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%.
- MDD increases the risk of developing coronary heart disease or myocardial infarction (MI) by 1.3 fold.
- In the first 6 months after an MI, having MDD makes you 4.3 times more likely to die.

Screening for depression after major cardiac illness is rare, despite recommendations for routine screening in practice guidelines. 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
1. To support depression screening and treatment pathways for cardiology patients using an AI-powered mobile app.
2. As this approach has no precedent, we will first conduct a feasibility study to explore logistical and practical challenges
3. Develop a continuing education seminar to address knowledge gaps and offer methods to implement screening effectively into clinical workflow

Methods

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, angiplasty, open heart surgery, angina, arrhythmia, and vascular risk factors. Focus is secondary prevention after a cardiac diagnosis
- Mental health expertise: First cardiology 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

References