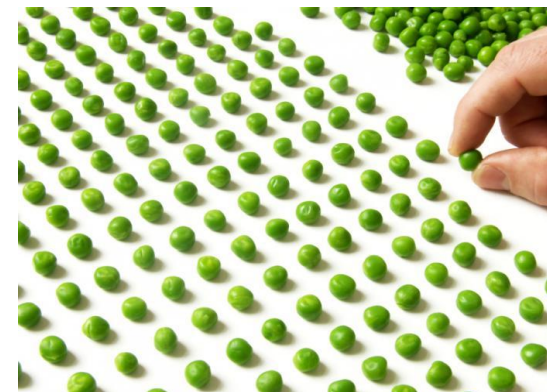




# BrainPark: Creating Healthy Habits, Brains and Lifestyles

**Dr Rebecca Segrave**  
**Deputy Director, BrainPark**  
Turner Institute for Brain and Mental Health  
Monash University  
Melbourne, Australia

# Addictions & obsessive compulsive disorder




# 80% of people don't receive help



# The current model







**STEP 1** Admit Powerlessness



We admitted we were powerless over our addiction - that our lives had become unmanageable

**Using Antabuse (*Disulfiram*) To Treat Alcoholism**



-  Effectiveness
-  Treatment Method
-  Understanding Antabuse

your body will be unable to process alcohol

# Neuroscience offers an opportunity

NEUROBIOLOGY OF ADDICTION

REVIEW

nature  
neuroscience

Neural systems of reinforcement for drug addiction: from actions to habits to compulsion

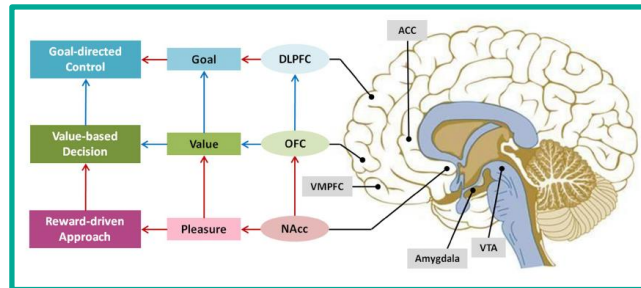
Barry J Everitt & Trevor W Robbins



Neuron  
Review

## Impulsivity, Compulsivity, and Top-Down Cognitive Control

Jeffrey W. Dalley,<sup>1,2,3</sup> Barry J. Everitt,<sup>1,2</sup> and Trevor W. Robbins<sup>1,2,\*</sup>  
<sup>1</sup>Behavioural and Clinical Neuroscience Institute  
<sup>2</sup>Department of Experimental Psychology  
 University of Cambridge, Downing Street, Cambridge CB2 3EB, UK



Kim, 2013, *Frontiers in Psychology*

nature  
neuroscience

Article | Published: 07 June 2009

Motivation and cognitive control in the human prefrontal cortex

Frédérique Kounieher, Sylvain Charron & Etienne Koechlin

*Nature Neuroscience* 12, 939–945 (2009) | Download Citation ↓

*The Journal of Neuroscience*, May 1, 2002, 22(9):3306–3311

## The Neuroscience of Natural Rewards: Relevance to Addictive Drugs

Ann E. Kelley<sup>1</sup> and Kent C. Berridge<sup>2</sup>

<sup>1</sup>Department of Psychiatry, University of Wisconsin–Madison Medical School, Madison, Wisconsin 53719, and  
<sup>2</sup>Department of Psychology, University of Michigan, Ann Arbor, Michigan 48109-1109

frontiers in  
PSYCHOLOGY

REVIEW ARTICLE  
published: 04 March 2013  
doi: 10.3389/fpsyg.2013.00098

## Neuroscientific model of motivational process

Sung-il Kim\*

Department of Education, Brain and Motivation Research Institute, Korea University, Seoul, South Korea

FOCUS ON SOCIAL NEUROSCIENCE

REVIEW

nature  
neuroscience

Social influences on neuroplasticity: stress and interventions to promote well-being

Richard J Davidson<sup>1</sup> & Bruce S McEwen<sup>2</sup>

PLoS one

## Changes in Gray Matter Induced by Learning—Revisited

Joenna Driemeyer<sup>1</sup>, Janina Boyke<sup>1</sup>, Christian Gaser<sup>2</sup>, Christian Büchel<sup>1</sup>, Arne May<sup>1\*</sup>

*HIPPOCAMPUS* 16:1091–1101 (2006)

## London Taxi Drivers and Bus Drivers: A Structural MRI and Neuropsychological Analysis

Eleanor A. Maguire,\* Katherine Woollett, and Hugo J. Spiers

*The Journal of Neuroscience*, October 31, 2012 • 32(44):15601–15610 • 15601

Behavioral/Systems/Cognitive

## Cognitive-Affective Neural Plasticity following Active-Controlled Mindfulness Intervention

Micah Allen,<sup>1</sup> Martin Dietz,<sup>2</sup> Karina S. Blair,<sup>2</sup> Martijn van Beek,<sup>4</sup> Geraint Rees,<sup>5</sup> Peter Vestergaard-Poulsen,<sup>1</sup> Antoine Lutz,<sup>6,9</sup> and Andreas Roepstorff<sup>1,3</sup>

*Molecular Psychiatry* (2018) 23, 1566–1574  
 © 2018 Macmillan Publishers Limited, part of Springer Nature. All rights reserved 1359-4184/18  
[www.nature.com/mp](http://www.nature.com/mp)

ORIGINAL ARTICLE

## Impact of video games on plasticity of the hippocampus

GL West<sup>1</sup>, K Konishi<sup>2</sup>, M Diarra<sup>1</sup>, J Benady-Chorney<sup>2</sup>, BL Drisdelle<sup>1</sup>, L Dahmani<sup>2</sup>, DJ Sodums<sup>2</sup>, F Lepore<sup>1</sup>, P Jolicœur<sup>1</sup> and VD Bohbot<sup>2</sup>



Contents lists available at SciVerse ScienceDirect

Brain Stimulation

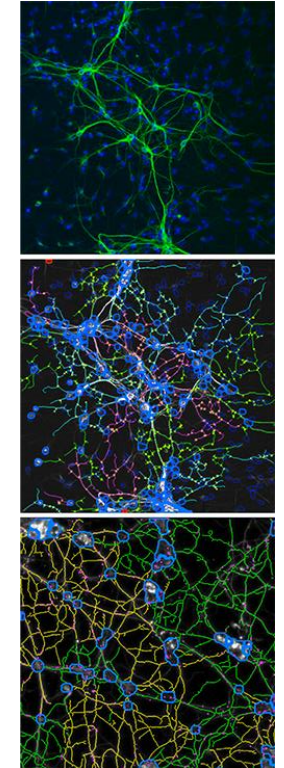
journal homepage: [www.brainstimjrn.com](http://www.brainstimjrn.com)

Original Articles

## Induction of Late LTP-Like Plasticity in the Human Motor Cortex by Repeated Non-Invasive Brain Stimulation

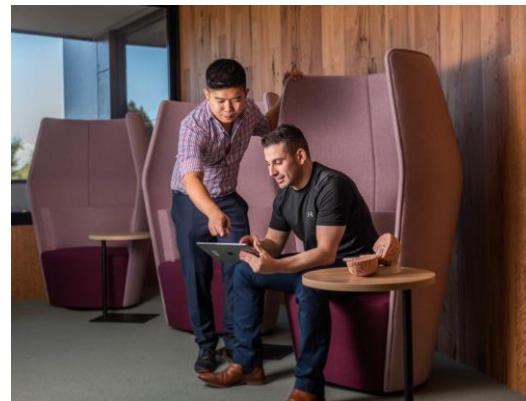
Katia Monte-Silva<sup>1</sup>, Min-Fang Kuo<sup>1</sup>, Silvia Hesselthaler, Shane Fresnoza, David Liebetanz, Walter Paulus, Michael A. Nitsche\*

Georg-August-University, Dept. Clinical Neurophysiology, Robert-Koch-Strasse 40, 37099 Goettingen, Germany

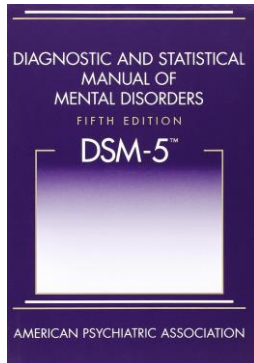


# BrainPark

Using neuroscience to create healthy habits, brains, and lifestyles



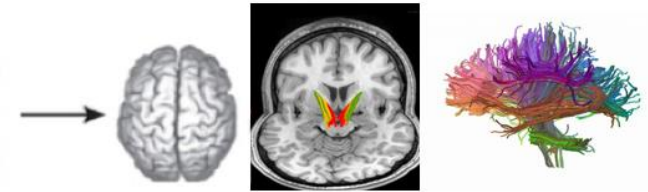
# Transdiagnostic neurocognitive assessment



Addictions & OCD



Neurocircuitry



Motivations



Individuals with similar motivations



Fear

Reward

Control

Innovative digital assessment tools

# DELPHI consensus study



ADDICTION

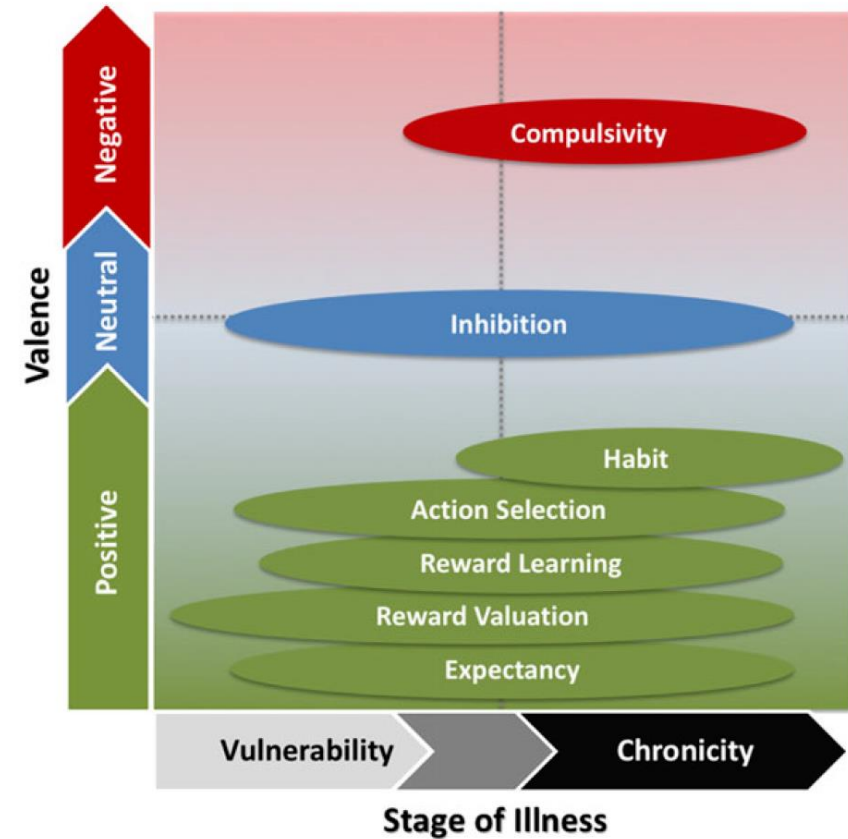
ADDICTION THEORIES AND CONSTRUCTS

SSA SOCIETY FOR THE STUDY OF ADDICTION

doi:10.1111/add.14424

## A transdiagnostic dimensional approach towards a neuropsychological assessment for addiction: an international Delphi consensus study

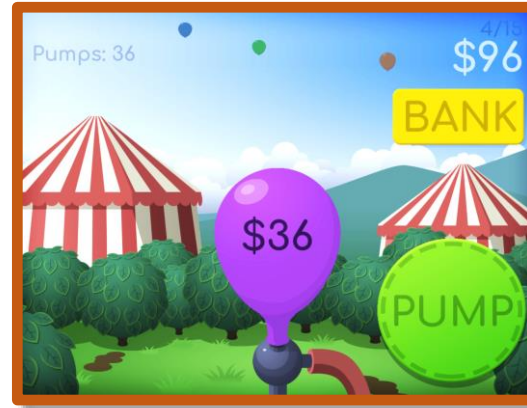
Murat Yücel<sup>1</sup> , Erin Oldenhof<sup>1</sup>, Serge H. Ahmed<sup>2</sup> , David Belin<sup>3</sup>, Joel Billieux<sup>4</sup> , Henrietta Bowden-Jones<sup>5</sup>, Adrian Carter<sup>1</sup> , Samuel R. Chamberlain<sup>6</sup>, Luke Clark<sup>7</sup> , Jason Connor<sup>8</sup>, Mark Daglish<sup>9</sup> , Geert Dom<sup>10</sup>, Pinhas Dannon<sup>11</sup>, Theodora Duka<sup>12</sup>, Maria Jose Fernandez-Serrano<sup>13</sup>, Matt Field<sup>14</sup>, Ingmar Franken<sup>15</sup>, Rita Z. Goldstein<sup>16</sup>, Raul Gonzalez<sup>17</sup>, Anna E. Goudriaan<sup>18</sup> , Jon E. Grant<sup>19</sup> , Matthew J. Gullo<sup>20</sup> , Robert Hester<sup>21</sup> , David C. Hodgins<sup>22</sup> , Bernard Le Foll<sup>23,24</sup> , Rico S. C. Lee<sup>1</sup>, Anne Lingford-Hughes<sup>25</sup> , Valentina Lorenzetti<sup>26</sup>, Scott J. Moeller<sup>27</sup> , Marcus R. Munafò<sup>28</sup> , Brian Odlaug<sup>29,30</sup> , Marc N. Potenza<sup>31</sup>, Rebecca Segrave<sup>1</sup>, Zsuzsika Sjoerds<sup>32,33</sup> , Nadia Solowij<sup>34,35</sup> , Wim van den Brink<sup>36</sup>, Ruth J. van Holst<sup>36</sup>, Valerie Voon<sup>37</sup>, Reinout Wiers<sup>38</sup> , Leonardo F. Fontenelle<sup>1\*</sup> & Antonio Verdejo-Garcia<sup>1\*</sup> 







# BrainPAC



## 1) BART

Are you a risk taker?

## 3) SST

How strong is your impulse control?



## 2) DDT

How well can you delay gratification?

## 4) VMAC

How sensitive are you to rewards?



# Lifestyle & technology interventions - physical

## Physical exercise



## VO2 max assessment

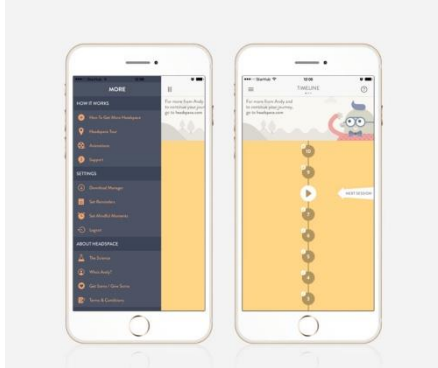


## Personalised intensity prescription

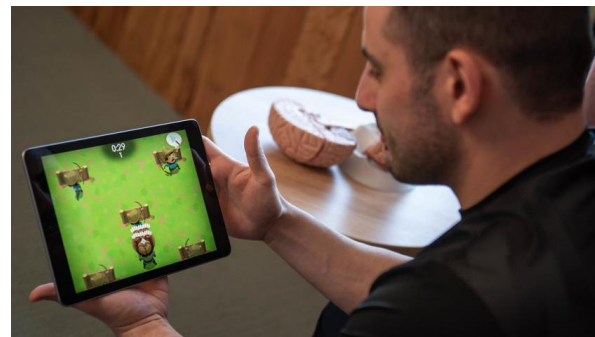
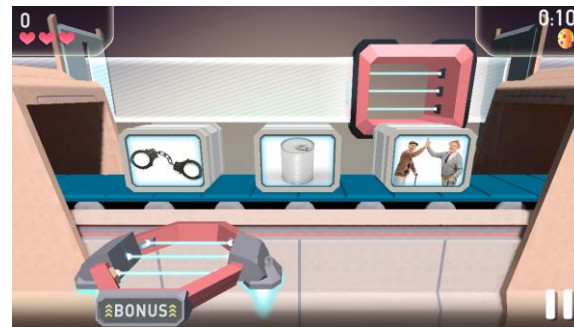
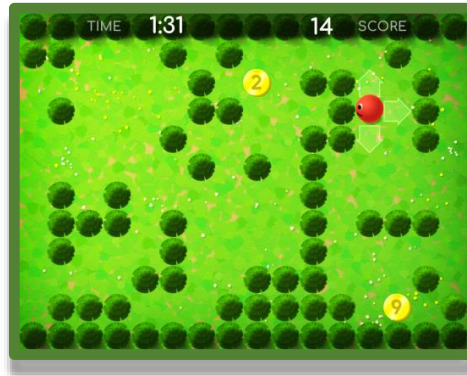


# Lifestyle & technology interventions – mental

## Meditation



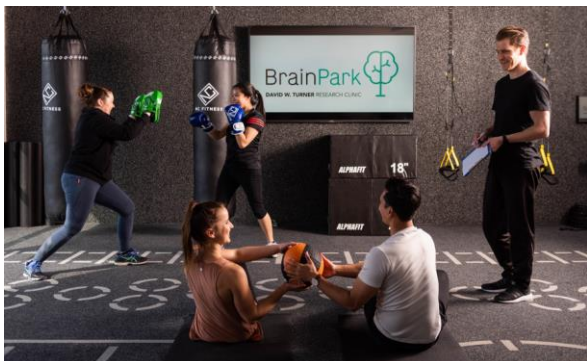
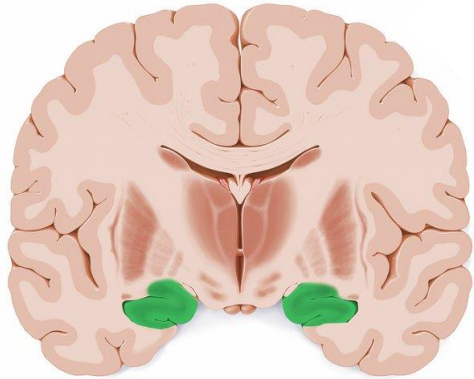
## Cognitive training



## Therapeutic virtual reality



# BEAT: Brain Exercise Addiction Trial



120 adults aged 18 – 55 years  
Chronic heavy cannabis consumers

Measure brain and mental health + cannabis use

Randomised into two exercise groups

12-weeks, 3 x per week  
personalised  
**high intensity exercise**

60 people

12-weeks, 3 x per week  
personalised  
**low intensity exercise**

60 people

Measure brain and mental health + cannabis use after 12-wk program

Measure brain and mental health + cannabis use 6-months later

# Virtual Reality Exposure and Response Prevention for OCD



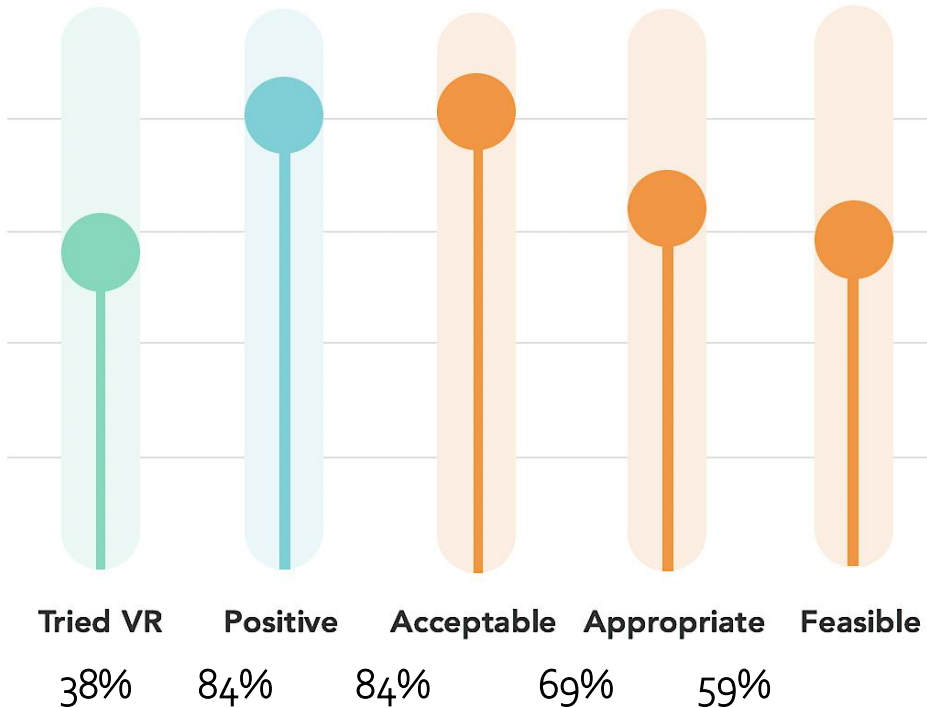
# Implementing therapeutic VR into clinical practice

## Aims

i) investigate the knowledge, attitudes and perspectives of **clinical** and **non-clinical** staff in **private** psychiatry around therapeutic virtual reality

## Setting

ii) map these to TDF > COM-B > BCT's to create implementation action plan  
Healthscope Australian private psychiatry hospitals



## Online survey (N = 81)

Age = 42 ± 11.9 years

Female (72%)

Clinical (66%)

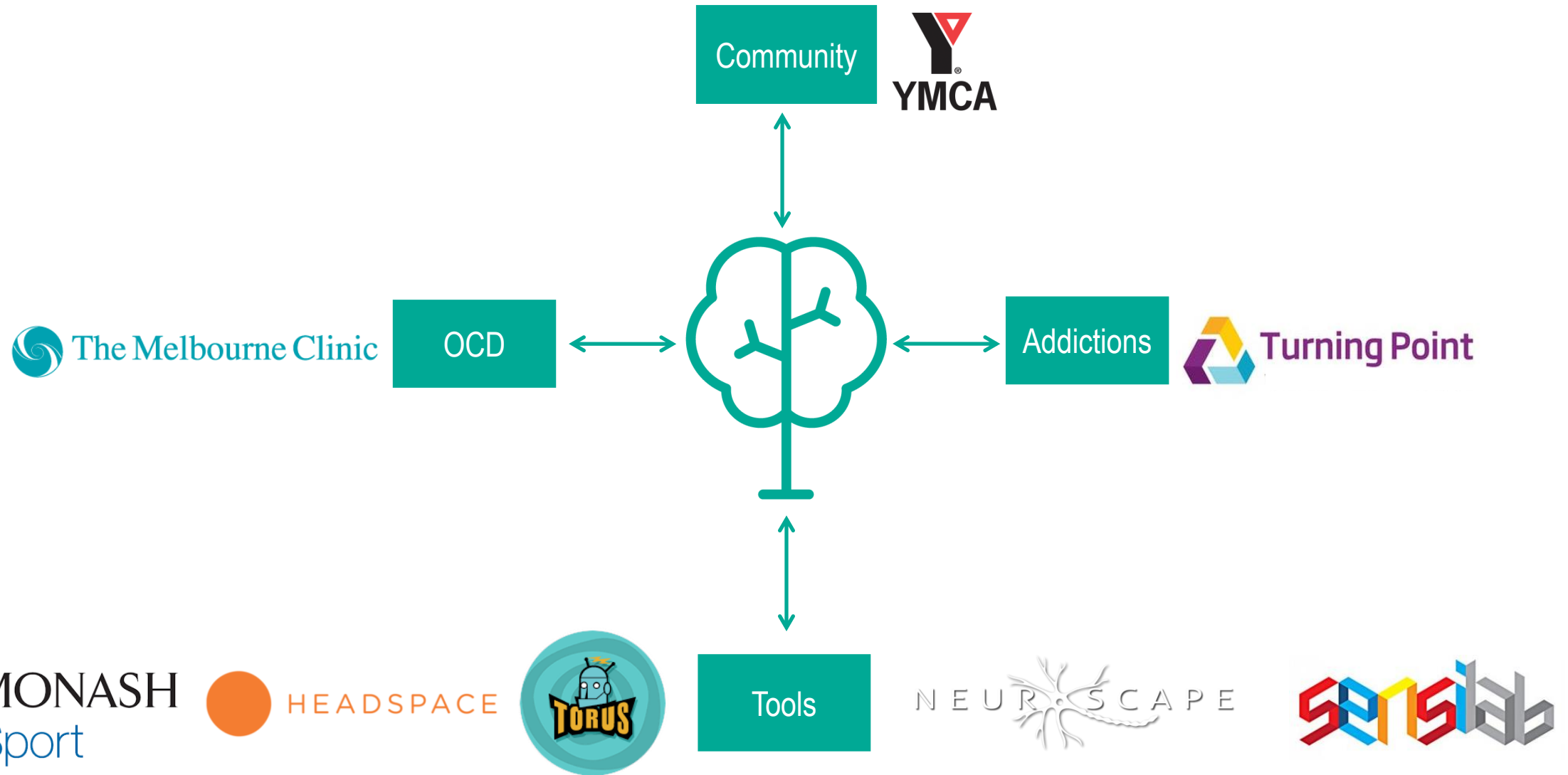
## Qualitative interviews (N = 19)

Clinical (n = 14)

Management (n = 5)



# Partnering to make change



# IBTN Summer School 2018





# BrainPark

DAVID W. TURNER RESEARCH CLINIC



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