Join Us for Your Master's Thesis: Digital Biomarker for Tracking Modifiable Risk Factors, such as Nutrition and Physical Activity for Metabolic Health

Metabolic diseases, such as cardiovascular disease and diabetes, are leading causes of global mortality and disability [1]. A growing body of research highlights the potential of wearable devices and smartphones to monitor modifiable risk factors (physiological and lifestyle, such as nutrition, sleep, stress and physical activity) [2] and to support precision medicine and precision nutrition by tailoring interventions based on individual data [3]. This thesis offers an opportunity to systematically explore how these digital tools contribute to the prevention and management of metabolic diseases.

Scope of the Thesis

This research aims to conduct a comprehensive scoping review of the literature to assess how wearables and smartphones are used to monitor modifiable risk factors in metabolic health [4]. The thesis will focus on understanding how these technologies measure lifestyle factors, such as nutrition and physical activity, and their role in advancing precision medicine and nutrition. The goal is to identify potential gaps in the measurement of modifiable risk factors in current digital metabolic health research. The results are expected to inform more standardized guidelines for wearable and smartphone-based measurements, as well as to identify potential applications that contribute to precision medicine.

Key Responsibilities

- **Develop a clear approach, research question, and hypothesis** to guide the process.
- **Co-conduct a comprehensive literature search** using five major databases (Scopus, Web of Science, PubMed, Cochrane, and SPORTDiscus) with predefined

search terms related to wearables, smartphones, modifiable risk factors (including lifestyle and physiological factors)
- **Screen and extract data** from eligible studies, ensuring a systematic and organized approach to data collection.
- **Perform a systematic literature review** following PRISMA-ScR guidelines.
- **Analyze and synthesize findings** qualitatively and quantitatively to identify trends, gaps, and opportunities in the use of wearable devices and smartphones for personalized interventions in metabolic diseases.
- **Collaborate closely with your thesis supervisor** to ensure the research aligns with the highest academic standards and contributes meaningfully to the field of digital health.

We Offer

- Flexible working opportunity
- Topic refinement to your desired topic of interest (i.e. physical activity or nutrition) and your future goals
- Insights into interdisciplinary research experience at the Centre for Digital Health Interventions
- If your work excels, we will support your efforts to publish in leading journals

Requirements

We are seeking self-driven and motivated students with a background in public health, food science, health science, nutrition science, epidemiology, medicine, digital health, or a related field. A strong interest in digital healthcare solutions, lifestyle, precision medicine, and precision nutrition are key to this project.

Key Information

- **Start**: Anytime, as soon as possible
- **Methodology**: Scoping review
- **Duration**: 6 months (or as discussed)
- **Contact**: Interested students should submit a brief statement of interest and their CV to Victoria Brügger (victoria.bruegger@unsig.ch)

References

1. Wang, H.; Liu, J.; Feng, Y.; Ma, A.; Wang, T. The Burden of Cardiovascular Diseases Attributable to Metabolic Risk Factors and Its Change from 1990 to 2019: A Systematic Analysis and Prediction. *Frontiers in Epidemiology* 2023, *3*, 1048515.
2. Natalucci, V.; Marmondi, F.; Biraghi, M.; Bonato, M. The Effectiveness of Wearable Devices in Non-Communicable Diseases to Manage Physical Activity and Nutrition: Where We Are? *Nutrients* 2023, *15*, 913.
3. Powell, D. Walk, Talk, Think, See and Feel: Harnessing the Power of Digital Biomarkers in Healthcare. *NPJ Digit Med* 2024, *7*, 45.
4. Brugger, V.; Kowatsch, T.; Jovanova, M. Wearables and Smartphones for Modifiable Risk Factors in Metabolic Health: A Scoping Review Protocol. *medRxiv* 2024, 2024.