

Background

Depression is bidirectionally associated with cardiovascular disease and is associated with worse outcomes.

- Major depression (MDD) is much more common in those with heart disease, with an annual prevalence of 45%¹
- MDD increases the risk of developing coronary heart disease or myocardial infarction (MI) by 1.3 fold²
- In the first 6 months after an MI, having MDD makes you 4.3 times more likely to die³

Screening for depression after major cardiac illness is rare, despite recommendations for routine screening in practice guidelines⁴. There are many possible barriers for effective screening, including:

- Specialists not confident with mental health or not knowing the importance of screening
- Costs of screening in terms of time, staffing, and impeding clinical workflow
- Uncertainty of next steps after a patient screens positive

Smartphone-based AI-assisted apps may be able to address the gap in care.

- >88% of Canadians own a smartphone
- Mobile app technology can be scalable and easily implemented into existing clinic workflow.

Objectives

- To support depression screening and treatment pathways for cardiology patients using an AI-powered mobile app.
- As this approach has no precedent, we will first conduct a feasibility study to explore logistical and practical challenges
- Develop a continuing education seminar to address knowledge gaps and offer methods to implement screening effectively into clinical workflow

Methods

SCANme-D – Main Features

White boxes indicate the minimum required features

Blue boxes indicate places where AI-powered emotional support may be helpful

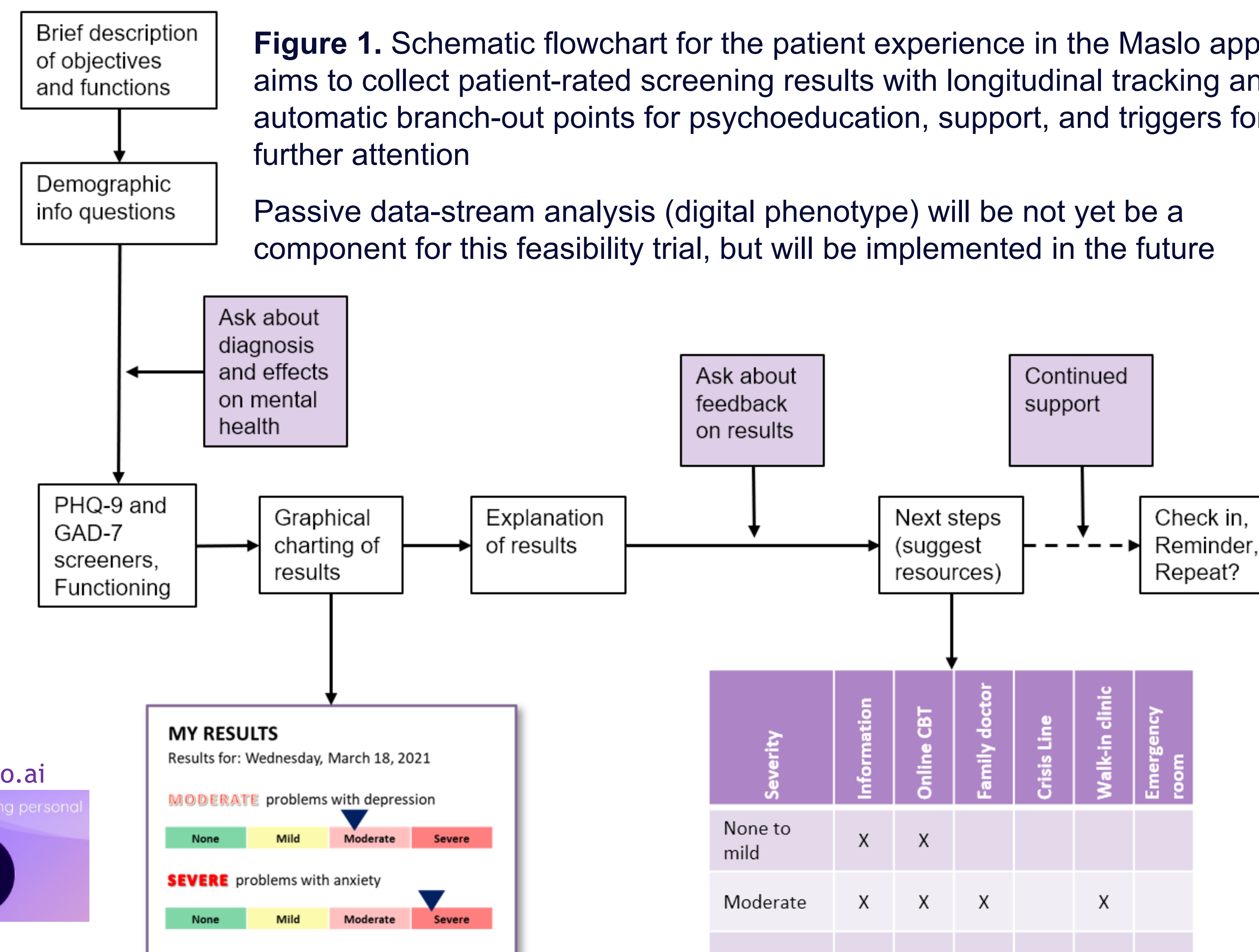
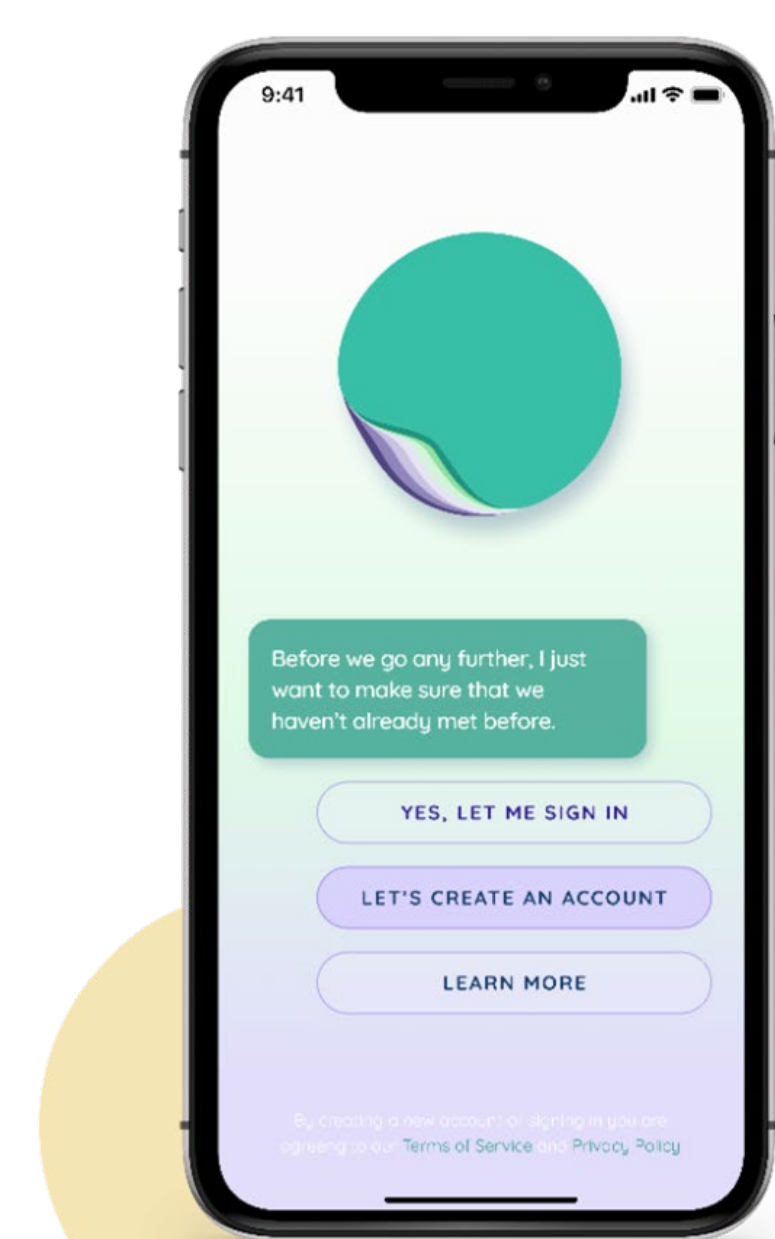


Figure 1. Schematic flowchart for the patient experience in the Maslo app. It aims to collect patient-rated screening results with longitudinal tracking and automatic branch-out points for psychoeducation, support, and triggers for further attention

Passive data-stream analysis (digital phenotype) will be not yet be a component for this feasibility trial, but will be implemented in the future

Component 1: The App

Maslo is an AI-integrated digital companion. It monitors information from the sensor suites of a smartphone to record a real-time quantification of its owner's behavior, also known as a **digital phenotype**. We use it as a platform to provide the screening functions needed for the study (Figure 1):

- Explicit data:** patient rating scales
- Passive data:** the digital phenotype, e.g. vocal characteristics, GPS and pedometer, facial expression, screen time, etc.

It also provides an audio/visual emotive element to accompany text responses for empathy without an uncanny valley effect. A demonstration can be found [here](#).

Component 2: The Study

The **VGH Centre for Cardiovascular Health** will be the study setting:

- What it is:** Comprehensive 4-6 month risk reduction program for patients with MI, angioplasty, open heart surgery, angina, arrhythmia, and vascular risk factors. Focus is secondary prevention after a cardiac diagnosis
- Mental health expertise:** First cardiac clinic to incorporate mental health in a cardiac rehabilitation setting. Established in 1997 with an experienced and well-trained team
- Volume:** 400-600 patients a year; high demand but unable to take all eligible patients

Inclusion: >18 years old, fluent in English, owns a smartphone with data/wifi

Exclusion: Current diagnosis of depression, currently receiving psychiatric care.

Primary outcome: Number of people fully completing the screening app

Secondary outcomes: User satisfaction and ease of use from patients and staff; Clinical outcomes via PHQ-9, GAD-7, EQ-5D-5L in comparison to historical data; Qualitative interviews with staff and patients to identify factors and barriers affecting implementation

Component 3: Clinician Education

We have created a 60-minute lunch-and-learn format Continuing Professional Development workshop with an intended audience of cardiologists and cardiac clinic staff. The goals of this workshop are:

- Illustrate the need for depression screening in major cardiovascular illness
- Explore challenges for implementing depression screening
- Demonstrate how screening can be effective and convenient, illustrated with the Maslo app.

Workshop materials will be hosted online in the public domain for free future dissemination.

Summary

We are conducting a feasibility trial of the Maslo smartphone app as a platform to deliver and facilitate mental health screening in a population recovering from major cardiac illness at the VGH Centre for Cardiovascular Health.

Findings will inform a multisite RCT for integration of routine screening on patient medical and psychiatric outcomes.

Please contact vicwli.ubc@gmail.com for any questions, suggestions, or feedback. Thanks!

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References

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