PRoF Award abstract – Call 2018

Carewear

Implementation of wearable technology in mental health care

1. Research Outline

Acronym	Carewear
Project name in English	Carewear: Implementation of wearable technology in mental health care
Pitch (1 sentence)	Carewear aims to encourage the use of wearable technology for mental health by providing a user-friendly platform and clinical guidelines tailored to elevated stress and depressive symptoms, which makes physiological data accessible and comprehensible for both healthcare professionals and their clients.
Executive summary (max. 10 lines)	
Wearables collect valuable, continuous, and ecologically valid physiological data that can be used in the prevention and treatment of mental disorders. Two mental disorders that are highly prevalent and are associated with societal and economical costs are burnout and depression. Carewear combines technological know-how with psychological expertise to enrich current employment assistance programs and the treatment of depression with the implementation of wearable technology. Clients will wear a wristband registering heart rate variability, stress (through skin conductance and heart rate data), and physical activity. A user-friendly platform will make the physiological data accessible and comprehensible for both healthcare professionals and clients so that it can be used in regular consults.	

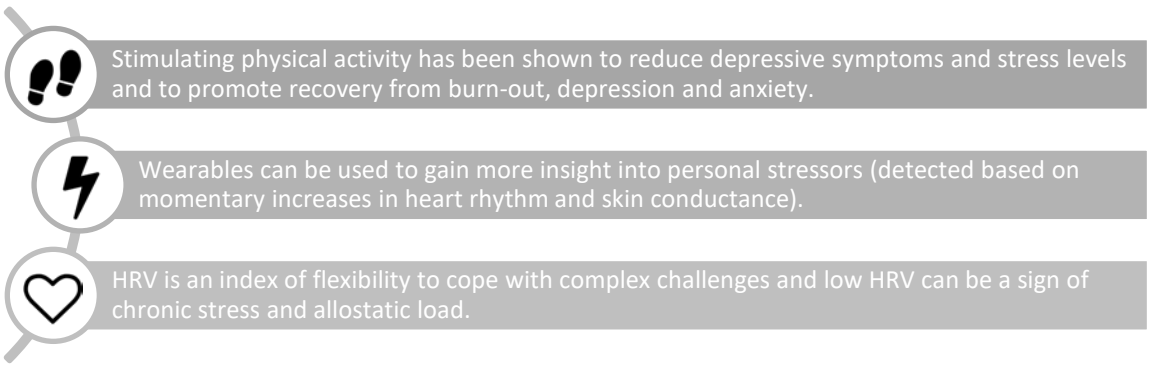
2. Cause and context of the research

Recently, there has been a strong increase in the application of wearable technology in medicine and research. Although wearables also have large potential for mental health care, current applications are limited. This is due to both the lack of cognitive behavioral expertise in technological companies as well as a lack of technological know-how in mental health care. Wearables can continuously capture valuable ecologically valid physiological data that can inform on both vulnerability factors and the process of recovery in mental disorders. In recent years, wearables have also become more accessible and affordable. This has led to the emergence of the 'Quantified Self' movement where people use the obtained data to monitor and ultimately improve the quality of their daily lives. Providing individuals with or at risk for mental illness with insight into their own physiological and behavioral patterns is in line with current trends towards increased patient empowerment.

"I do consider a wearable to be an added value, compared to needing to register on paper… It offers comfort, since it is not bothersome to wear and you can register a number of different things. I do think it can be a supportive tool in working with your clients."

Psychologist in user study

Wearable technology could be useful for the prevention and treatment of mental disorders by providing additional data, mapping the effect of interventions, providing time-locked feedback, and targeting waiting lists. It allows to monitor patients outside of the treatment context, which can lead to increased wellbeing and reduced health care costs. Two mental disorders that are highly prevalent, have a large impact on psycho-emotional wellbeing, and are associated with societal and economical costs, are burnout and depression. Three physiological indices seem especially promising when implementing wearable devices in mental health care, specifically in the treatment of depression and employment assistance programs targeting stress at work: physical activity, stress, and heart rate variability (HRV).



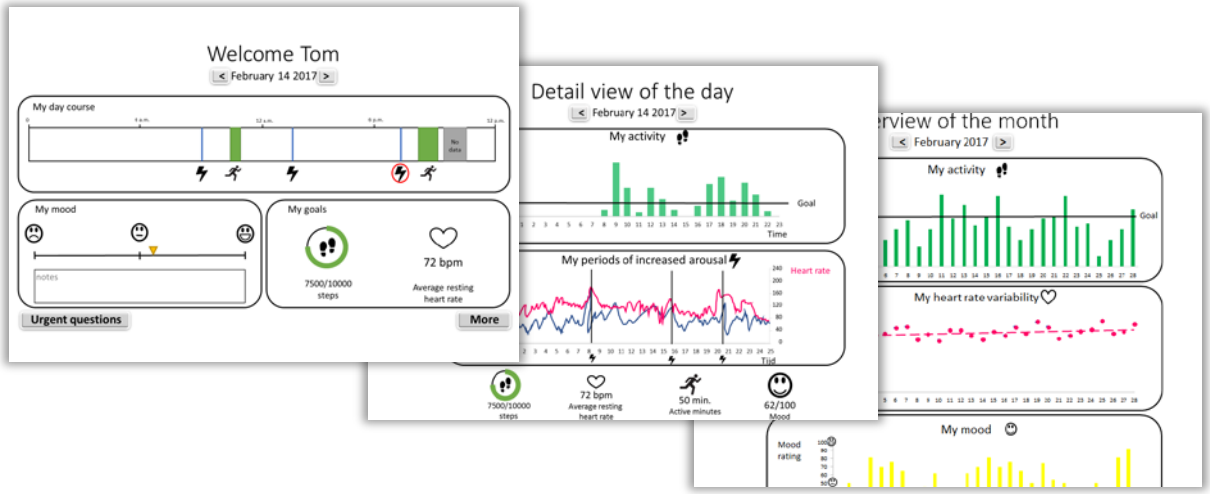
The Carewear platform can give individuals additional insight into these parameters. However, it is essential not to solely inform individuals of these processes, but also to provide them with tools for improving their mental health. Consequently, health care professionals can use the clinical Carewear manual to stimulate a more active lifestyle, set goals, and offer their clients tools to cope with stress. Additionally, monitoring long-term trends in HRV could provide an index of general mental health and resilience.

Despite the large potential of wearable technology, mental health care professionals are currently lacking the knowledge and tools to implement this technology in their setting. The Carewear project wants to combine technological know-how with psychological expertise to enrich current employment assistance programs and the treatment of depression with the implementation of wearable technology.

3. Innovation results achieved

We have created a network with important stakeholders in the field of technology, employment assistance programs, and clinical psychology. The online platform was shaped using co-creation with the stakeholders and other potential end-users. Based on their essential input we were able to build a new version of an online software platform that meets the needs of health care professionals.

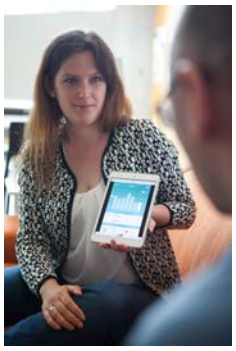
In this platform, data from the wearable device is shown and clients can add information concerning their personal experiences. Health care professionals can also consult the data and discuss the findings in regular consults. The visual representation of structured data allows for the detection of patterns and the professional can provide the client with alternative strategies and goals to improve mental health. Below you can find an example of some of the wireframes of the online platform.



To translate the data from the wearable devices to the indicators you see in the platform, complex algorithms are needed. We have designed algorithms to calculate steps and periods of more intense physical activity based on accelerometer data. The HRV at rest is obtained by analyzing the measured photoplethysmogram (PPG) signal. Potential stress situations are being detected through a combination of skin conductance and heart rate (in combination with low physical activity).

A second essential component of Carewear is the cognitive behavioral manual that informs health care professionals how they can use Carewear to (1) promote physical activity, (2) help clients cope with stress, and (3) monitor HRV. This manual provides an overview of the current evidence and applied tools and interventions that are readily usable in clinical practice.

We are currently preparing use cases to investigate the added value of the implementation of wearable technology in current protocols to prevent burnout and treat depression. Clients will be asked to wear a wristband and complete the physiological data on the platform. Professionals in mental health care can discuss the findings in regular consults. These use cases will allow us to optimize Carewear before we can make it available for the broader public.



Carewear can be improved and offered more broadly in the future beyond the current project and the ProF award could help us do this. We want to offer our users the choice

between different wearable devices, but data analysis protocols will be different for each wearable, which entails an added programming load and cost for implementation. Carewear also shows promise beyond employment assistance programs and the treatment of depression. The online platform could also be improved further for these and other mental health problems. We would like to take our proof of concept to the next level.

4. Link to the PRoF values

Awareness

Elevated stress symptoms (including burnout) and depression are two important societal challenges that are associated with lower quality of life and disability. Carewear provides individuals with tools to monitor their own mental health and progress towards goals. Carewear hereby increases awareness and empowers individuals in the field of stress and wellbeing.

Comfort

Although valuable psychophysiological parameters are measured, this is done in a non-invasive way through a wearable device worn on the wrist. These devices are worn in daily life in familiar surroundings and do not hinder regular functioning. Previous research and a small implementation study have shown that participants are comfortable wearing these devices.

Safety

Being able to monitor, inspect and complete your own data in the online platform gives patients full control and insight into what is being collected. This promotes trust and motivation for treatment. Additionally, the platform has an ‘urgent questions’ button that brings patients in touch with their health care professional when they have important questions or concerns.

Privacy

The data is being collected within a confidential relationship between the client and health care professional. Importantly, GPS data is not collected, which ensures personal privacy. A key characteristic of Carewear is that users can monitor valuable physiological data, but they can do this in their daily life and home context ensuring comfort, control, and privacy.

Loneliness

Institutionalizing patients disrupts their social life and can contribute to feelings of loneliness. However, through Carewear patient monitoring takes place outside of mental health care facilities, in their home context. Carewear aims to detect maladaptive patterns before they reach the severity levels where (a new) inpatient treatment is needed. Additionally, the Carewear guidelines for health care professionals include a focus on engaging in activities outside of the house and the importance of a good social network.

Non-stigmatizing

The wearable devices that are being used for Carewear are wristbands. Currently, an increasing number of people are wearing smartwatches and activity trackers, so there is no stigma associated with wearing such a wristband. Carewear can be used by individuals with elevated stress and depressive symptoms, but it can also be used as a preventive tool in healthy individuals. This can increase awareness and reduce stigma related to mental health problems.

Intergenerational

Carewear can be used by people of all age ranges. It can monitor people in their daily life and hereby prevent institutionalization where people are often grouped together based on their age or mental health status. We aim to provide individuals with tools that allow them to work on possible mental health problems outside of such a context and let them maintain their social network and daily functioning.

Flexibility

Wearable devices fit perfectly in the trend of deinstitutionalizing mental health care. Carewear increases mental health awareness in the patient and promotes self-care outside of treatment facilities. The goal is to prevent severe mental illness which would lead to institutionalizing or time away from work. Carewear can be used flexibly in a daily context by people with and without current mental illness.

5. Applicable IPR rules

At this point the IP is held by Thomas More.

6. Information on the partners

Carewear is being realized by the department of Applied Psychology and Mobilab of Thomas More University of Applied Sciences. This collaboration between departments allows us to combine the technichal expertise of the Mobilab engineers with the clinical expertise of the department of psychology. Carewear receives funding from VLAIO and as a technology transfer (TETRA) project we also receive co-financing from and strongly collaborate with a group of organizations that are interested in implementing the expertise and tools of the project: Alma.Care, Aptus, the professional association of psychological consultants (BPC), COMmeto, Faresa, IDEWE, imec, Learn2ACT, OPZ Geel, Pulso, SD worx, The Human Link and the Flemish association of clinical psychologists (VVKP).

The main researchers of the project are:

- Thomas More University of Applied Sciences
  - Department of Applied Psychology: Expertise Unit Psychology, Technology & Society
    - Nele De Witte, PhD (project lead)
    - Tom Van Daele, PhD
    - Tim Vanhoomissen, PhD
  - Mobilab
    - Bert Bonroy, PhD
    - Glen Debard, PhD
    - Romy Sels
    - Marc Mertens

Note:

If your project is selected as laureate for the Award Symposium, a powerpoint presentation that reflects the project as suggested will be required (in advance), including a future plan how the funding will be used.

If your project is selected as the winner of the Award, you will be invited to present the results achieved thanks to the award during the Award Symposium of the next year.

Addendum: Contact information

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