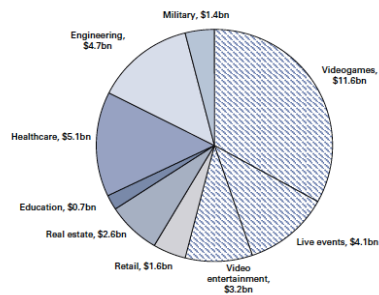




**Exhibit 4: Our 2025 base case VR/AR software assumptions by use case**



Source: Goldman Sachs Global Investment Research.

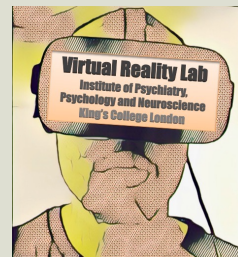


## Bringing everyday social situation into the consultation room?

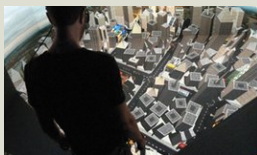


## Video VR Lab

[https://www.youtube.com/watch?v=1t4\\_uXr9YIY](https://www.youtube.com/watch?v=1t4_uXr9YIY)



## Simple Phobias



Schuemie et al., 2000



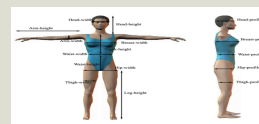
Baus&Bouchard, 2014



## Eating Disorders

"What Are You Thinking When You Look at Me?"  
A Pilot Study of the Use of Virtual Reality in Body Image

Victoria A. Mountford, BA, DClSciPsy<sup>1,2</sup>, Kate Tchanturia, BSc, MSc, PhD, DClSciPsy<sup>1,2</sup>  
and Lucia Valmaggia, BSc, MSc, PhD<sup>1,2</sup>



Ferrer et al., 2000

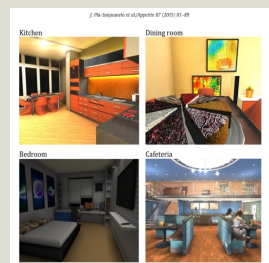


Fig. 1. Pictures of the virtual environments.

Pla-Sanjuelo et al., 2015



## Obsessive Compulsive Disorders



Kumar & Clarke, SLAM



Kumar & Clarke, SLAM



Kumar & Clarke, SLAM

## Post Traumatic Stress Disorder



Skip Rizzo



## Evidence Base: Treatment

- Eating disorders
- Agoraphobia with or without panic disorder
- Phobias
- Anxiety disorders
- Social anxiety
- PTSD
- Psychosis
- Autism

### Main findings

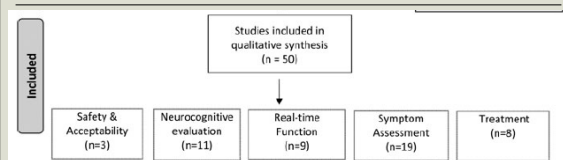
VR more effective than treatment as usual  
VR as effective of more than cognitive behaviour therapy

### Limitations:

High drop-out rates (too confronting, or cyber-sickness)  
Small sample sizes and lacked statistical power

Valmaggia et al 2016; Freeman et al 2017

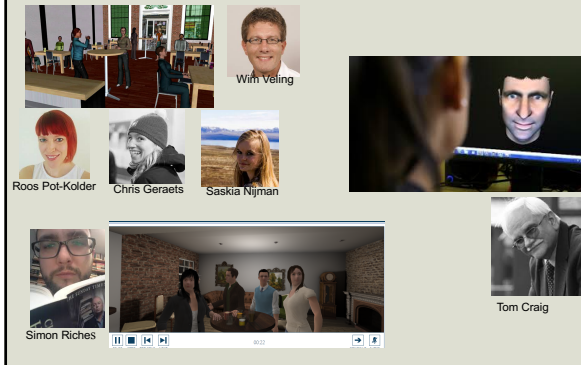
## Evidence base for VR in Psychosis



- Immersive VR is **safe**, no symptom worsening
- VR has the potential to be an effective additional tool for **neurocognitive evaluation** in psychosis, but it is still in its infancy
- Validity and reliability of VR as a neurocognitive assessment tool remains to be established.
- VR enables the introduction of virtual agents and the manipulation of interpersonal communication cues (sounds, laughs, affect, prosody), enhancing the emotional, social and functional assessment.
- Early days!

Rus-Calafell et al 2017 Psychological Medicine

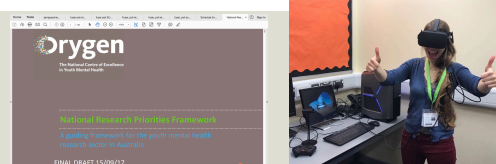
### S7.2 Virtual Reality treatments for psychotic disorders - the beginning of a new era? 5pm Rode Zaal



### E-Health for the I-Generation

Recommended priority areas to reduce the burden of mental illness in young people include:

- Developing novel therapies for young people, including biological interventions, online interventions, virtual reality and third-wave cognitive therapies.
- Research to understand young people's beliefs and preferences about mental health and mental health services to enhance approaches to stigma reduction and raising awareness of how, when and where to seek help.



### Prevention of mental health problems

50% of people who develop a mental health problem will experience the first (attenuated) symptoms before the age of 15.

Adverse social events and other environment factors contribute to onset of mental health problems.

Aims: better understand onset, improve detection, and develop preventative interventions to increase resilience.



Charlotte Gayer-Anderson & Craig Morgan

### Paranoid Thoughts in Adolescents Resilience, Ethnicity & AdolesCent mental Health (REACH)

- n ~ 400 adolescents
- Assessments at baseline and 1 year follow-up
- Validate against self-report and interview measures of paranoid ideation
- Assessment of risk (e.g. abuse & bullying) and protective factors (e.g. social support, coping methods, school climate)
- Exploration of potential psychological (i.e. interpersonal sensitivity) and biological mechanisms (i.e. hair cortisol)



Charlotte Gayer-Anderson, Lucia Valmaggia, Craig Morgan

### Use of VR within REACH study

[https://m.youtube.com/watch?feature=em-share\\_video\\_user&v=x-ZzkhgWcEM](https://m.youtube.com/watch?feature=em-share_video_user&v=x-ZzkhgWcEM)



### New Interventions



## Points to consider

- Evidence: Early days
- How to evaluate?
- Ethical concerns
- Costs and Implementation
- Merging with physiological and ESM measures
- Level of immersion?
- Bridging the gap between Industry - academia - clinical



Valmaggia 2017, World Psychiatry

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 Psychiatry Research Trust



VIRTUALVARE

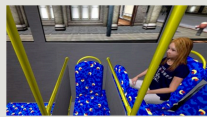
## Thank you for listening !

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Using Virtual Reality to improve the understanding of the mechanisms, which play a role in the onset and maintenance of psychosis

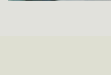
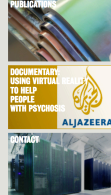
VR assisted assessment and VR assisted therapy for psychosis

Using VR to study the effect of Cognitive Bias Modification for Perceptual

VR to explore the efficacy of new medical compounds: Cannabinoid studies

Eating disorders

Neuropsychology



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