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Cognitive and behavioural biomarkers for the treatment of mental health conditions: an investigation of acceptability and efficacy when used as a therapeutic tool

Submission date
23/03/2020

Recruitment status
No longer recruiting

Registration date
01/04/2020

Overall study status
Completed

Last Edited
13/06/2022

Condition category
Mental and Behavioural Disorders

[X] Prospectively registered
[X] Protocol
[ ] Statistical analysis plan
[ ] Results
[ ] Individual participant data
[ ] Record updated in last year

Plain English summary of protocol

Background and study aims
Mental health disorders constitute an enormous healthcare concern, with one in four people estimated to be affected. The global economic cost of mental illness is estimated at £105bn per year in the UK alone. However, access to care remains poor across the globe, and clinical outcomes have remained stagnant for decades. The current study aims to collect and explore the potential value of digital cognitive and behavioural biomarkers in increasing the therapeutic benefits of internet-enabled cognitive behavioural therapy (IECBT). Examples of these cognitive and behavioural biomarkers include features of patient language, summary measures of patients' physical activity, geolocation, and patterns of social media use and digital interaction. In this study the researchers are interested in exploring whether passively collected biomarkers, such as physical activity, sleep, location and social and digital interaction, can be used as to monitor changes in symptoms in patients receiving a course of psychotherapy. They are also interested in testing the hypothesis that sharing patients' biomarker information with their therapist, as the patient receives a course of IECBT, can lead to improvements in clinical outcomes, through the delivery of more personalized treatment protocols.
In summary, the project can be defined by the following objectives:
1. Define a range of cognitive and behavioural biomarkers and explore associations with symptoms of common mental health disorders
2. Assess the acceptability of collection of cognitive and behavioural biomarkers and how willing patients are to volunteer this information within a therapeutic context
3. Develop digital mental health monitoring tools to be used by both patients and therapists
4. Evaluate the effectiveness of digital mental health monitoring tools in providing additional patient information to the therapists, allowing them to personalize treatment protocols with the aim of optimizing clinical outcomes

Who can participate?
Adult patients (aged over 18) who experience any symptoms of low mood or anxiety and have registered to receive IECBT with Ieso Digital Health

What does the study involve?
At the start of treatment consenting patients will be given an activity tracker (Fitbit) and access to a mobile app, allowing them to track behavioural biomarkers against mood, including:
1. Fitbit activity data, including active, cardio and peak minutes per day, total sleep and awake time per day
2. Location summary measures, including total distance travelled, number of locations visited, time spent at home and maximum distance from home, per day
3. Digital interaction information, including time spent using your phone, per day
4. Social interaction information, including time spent on social media or messaging apps per day, number and total duration of calls made, received, and missed, per day.
Patients will be randomly allocated to one of two groups:
Therapist and patient visibility: Therapists delivering therapy will also have access to patients' biomarkers and use this information to tailor the care delivered to each patient and monitor patient outcomes.
Patient visibility only: Therapists will not have access to patients' biomarker data.
This study aims to recruit a total of 200 patients, of whom 100 will be randomly allocated to standard psychotherapy with patient visibility of biomarkers, and 100 to enhanced psychotherapy, informed by patient and therapist's visibility of biomarkers.
Participants will receive a course of IECBT consisting of weekly therapy appointments delivered over the internet in a dedicated platform using written conversation. Average treatment durations are 7 treatments sessions over a period of two months. Patients' depression and anxiety symptoms will be tracked at each treatment session over the entire course of treatment. These symptoms scores will be used to evaluate any group differences in clinical outcomes between the two groups, including total change in symptoms and rate of symptom change.

What are the possible benefits and risks of participating?
Participants for this study are invited to take part once they have already registered for IECBT and thus receive CBT treatment as appropriate regardless of whether they choose to participate in the study or not. Should they choose to participate they will receive a Fitbit activity tracker, as is necessary for the purposes of the study, and be given access to a mobile phone app that allows them to track their daily mood against a range of behavioural data, including physical activity, sleep and phone usage. This gives them access to data and information that they may otherwise not be able to access, and which may be beneficial for monitoring their mental health.
Patients may consider the collection of biomarker data an intrusion on their privacy or be concerned about the confidentiality and security of these data. Patients will be provided with information on how their biomarker and therapy data will be de-identified, handled and stored by Ieso Digital Health as part of their Participant Information so that they are fully informed before consent. Data collected by the study app will be processed locally within the participant's mobile phone to provide summary measures of behavioural biomarkers. These summary measures, which contain no personally identifiable information and are identified by a unique study ID, will be securely transferred to Ieso servers via an encrypted connection. Together with therapy data, these data will be stored confidentially and securely in Ieso servers.
During the course of treatment it may be identified that there is a significant risk of harm to a patient or another individual. Ieso Digital Health has procedures in place to safeguard patients. Patients at risk will be counselled by their therapists and signposted to specialist services as appropriate.

Where is the study run from?
Ieso Digital Health (UK)

When is the study starting and how long is it expected to run for?
May 2018 to December 2021 (updated 16/03/2021, previously: March 2021)

Who is funding the study?
Ieso Digital Health (UK)

Who is the main contact?
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Contact information

Type(s)
Scientific

Contact name
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Additional identifiers

EudraCT/CTIS number
Nil known

IRAS number
281261

ClinicalTrials.gov number
Nil known

Secondary identifying numbers
IRAS 281261

Study information

Scientific Title
Cognitive and behavioural biomarkers in cognitive behavioural therapy (CBB4CBT): an investigation of the effect of therapist vs patient-only visibility of patient biomarkers in improving clinical outcomes for patients with mental health conditions

Acronym

CBB4CBT

Study objectives
In this study, the researchers are interested in exploring whether passively collected biomarkers can be used as a proxy to detect symptom changes in patients receiving a course of psychotherapy. They are interested in testing the hypothesis that sharing patients' biomarker information with their therapist, as the patient receives a course of internet-enabled cognitive behavioural therapy (IECBT), can lead to improvements in clinical outcomes, through the delivery of more personalized treatment protocols.

Ethics approval required
Old ethics approval format

Ethics approval(s)
Approved 19/06/2020, West Midlands – Black Country Research Ethics Committee (The Old Chapel, Royal Standard Place, Nottingham, NG1 6FS, UK; +44 (0)207 104 8010, +44 (0)207 1048106, +44 (0)207 104 8284; nrescommittee.westmidlands-blackcountry@nhs.net), REC ref: 20 /WM/0128

Study design
Single-centre interventional randomised controlled trial

Primary study design
Interventional

Secondary study design
Randomised controlled trial

Study setting(s)
Internet/virtual

Study type(s)
Treatment

Participant information sheet
Not available in web format, please use contact details to request a participant information sheet

Health condition(s) or problem(s) studied
Common mental health disorders including depression, anxiety, obsessive-compulsive disorder (OCD), phobias, post-traumatic stress disorder (PTSD) and social anxiety

Interventions
This is an interventional study involving patients entering into treatment with Ieso Digital Health, a provider of Internet-enabled cognitive behavioural therapy (IECBT), where patients communicate with a qualified CBT therapist using a real-time text-based system. Patients entering into the IECBT service who fulfil eligibility criteria will be invited to participate in the research study.

Before commencing their course of IECBT treatment, consenting patients will be randomized to one of two groups by the patient services team, who will be blind to study group allocation.

Therapist and patient visibility: Patients allocated to this group will be given an activity tracker (Fitbit) and access to a mobile app that allows them to track their activity, location, social interaction and digital interaction biomarkers against their mood. They will receive a course of IECBT, and their therapist will also have access to these biomarkers and will use this information to tailor the care delivered to each patient and monitor patient outcomes.

Patient visibility only: patients allocated to this group will be given an activity tracker (Fitbit) and access to a mobile app that allows them to track their activity, location, social interaction and digital interaction biomarkers against their mood. They will also receive a course of IECBT. However, their therapists will not have access to patients' biomarker data.

In this study, the researchers have opted not to include a formal control group of patients who have no visibility of their own biomarker data. However, in order to provide a benchmark for mental health outcomes in patients without biomarker visibility, a comparison dataset will be evaluated. This dataset will be obtained from the wider cohort of patients receiving standard IECBT with Ieso Digital Health, thus enabling us to broadly compare the effect of IECBT augmented by biomarker visibility with standard care.

Patients' clinical outcomes and response to therapy will be monitored. Therefore, patients will be involved in the study for the duration of a course of therapy, which is typically between 8 and 12 weeks. It is anticipated that the study should be complete within 8 months. This includes 5 months to recruit participants and 2-3 months to complete each course of therapy.

Due to the nature of the study, it is not possible to blind therapists or patients to study group. Nevertheless, therapists will be specially trained in the study procedures and will aim to deliver the same standard of care across both groups.

The clinical outcomes collected in this study are collected as part of existing 'standard of care'. In the context of this study treatment non-response will be defined as non-engagement or failure to achieve defined symptom change for recovery and/or improvement. The service provider, Ieso Digital Health, operates within the Improving Access to Psychological Therapies (IAPT) programme. As such, as mandated by IAPT, all patients receiving treatment, whether or not they have opted to participate in the study, will complete two symptom severity measures at initial assessment and before every therapy session: PHQ-9 and GAD-7, corresponding to depressive and anxiety symptoms respectively. These metrics will be used as primary outcome metrics to calculate clinical outcomes.

Within this framework, clinical outcomes including engagement, recovery and improvement will be defined following IAPT guidelines. Non-engagement will be defined as failure to attend at least two treatment sessions. This is the minimum dose of therapy a patient must receive such that pre- and post-treatment scores are collected and clinical change can be estimated.

Within the IAPT framework, clinical recovery and reliable improvement are calculated based on PHQ-9 and GAD-7 scores. Patients with two or more therapy sessions who show a significant reduction in at least one of the outcome measures from assessment to the last treatment session (i.e. decrease of six points or more in the PHQ-9 and/or four points or more in the GAD-7), while not showing a significant increase in the other outcome measure, were classed as showing reliable improvement.

If a patient scores eight points or above for GAD-7, and/or ten points or above for the PHQ-9, they will be classed as meeting the clinical threshold for caseness, which means they are

considered to be suffering from clinically significant anxiety and/or depression symptoms. Patients with two or more therapy sessions who move from above caseness at assessment to below caseness at the last treatment session will be classed as recovered.

Intervention Type
Behavioural

Primary outcome measure
1. Depressive symptoms measured using the PHQ-9 at initial assessment and before every therapy session
2. Anxiety symptoms measured using the GAD-7 at initial assessment and before every therapy session

Secondary outcome measures
1. Mood ratings using a single scale question, every day throughout the course of treatment
2. Active minutes measured through a Fitibit, every day throughout the course of treatment
3. Cardio minutes measured through a Fitibit, every day throughout the course of treatment
4. Peak activity minutes measured through a Fitbit, every day throughout the course of treatment
5. Total time asleep measured through a Fitibit, every day throughout the course of treatment
6. Total time awake measured through a Fitibit, every day throughout the course of treatment
7. Total distance travelled measured by the mobile phone, every day throughout the course of treatment
8. Number of locations visited measured by the mobile phone, every day throughout the course of treatment
9. Time spent at home measured by the mobile phone, every day throughout the course of treatment
10. Maximum distance from home measured by the mobile phone, every day throughout the course of treatment
11. Time with phone screen on measured by the mobile phone, every day throughout the course of treatment
12. Time spent on social media apps measured by the mobile phone, every day throughout the course of treatment
13. Time spent on messaging apps measured by the mobile phone, every day throughout the course of treatment
14. Number of calls made, received, and missed, measured by the mobile phone, every day throughout the course of treatment
15. Total duration of calls made, received, and missed measured by the mobile phone, every day throughout the course of treatment

Overall study start date
01/05/2018

Completion date
31/12/2021

Eligibility

Key inclusion criteria
Patients referred to the IECBT service for the treatment of depression or an anxiety disorder, who meet the eligibility criteria, will be invited to participate in the study. These criteria are as

follows:
1. Patients must be over 18 years old at the time of recruitment and registered with a general practitioner in the geographical region of Surrey, where the service is commissioned and the study will recruit from.
2. Patients must have a primary diagnosis of depression or anxiety disorder
3. Able and willing to sign a consent form prior to the study
4. Patients must own an internet-connected mobile phone, running Android version 4.0.3 or higher

Participant type(s)
Patient

Age group
Adult

Lower age limit
18 Years

Sex
Both

Target number of participants
This study aims to recruit a total of 200 patients completing a course of treatment, of whom 100 will be randomly allocated to standard psychotherapy with patient visibility of biomarkers, and 100 to enhanced psychotherapy, informed by patient and therapist's visibility of biomarkers.

Total final enrolment
235

Key exclusion criteria
It is important that this study only seeks to recruit patients who are suitable for a primary care psychological therapy intervention and that these patients are suitable for CBT. It is also essential that patients recruited to the study are able to access and use a computer or other Internet-enabled device. Therefore, the following groups of patients will be excluded from the study:
1. Patients who are not suitable for CBT, this includes patients with a comorbid diagnosis (a diagnosis of multiple disorders) of psychotic or personality disorder, autism spectrum condition or intellectual disability
2. Patients who display a significant risk of self-harm, as assessed by item 9 of the PHQ-9 questionnaire and ongoing assessment by their assigned clinician
3. Patients who have a poor likelihood of engagement with the therapeutic process, as assessed at triage
4. Patients who do not have access to an Internet-enabled device or an Internet connection
5. Patients who have a low level of literacy. Patients who cannot write or read emails or texts will be excluded from this study because they will be unable to utilise the intervention
6. Patients who are visually impaired and are unable to write on or read from a computer and do not have access to appropriate assistive technology for the visually impaired
7. Patients who do not speak English
8. Patients who become unsuitable for treatment within an NHS primary care mental health (Improving Access to Psychological Therapy, IAPT) service. The normal NHS IAPT exclusion criteria will be applied whereby patients who become actively suicidal or present as a risk to

others require a referral on to a more specialised, secondary care service. In addition, patients who are experiencing symptoms of psychosis, hyper-mania, severe cognitive impairment, severe personality disorder or severe learning disability are also deemed as being unsuitable for an IAPT service. These patients will be excluded from this study and referred on to more specialised services.
9. Participants who are already involved in a different research project

Date of first enrolment
01/07/2020

Date of final enrolment
30/09/2021

Locations

Countries of recruitment
England

United Kingdom

Study participating centre
Ieso Digital Health
Jeffrey's Building
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Sponsor information

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Sponsor type
Industry

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Sponsor type
Industry

Website
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Funder(s)

Funder type
Government

Funder Name
Innovate UK

Alternative Name(s)
innovateuk

Funding Body Type
Government organisation

Funding Body Subtype
National government

Location
United Kingdom

Results and Publications

Publication and dissemination plan

Reports of the study findings will contain aggregated data and summary statistics only (e.g. group means). Patients' names or personal identifiable data will never be included in any publication. The researchers plan to publish the results of the study in a peer-reviewed scientific journal in the second half of 2021. In addition to this, study results will also be presented at relevant international conferences and through internal reports.

Intention to publish date

31/12/2022

Individual participant data (IPD) sharing plan

Due to the dataset's richness, there is a privacy risk associated with sharing participant-level data, as individual participants may be identifiable by 'triangulation'. To mitigate this risk, it is the researchers' general policy to never share participant-level data for any of the patients that they treat. All the data is stored securely within their own computing environment and can be made available to researchers who apply for it, pass the internal review process, and are able to visit the premises to access the data from terminals within the firewall.

IPD sharing plan summary

Not expected to be made available

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Protocol file	version v1	06/03/2020	01/04/2020	No	No
HRA research summary			28/06/2023	No	No