E-Health and Omics Profiling Supporting Early Dementia

Prevention in the Community

Introduction to The University of Manchester and its role in the

COMFORTage Project

The University of Manchester, one of the UK's leading research institutions, is at the forefront of scientific innovation and health initiatives. UNIMAN team has previously worked on projects involving the measurement of biomarker series and lifestyle interventions in cancer research, with strong strength in predicting genetic predisposition, biological aging and actionable lifestyle modifications to drive measurable health improvements. **Over 70% of participants** were positively influenced to adopt healthier lifestyles.

Building on this experience, we're part of an exciting EU-wide project, COMFORTage, focused on early dementia detection and prevention. We combine data from omics profiling, lifestyle questionnaires, and wearables like "Fitbit" to give people personalized feedback and intervention strategies. By identifying proximal markers of current risk, we aim to help people reduce their dementia risk before symptoms arise.

Linking COMFORTage with UK Biobank: A Unique Strength at

Manchester

The University of Manchester has a long-standing connection with UKBiobank—a globally renowned resource of genetic, lifestyle, and health data from over 500,000 participants and hosts the sample collection in a brand new facility currently being constructed. This readily positions The University of Manchester to translate COMFORTage innovations into wider-scale further evaluations and subsequent impact. As a lead academic partner, we have already established approved access to UK Biobank through funded research projects and approved concept forms, allowing us to use these data to rigorously test and validate the models and risk prediction strategies developed in COMFORTage.

Although UK Biobank data cannot be shared directly with the COMFORTage consortium due to strict data governance rules, the University of Manchester can leverage its existing approvals and infrastructure to conduct complementary analyses. These analyses will assess how findings from COMFORTage—such as omics-based markers, digital intervention strategies, or early risk profiles—perform across a larger, independent cohort. This enables us to explore the generalisability of our results and further validate the most promising tools and biomarkers emerging from the COMFORTage study.

By linking detailed community-based data from COMFORTage with large-scale population data from UK Biobank, we can accelerate the development of robust, scalable models for early dementia prevention—bridging the gap between innovation and real-world implementation.

Dementia Challenge in the UK

Dementia is one of the UK's biggest health challenges. With a death rate of 42.7 per 100,000 people, the UK has one of the highest death rates from dementia in Europe. Retrospective data show that in 2019, the incidence rate of dementia in England and Wales was 1.13%. In 2017, the prevalence rate of dementia among the primary care registered population peaked at 4.3%. By 2021, this rate had decreased slightly to 3.9%, before rising again to 4.2% in 2024. Around 982,000 people were living with dementia in the UK in 2024—57% of them women. This number is expected to rise to 1.4 million by 2040. 1 in 14 people over 65, and 1 in 6 over 80, live with dementia. The cost to the UK is around £26.3 billion a year, more than cancer, heart disease, or strokes.

Over the years, the UK has made progress through national strategies, starting with the 2009 Living Well with Dementia plan and continuing with the 10-Year Dementia Plan launched in 2022. These focus on early diagnosis, research, prevention, and improved care through technology. Services like memory clinics, community programs, and specialist nurses are now more widely available. While the challenges like staff shortages and rural access remain.

Why Early Detection Matters

Many people think dementia is an "old age" problem—but the truth is, the biological processes behind it can start decades before symptoms show. By the time someone is diagnosed in their 70s or 80s, the damage has often been built since their **40s or 50s**. The problem? Early signs are often missed. Many dismiss forgetfulness or mild confusion as "just aging", nearly a third of cases go undiagnosed in the UK. That's a huge missed opportunity, because research shows that lifestyle changes—like better sleep, diet, and exercise—can slow progression if started early.

So how do we motivate people to act sooner? That's where e-health tools and omics profiling come in.

Data Collection

We are recruiting **800 healthy adults** (aged 40-75) over a three-year period. The study aims to evaluate how e-health support tools and omics profiling can help detect early signs of dementia, reduce risk factors for dementia and other chronic conditions, and promote long-term well-being.

We will extract **omics data from blood sample** to understand biological and genetic health markers. We will also gather information on **lifestyle factors** like diet, sleep, and mental well-being using **validated questionnaires**. Finally, participants using **Fitbit wearables** will provide **real-time data** such as daily steps, heart rate, and sleep patterns, giving us valuable insights into everyday habits and physical activity.

Intervention Strategies

Participants will be randomly assigned to one of four groups to assess different intervention approaches:

- Group 1: Receives e-health interventions, including a selection of health apps and a Fitbit for activity monitoring.
- Group 2: Receives omics profiling feedback, which provides insights based on their genomics, epigenomics, and metabolomic profiles.
- Group 3: Receives both e-health support and omics profiling feedback.
- Group 4 (Control Group): Receives no intervention.

Participants will be informed about the study, provided with a participant information sheet, and asked to complete a screening questionnaire. Eligible participants will provide written informed consent. Following consent, all participants will undergo blood sample collection and a grip strength test on the event day. They will also complete a series of lifestyle-related questionnaires. After nine months, they will complete the same questionnaires and provide a second blood sample to track changes over time.

Study design flow chart:



What's Omics Profiling?

"Omics" sounds high-tech, but it's an advanced way to understand your health. By integrating data from your **DNA**, **blood**, **and metabolism**, omics profiling gives you a comprehensive picture of your current health. Unlike conventional health assessments that examine isolated biomarkers, "omics profiling" offers **integrated signals of current health profile** based on multiple health biomarkers of different sorts. Our analysis includes:

- **Genomics:** This is the study of your DNA, revealing inherited risks for diseases. While genomics can't change your genetic makeup, it helps in understanding predispositions and guiding lifestyle choices accordingly.
- **Epigenetics:** Shows how your environment and lifestyle influence gene activity. Factors like stress, diet, exercise, and pollution can turn genes on or off, impacting your overall health.
- **Metabolomics**: This involves analyzing small molecules (metabolites) in the blood that reflect biochemical processes in the body. Metabolomics provides insights into metabolism, energy balance, aging etc., making it a powerful tool for assessing health risks and potential interventions.

Instead of just saying, *"You might get dementia in 30 years,"* we focus on **current risks** like metabolic health or biological age—that people can actually do something about.

Bringing Research to the Community

In collaboration with the Graham Fulford Charitable Trust (GFCT), a King's Awardwinning organization renowned for its community health initiatives, we engage directly with the public to turn scientific insights into meaningful health outcomes. We host events where people can join the study and give samples. So far, over 100 people have taken part. At these events, we've seen that **people are really interested in knowing their biological age and markers of early changes showing up in their metabolic biomarkers**—whether their body is aging faster or slower than their actual age. Because of this, we focus on present health rather than just future risks. This makes the results more useful and easier to act on.

Recruitment continues in the community and as shown below it consists of a series of steps:



Step 1 - Explanation of the study to potential participants



Step 2 - Consenting the participants



Step 3 – Distributing Fitbits to the participants



Step 4 – Measuring grip strength

The blood samples taken from the participants at these events go to the laboratories for testing. The UNIMAN study them to find markers linked to dementia and multimorbidity. The results help us to create personalized early health interventions and individual health plans for each of our participants.

How We Keep Participants Engaged

It's important to keep participants engaged in the study, as this is essential for high retention and data quality. We use different ways to keep participants engaged.

Reports

Participants receive detailed reports on their biological aging, epigenetics, and metabolomics. These reports provide personalized key findings, allowing participants to understand their unique health profile. Fitbit users also get reports summarizing their average steps and sleep patterns to help them track progress over time.

Report examples:



Apps

We offer innovative apps to support participants' cognitive function and overall health. For example, Eligence is a cognitive training platform offering scientifically designed games to enhance cognitive function and mental well-being, helping participants stay engaged while improving their cognitive health.

Recommendations

To guide participants in making positive changes, we offer starting recommendations focused on three key aspects of health: diet, physical activity, and sleep. These actionable, evidence-based suggestions help them make small but important changes in their daily lives.

Newsletters

Participants will also receive a monthly newsletter containing health tips, educational content, and insights from reputable sources like Harvard Health. These newsletters aim to provide ongoing education, valuable advice, and fresh content to keep participants engaged and informed on their health journey.

How COMFORTage Could Change Dementia Research at UNIMAN

The COMFORTage project unites 39 partners from 12 European countries to tackle dementia through integrated health data, AI-driven predictive models, and Digital Twin technology. By identifying risks earlier and enabling personalized interventions, the initiative aims to transform dementia prevention and care.

For The University of Manchester, this project builds on our research in community health and dementia prevention, helping us build a full picture of risk factors, underlying causes, and early intervention strategies. With COMFORTage, we can better identify who is at risk, understand why, and take proactive steps to support them, ultimately improving outcomes and quality of life for those affected.

Conclusion

The COMFORTage project uses an innovative, data-driven approach to early dementia prevention, integrating omics profiling, e-health tools. Through community engagement and personalized interventions, we aim to empower individuals, improve early risk detection, and help build a healthier future for all.