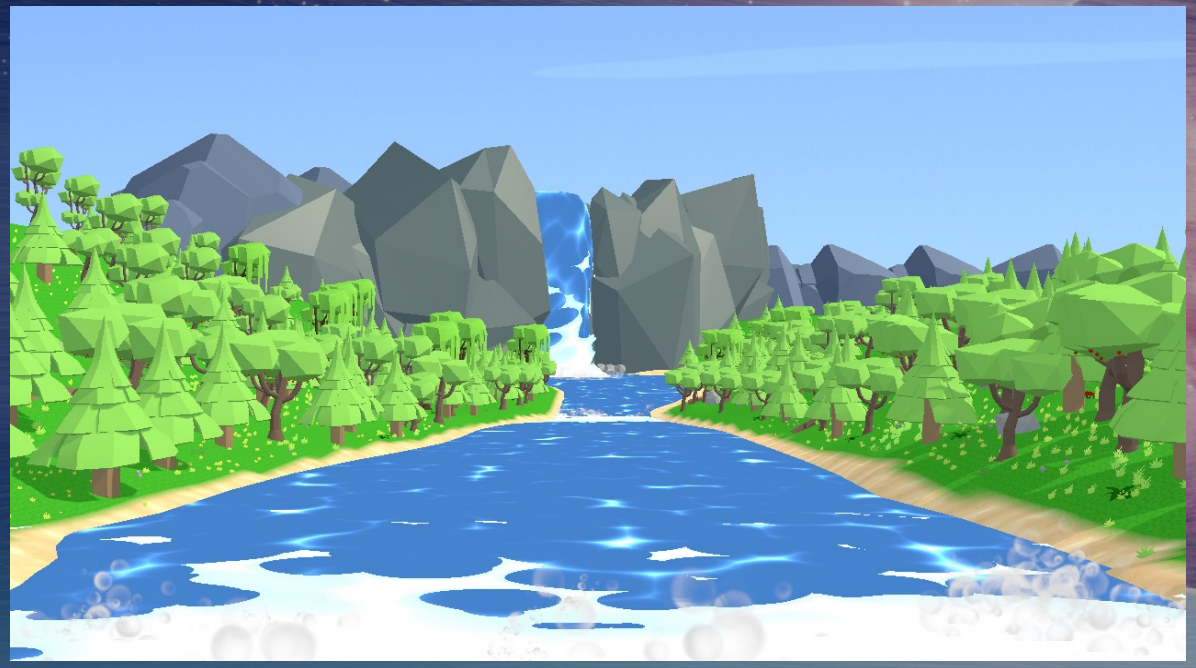


Subjective Experience Questionnaire (after each and at the end)



Data Collection – Experiment 2

2. Two VR Environments



V
S

Oculus Rift S

64ch Active Electrode EEG

McGill Pain Questionnaire (Short Form)

Pain VAS (written and VR)

Subjective Experience Questionnaire (between and after)

Data Collection – Experiment 3

3. Four VR Cognitive Tasks

Boat Game:
Rail Shooter task

Farming Game:
Management/Multi-task

Sequence Game:
Memory-based task

Vine Matching:
Match-3 task

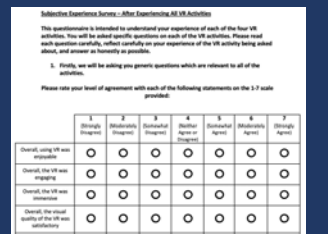
Oculus Rift S

64ch Active Electrode EEG

McGill Pain Questionnaire (Short Form)

Pain VAS (written and VR)

Subjective Experience Questionnaire (between and after)



Data Collection – Experiment 4

4. A Brain-Computer Interface

Boat Game: Rail Shooter task

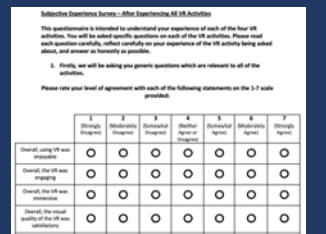
Oculus Rift S

64ch Active Electrode EEG

McGill Pain Questionnaire (Short Form)

Pain VAS (written and VR)

Subjective Experience Questionnaire



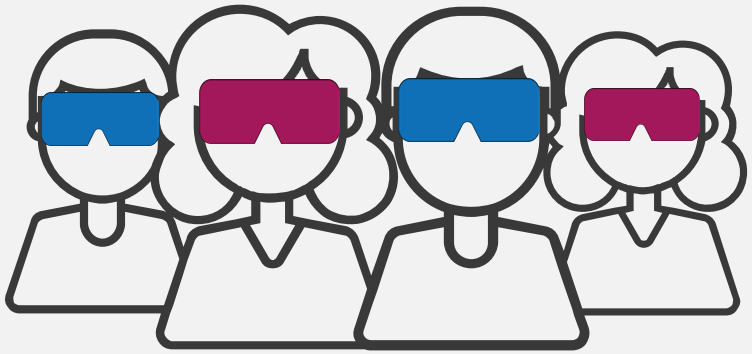
TUTORIAL
Look at the
arget and press
he "A" button to
fire a projectile
at it
CLICK
0
50
100
200

Preliminary Results

Experiment 1 (n=13)

Acceptability

High levels of agreement with 15 acceptability statements



Perceptions

100% agree they would be open to regular VR use at home for pain treatment

Pain

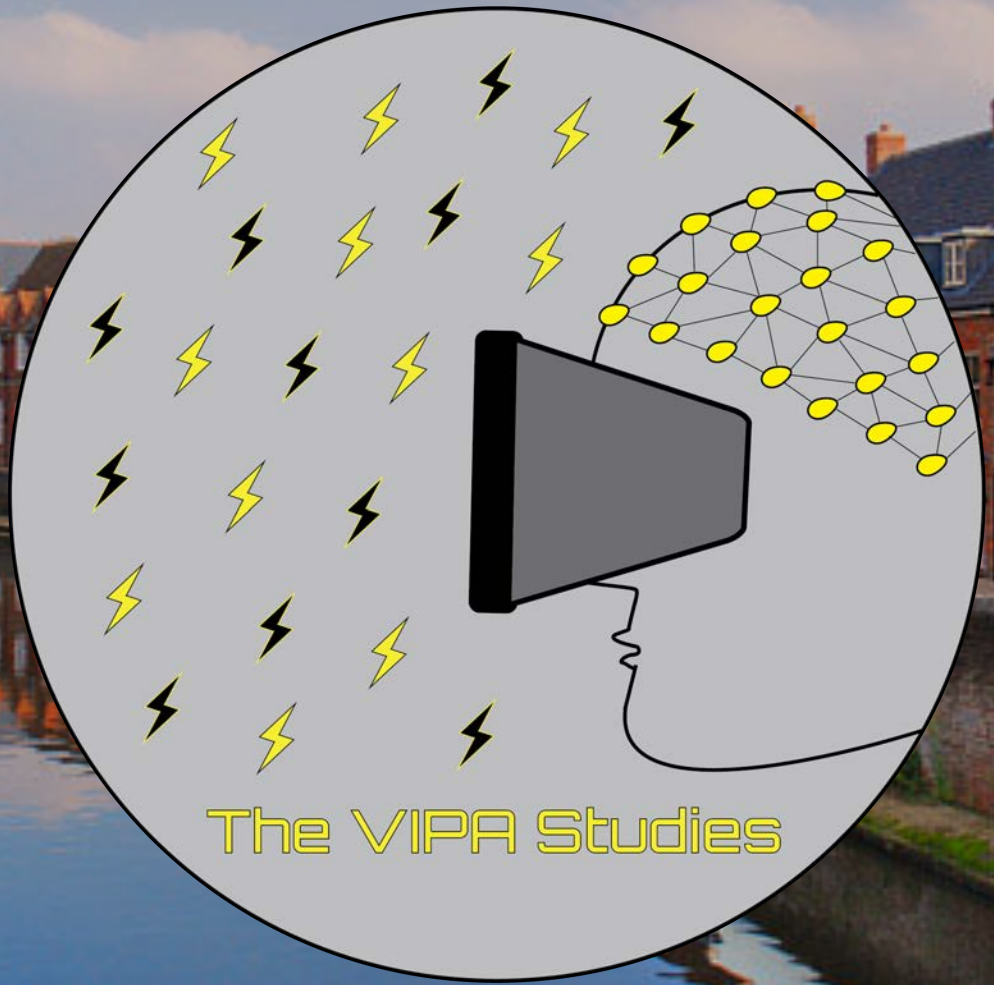
48.2% reduction in McGill Pain Questionnaire Scores*

*Statistically Significant (Wilcoxon Signed Rank, $p<0.05$)

In Summary

1. Chronic pain is a both prevalent and difficult to treat
2. Our early results are encouraging in Fibromyalgia Syndrome
3. Further pain and neurophysiological data will offer further insights
4. Feasibility results need confirming in larger studies
5. The future is bright! Therapeutic VR has enormous potential

Thank you!
Any Questions?



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References

1. British Pain Society news report (2016). Available from https://www.britishpainsociety.org/mediacentre/news/the-silent-epidemic-chronic-pain-in-the-uk/ (accessed on 28 April 2019)
2. Fayaz A, Croft P, Langford RM, *et al.* Prevalence of chronic pain in the UK: a systematic review and meta-analysis of population studies. *BMJ Open* 2016;**6**:e010364.
3. National Institute for Health and Care Excellence. Chronic pain in over 16s: assessment and management (Draft for consultation). August 2020. Available at: https://www.nice.org.uk/guidance/GID-NG10069/documents/draft-guideline
4. Macfarlane GJ, Kronisch C, Dean LE, Atzeni F, Häuser W, Fluß E, Choy E, Kosek E, Amris K, Branco J, Dincer F, Leino-Arjas P, Longley K, McCarthy GM, Makri S, Perrot S, Sarzi-Puttini P, Taylor A, Jones G T. EULAR revised recommendations for the management of fibromyalgia. *Ann Rheum Dis* 2017;76:318-328
5. Ashaye T, Hounsome N, Carnes D on behalf of the COPERS Study Team (ISRCTN 24426731) *et al*. Opioid prescribing for chronic musculoskeletal pain in UK primary care: results from a cohort analysis of the COPERS trial. *BMJ Open* 2018;**8**:e019491
6. Spiegel B, Fuller G, Lopez M, Dupuy T, Noah B, Howard A, Albert M, Tashjian V, Lam R, Ahn J, Dailey F, Rosen BT, Vrahas M, Little M, Garlich J, Dzubur E, IsHak W, Danovitch I. Virtual reality for management of pain in hospitalized patients: a randomized comparative effectiveness trial. PLoS One 2019;14(8):e0219115
7. Hoffman HG, Richards TL, Coda B, Bills AR, Blough D, Richards AL, Sharar SR. Modulation of thermal pain-related brain activity with virtual reality: evidence from fMRI. NeuroReport 2004;15(8):1245-8
8. Jones T, Moore T and Choo J. The impact of virtual reality on chronic pain. PLoS One 2016;11(12):e0167523