

Aims and Objectives

- To individualize psychiatric treatment in clinical practice
- To explore and highlight crucial influences in treatment options for more targeted research in the future

The aim of this research project is to investigate if easily-acquired demographic information can be used to improve treatment assignment in mental health.

Antidepressants (AD) can be effective to treat disorders such as depression and anxiety. However, treatment outcomes are modest and highly variable ¹, with only 40-60% of individuals responding to their first line of treatment ²⁻⁴. There is an urgent need to identify methods that can help clinicians to individualise treatment, to assign the right medication or talking therapy to each patient to optimise their chance of recovery.

There has been considerable interest in this area of research, but few actionable insights have emerged, and there are virtually none being used in clinical practice today ⁵. Preliminary findings suggest there are some demographic factors that are associated with improved response to certain treatments, for example, income and education may have some signal ⁶. Crucially, these studies have only tested the extent to which individuals respond or don't respond to one active treatment. Therefore, it remains unclear if these indicators signal general chronicity of illness and poorer outcomes overall, or if there are alternative treatments that might perform better for individuals in these demographic brackets.

However, there is support for the latter view. For example, specific symptom clusters were found to be dependent on AD type where escitalopram was less effective than duloxetine in treating core emotional symptoms ⁷. Also, there is some preliminary evidence that predictions about treatment-specific outcomes may be possible based on demographic factors. One body of work has developed a 'personalised advantage index' and found that participants who undertook the treatment that this index deemed was best suited to them responded better than if they undertook a non-optimal treatment ⁸. In this project, I want to take this idea further and explore if demographic factors can be used to discern if an individual will respond better to AD treatment or ADs in combination with internet-based cognitive-behavioural therapy (iCBT). Given that psychological therapies are currently more

costly to healthcare systems than prescribing ADs, developing an evidence base around who would benefit most from this adjunct would be of immense real-world value. If we learn that certain features have predictive power, this will lay the groundwork for a future more extensive study that might allow individual recommendations to be put into clinical practice.

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Method

Participants

A sample of 1003 participants with the median age 28 (range = 18 - 69), were recruited through GoogleAds, targeted marketing in pharmacies and through the SilverCloud Health iCBT platform. The sample size allows interpretation beyond the sample data. The majority of the sample is from UK, US and Ireland and cross-cultural interpretation is therefore limited. All participants in the AD arm will have started a new AD 2 days before, or after the first day of participation. Participants in the CBT arm will have started their treatment within 2 days of the baseline assessment.

Design

The data has been collected by Gillan Lab in the context of a longitudinal treatment study that aims to develop machine learning algorithms that can predict overall treatment response. In this project I aim to take advantage of data they are incidentally gathering on treatment *type*. Their subjects are highly heterogeneous in terms of the treatment they are receiving and there are no plans to formally study differential response to different types of ADs and their combination with iCBT. Therefore, the study is separate from the work that is currently being conducted by the Lab.

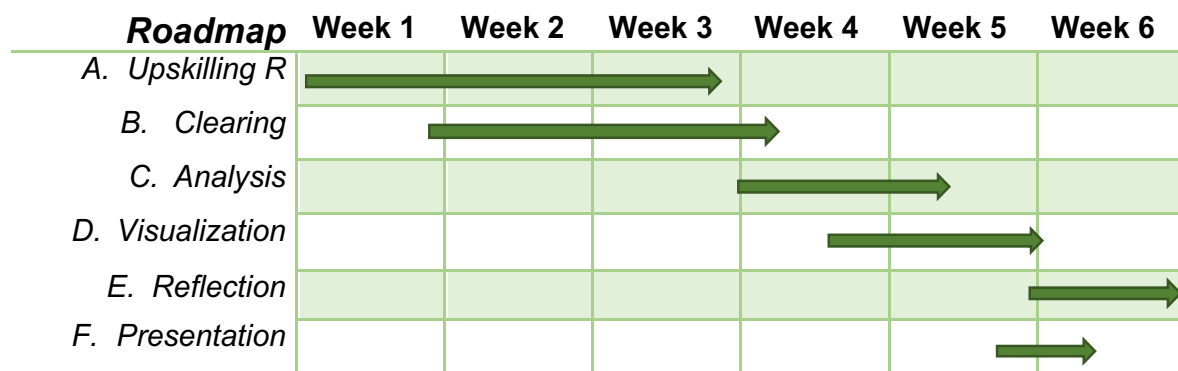
The primary methodology will be to segment the sample into patients receiving ADs, iCBT and a combination into three cohorts and compare the associations with a range of demographic variables to treatment response across these groups. I will use R to prepare data for analysis and interpretation and to produce figures representing my results.

The study is internet based and the data is quantitative and obtained from standardized questionnaires (e.g., Social Phobia, (LSAS); Obsessive-Compulsive Disorder, (OCI); Anxiety (STAI) and functional impairment (WSAS)), demographics (e.g., age, sex, ethnicity, education level and employment), treatment type (ADs or

ADs in combination with CBT, iCBT alone) and the treatment outcome (scores on questionnaires). Participants report demographics and fill in questionnaires on first assessment, followed by weekly questionnaire reporting for a period of six weeks.

Procedure

A regression analysis computed using R, will be used to assess how much of the difference in treatment outcome that can be explained by specific demographic factors. The importance of demographic factors in treatment response is measured by overall score variance from questionnaires. The research will take place remotely and will not be affected by Covid-19 restrictions.



Roadmap. A) Upskilling R. Taking courses to learn coding with R, to understand concepts, analyse results, and to form figures. **B)** Clearing and Organizing. Removing excess data and forming new variables to facilitate analyzation. **D)** Analysing. Analyse data with coding programme R **E)** Forming figures. Form figures to represent findings. **F)** Reflection. Write assignment for summer one. **G)** Presenting findings to Gillan Lab. **Troubleshooting coding issues have been taken into account**

Interdisciplinary focus and Collaboration

The study is relevant to several disciplines e.g., psychiatric, psychological and computer. Therefore, Hampus Söderberg, background in Molecular Biotechnology Engineering, Uppsala University will also support me during my research.

