Developing CIRCuiTS – pros and cons for service users, clinicians and researchers

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CIRCuiTS

Computerised **I**nteractive **R**emediation of **C**ognition - **T**raining for **S**chizophrenia

Reeder and Wykes (2011)

CIRCuiTS – the team

- Therapists/researchers
  - Vyv Huddy
  - Tory Pile
  - Polly Crawford
  - Chris Rice
  - Ailsa Russell
  - Rumina Shivji
  - Helen Wood
  - Gaby Illingworth
  - Anna Ruddle
  - Michael Kelly
  - Tracy Johnson
  - Alison Culpeck

- King's DPFS
  - Karen Philpott
- King's Business
  - Francesca Gliubich
- Software
  - SPIKA Ltd

Cognitive remediation (CRT)

- **What is it?**
  - A psychological intervention to improve thinking skills (e.g. memory, attention, executive function)
  - Different from Cognitive Behaviour Therapy (CBT) whose aim is to improve symptoms
- **Who needs it?**
  - People with schizophrenia have cognitive difficulties which limit their ability to recover
  - Cognitive difficulties are related to work and social functioning
- **What is the outcome from CRT?**
  - Improvements in cognition
  - Eventually improvements in social functioning and work

Why use a computer?

- Visually appealing

- More adaptable

- Normative, valued by users

- CRT therapist input unusually intensive but does not rely on high levels of training

- Tracks process and progress

A few notes!

- CRT is not 'brain training'

- It is a psychological therapy and the therapist is crucial

- Aim of therapist to help the patient develop a new approach to thinking about and in their everyday lives

- Engages people who do not usually commit to treatment

Patient quotes

"My brain is really alive now. I feel like I have achieved something when I thought I would never achieve anything"

"I never thought I would be able to use a computer. It's a real achievement"

"Its really interesting, can I take it home?"

What is CIRCuiTS?

- Computerised web-based CRT programme
- Can also be installed on a PC by therapist (for sessions) or patient (for homework)
- A modular system so that
  - (a) new task instances can easily be created,
  - (b) task instances can be organised into infinite 'programmes',
  - (c) new task templates can be added,
  - (d) new versions in different languages can be developed.

What is CIRCuiTS?

- Based on clear theoretical principles and evidence-based teaching techniques
- Tasks:
  - 'abstract' (teach specific cognitive skills)
  - 'exercises' (complex ecologically valid tasks involving numerous cognitive skills)
- Learning (metacognitive) supports incorporated into programme
- Difficulty level gradually increases but is also moderated by computer using artificial intelligence
- Aims to maximise 'transfer' of new cognitive skills to everyday living

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The therapy programme

- 40 sessions
- Takes place on at least 3 days per week
- 5-8 tasks per session (recommended up to an hour)
- Sessions recommended by CIRCuiTS but may be overridden by therapist or patients
- Additional functions for therapist
- Homework can be downloaded to disc
- Sessions carried out online or offline

Interfaces

- Patient – the tasks (in session and homework)

- Therapist - to tailor the therapy, access tasks outside therapy, set and monitor homework and track performance

- Administrator – to regulate users, to create new task instances or therapy programmes, to download data reports.

The village – patient interface

- CIRCuiTS homepage

- Point of return between each task

- Tasks take place in various buildings

- Library:
  - Scoring
  - Help
  - Credits
  - CIRCuiTS history

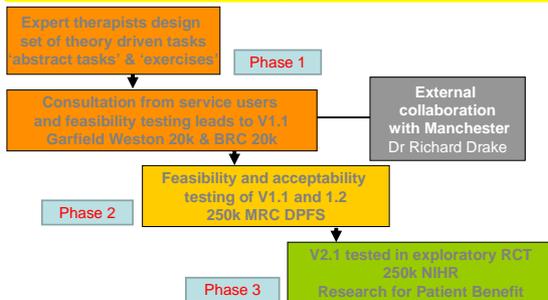## Village demo

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Abstract task demo

- Rotations

Exercise demo

- Perspective-taking

Demo of metacognitive aspects

- Goals

Developing CIRCuiTS

Expert therapists design set of theory driven tasks 'abstract tasks' & 'exercises'

Phase 1

Consultation from service users and feasibility testing leads to V1.1 Garfield Weston 20k & BRC 20k

External collaboration with Manchester
Dr Richard Drake

Feasibility and acceptability testing of V1.1 and 1.2 250k MRC DPFS

Phase 2

V2.1 tested in exploratory RCT 250k NIHR Research for Patient Benefit

Phase 3

Phase 1 – Task building

- 11 expert CRT therapists designed:
  - (a) basic format and setting
  - (b) set of 'abstract tasks' and 'exercises'
  - (d) set of therapeutic (metacognitive) learning supports

- 14 participants with a Sz dx recruited to BRC feasibility study and consulted on:
  - Look-and-feel
  - Usability
  - Comprehensibility
  - Appropriateness of task difficulty
  - Perceived value

Phase 2 – Version 1.1

- V1.1. in place following phase 1

- 18 month feasibility and acceptability study

- 3 milestones

- MRC DPFS funding

- Potential for patent and trademark considered

M1 aims: software and non-clinical testing

- RA trouble-shoots software errors

- 30 non-clinical participants (actual n34) rate
  – Attractiveness of software
  – Appropriateness (e.g. cultural) of variety and types of tasks

- Detailed beta-testing by 10 non-clinical participants (actual n13)

- Amendments made to software

Milestone 1: Results

- Mean overall attractiveness = 84%
- Mean 'cultural acceptability' = 89%
- Mean understanding and ease of use = 78%
- Mean understanding and ease of use for online help (library books) = 84%
- 86% of tasks run to protocol
- 78% of identified bugs corrected
- All design change requests documented.

M2 aims: clinical and therapist testing

- 3 therapists
  – rate attractiveness and usability
  – assemble 5 brief pre-specified therapy programme and rate ease of use

- 5 Sz participants receive 10 hours of therapy and rate/identify
  – attractiveness, usability and comprehensibility
  – computer skills needed to complete the programme
  – errors within the programme
  – possible design changes

Milestone 2: Results

- Therapists:
  – ease of use 87%
  – ease of understanding 87%
  – 100% took <target 20 min to assemble programmes
- Patients:
  – attractiveness 90%
  – usability 70% rising to 85% after 10 sessions
  – learning support usefulness 70% rising to 85% after 10 sessions
- V2 released: amendments made with high therapist consensus using Delphi groups

M3 aims: re-testing and manual writing

- 5 patients receive one session and rate
  – Attractiveness
  – Learning support
- 2 therapists conduct one session and rate
  – Attractiveness
  – Learning support
  – Data view ease of access
- Create computer skills training programme
- Create therapist manual

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Milestone 3: Results

- All ratings exceeded those from M2

- 3 participants also completed detailed beta-testing of V2

- Mouse skills training programme created

- Comprehensive therapist manual created after consultation with therapist group

- Therapist and admin induction wizards created

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Phase 3

- RfPB RCT (CIRCuiTS vs TAU) now almost complete
- Planned n=120, 100 now recruited
- Participants initially receive therapist-led therapy, but independent sessions gradually introduced

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Phase 3

- 37k funding received from King's Futures Funds to devised system for software to be easily translatable
- CIRCuiTS translated into French and Spanish
- CIRCuiTS licensed to clinical researchers free of charge

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Pros and cons - Service users

- Pros
  - Computers (and IT skills) considered normative and valuable
  - High ecological validity
  - Software appealing and engaging
  - Potential for increased access to psychological therapy
  - Increased sense of empowerment and self-efficacy from independent working
- Cons
  - Potential reduction in highly valued therapist contact
  - Some anxiety about using computers (allayed by mouse skills programme and therapist contact)
  - Restricted access to computers (although generally overcome with memory sticks etc)

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Pros and cons - Clinicians

- Pros
  - Reduced preparation of materials
  - High levels of therapist support within the programme
  - Ensures a particular therapeutic focus 'metacognition' by therapist role inbuilt into programme
  - Detailed records of patient performance
  - Potential to run CRT in groups
- Cons
  - Reluctance to relinquish therapist role and allow independent working
  - Scepticism about whether a 'real' therapy
  - Potential to reduce 'therapeutic' input by over-reliance on computer
  - Limited software support

CIRCUITS
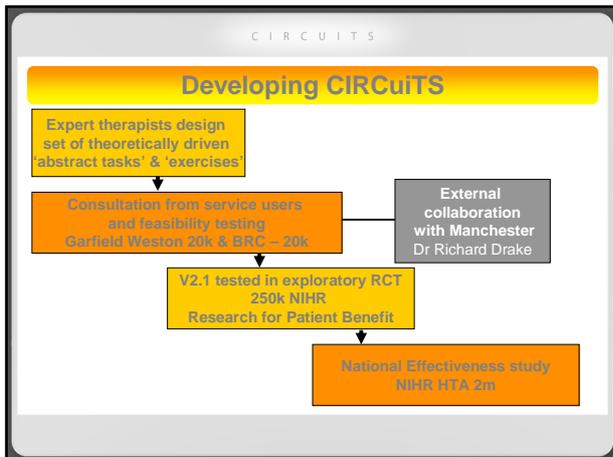
Pros and cons - Researchers

- Pros
  - Access to huge amount of process data collected automatically
  - Data is highly reliable, consistent and specific
  - High visibility of process
  - Data reported in useable formats which can be pre-specified
  - International access to a single therapy and data
- Cons
  - Data overload!
  - Therapist involvement and tailoring results in participant variation
  - Bugs sometimes identified mid-process
  - Who pays for ongoing software support and hosting?
  - How is the software distributed?
  - Users need ongoing level of support (clinical and software)

Next phase

- Create contract for licensees (particularly for translators)
- Create a sustainable business model for the dissemination of CIRCuiTS
- Create online forum for ongoing software and therapy support
- Generate funding for future hosting and support costs
- Conduct national effectiveness study

Advantages

- Increase access to psychological therapies NHS doesn't have many therapists
- CRT could:
  - Improve rehabilitation outcome
  - Reduce the cost of care
  - Improve social inclusion
- Traditional cognitive therapies involve one-to-one therapy
- Engages people who do not usually commit to treatment

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National Effectiveness study
NIHR HTA 2m

Tailoring treatment

- Tasks gradually increase in difficulty but computer also moderates difficulty level based on prior performance

- 'Beat the clock' element introduced later in the programme

- Therapist can tailor sessions and set personalised homework

- Admin system allows design of individualised programmes

Abstract tasks

- Neutral content

- Specific cognitive targets

- Appear early in the programme

- Often form part of the later exercises

An exercise

- Ecologically valid – map on to real-life activities

- Mainly reliant upon multiple executive functions

- Fall under functioning categories:
  - Work
  - Social situations
  - Cooking and shopping
  - Travelling

Improving metacognition

- Strategy-use integral to task completion

- Before beginning a task
  - Rate expected difficulty
  - Rate expected time to complete task

- On completing the task
  - Score given
  - Rate usefulness of strategies
  - Rate actual difficulty of the task
  - Actual time taken shown

Scoring and feedback

- Feedback relies on evidence-based training techniques, all based on achieving a high level of success
  - Positive reinforcement for desirable behaviour
  - Scaffolding
  - Errorless learning

- Scores are reported
  - At the end of each task
  - Cumulatively in the library

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