IMPACT

PROMOTING ACTIVE AGEING

Impact Objectives

- Promote the concept that regular physical activity in middle age contributes significantly to increased wellbeing in later years and will work towards a healthy ageing society

- Highlight the positives of smart technology monitoring functional fitness and thus make more people increasingly conscious and receptive to being responsible for their own wellbeing

- Use smart technology to detect very early signs of increased risk of functional decline and ultimately develop individual intervention plans to help those at risk maintain as healthy a lifestyle as possible, for as long as is practical

Promoting active ageing

*Professors Jorunn Helbostad and Beatrix Vereijken are coordinators of the **PreventIT** project, which will use wearable technology to measure and prevent function decline in older people. Here they explain how they will use the information to develop strategies to keep people as healthy as possible, for as long as possible*

Professor Jorunn L. Helbostad

Professor Beatrix Vereijken

How have you selected PreventIT participants?

BV: We want to develop a mobile health (mHealth) system for young older adults at risk of functional decline. Therefore, we need to identify those at risk of functional decline at a very early stage, often before they have become aware of functional decline themselves. To do so, we used regional registries and drew random samples from the general population between 60 and 70 years of age in three different European cities: Stuttgart, Germany; Amsterdam, The Netherlands; and Trondheim, Norway. From this population we screened people who were already retired and at risk of functional decline. The risk screening tool we use is developed through the PreventIT project. We have used data from existing large epidemiological studies and available literature to develop the risk screening tool. By using this tool, we hope to distinguish between those at risk of functional decline, those who are active and healthy, and those who already have a disability.

The project relies on technology, something older people can sometimes struggle with. How do you overcome such potential issues?

JH: Use of smartphones and smartwatches has increased rapidly in the population of older adults. However, there are challenges in that existing technology has not been developed with this user group in focus. In order to develop an mHealth system based on these technologies for older people, we need to use a user-centered design process, where end users are actively involved in all stages of the development phase. To do so we have followed the ISO standard 9241-210. By doing this we hope to develop a system with user interfaces and functionality that is feasible for the older generation.

Do you see any problems arising from the need to have body-worn sensing systems?

JH: The challenge of using smartphones to monitor behaviour is that reliable information from the embedded sensors in the phones depends on people wearing the phones on their body, which is not always the case. And we do not want to instruct people on when and how to wear the phone. As a compromise, we collect behavioural information from the smartwatch when the phone is not worn. We have developed a fusion algorithm connecting the two devices. One current limitation is the battery capacity of the technology, in particular the smartwatch when we run applications on top of the software that is already on the watches and the phones.

Part of the project involves the development of bespoke apps. Is this area of work going to be carried out by commercial partners?

BV: The first two versions of the mHealth system, including the app, will be developed by the PreventIT partners during the life of the project. In addition, we are working with big actors in the market to see if the system can be implemented through their products. We believe our system is more than an app, and can be promoted and sold as a set of services, where the app is used as part of a service by the target groups. To decide on this, we need contact with municipalities and health bodies in different European countries to see how our services fit or can be adapted to the system in the different countries.

JH: We are already in contact with other research groups that want to use the interventions and the mobile health system in other populations. We are also in contact with insurance companies interested to roll out the system and test it on their customers. Furthermore, we are in contact with large actors in the mHealth market about future exploitation. To be evidence-based, we also need to test the intervention in a final trial after we have developed version 2.0 of the mHealth system. In the next year we will decide on concrete strategies for exploitation and implementation of the system. Our mHealth system consists of multiple products and services and we are also in the process of deciding to what extent these individual products can be promoted as standalone systems and services.

Do you see any problems arising from the need to have body-worn sensing systems?

If the trial is successful, how do you intend to roll it out to a larger population?

Smart technology for smart ageing

*Staying fit is important for all age groups, but becomes increasingly so as we age. The **PreventIT** project seeks to build a network of smart products to monitor the levels of function and activity of the young older adult age group to encourage future wellbeing*

Exercising with increasing years has always been a contentious issue. There is mounting evidence that doing regular exercise in middle age can contribute significantly to increased wellbeing in later years, and investing in a healthy lifestyle as we age has huge benefits. Several high-quality studies have shown a positive connection between exercise participation and improved health with increasing age. Data compiled by the World Health Organization (WHO) reports that chronic heart conditions and as many as 3.2 million deaths per year can be connected to insufficient levels of activity.

According to WHO, few older adults manage to take part in even least moderate levels of exercise for five days per week, including both aerobic and strengthening exercise. It has therefore become a challenge for health professionals to increase that level of exercise, and the Prevent IT project is taking up the challenge. With a rapidly ageing European population, the average life expectancy has grown to over 80 years – an increase of 10 years since the 1970s. This age group is expected to account for around 20 per cent of the overall population by 2050, putting significant pressure on the overall healthcare system. Therefore, it has become necessary to become more attentive to that age group and ensure their continued health for as long as possible, using the latest technology to monitor and stimulate exercise rates.

SMART TECHNOLOGY

Ensuring the elder age group gets sufficient exercise has been a contentious issue up until now, but smart technology now offers a way to accurately determine how much exercise is being undertaken. The Prevent IT project is a pan-European research project that seeks to collect and use smart-data on the physical and social functioning of newly-retired senior citizens.

It is estimated that there are currently around 16,500 health-related apps available across the Apple App Store and Google Play Store, and a huge number of devices that are able to run them. The collection of data from physical exercise is now a tried and tested process and the validity of the results proven to be reliable. From the premise that collected data can be accepted as accurate, it's not only plausible, but also highly practical, to use these collection devices for the young senior age group.

Devices such as smartphones, smartwatches, wristbands and other wearable technology are lightweight and unobtrusive, and can be used to collect reliable data on the physical activities that the age group undertakes on an ongoing basis. This data – frequently referred to as mobile health or mHealth – can be collated and an accurate picture of exercise regimes and social patterns can be formed.

ROOTED IN FUNCTIONAL FITNESS

The PreventIT project grew from earlier investigations into how Information and Communications Technology (ICT) may be used to monitor older age groups. This resulted amongst others in the FARSEEING project, which focused on how wearable technology could be used to develop solutions to monitor status and prevent falls in older people via real-time wearable tech. With that project successfully completed, and advances in wearable tech transforming into effective personal monitors, the team led by Professors Jorunn Helbostad and Beatrix Vereijken from the Department of Neuromedicine and Movement Science at NTNU Norway, moved to consider the use of such technology for measuring the activity of young seniors. This led them to coordinate the PreventIT project, with the intention of reducing interventions amongst the group and helping to make them become responsible for their own wellbeing.

The ultimate goal of the project is to detect very early signs of increased risk that a person may have, measured by a notable decline in their physical activity as they age, and from that point develop individual intervention plans to help them maintain

An example of activity guidance in the PreventIT app

as healthy a lifestyle as possible, for as long as is practical. As Helbostad explains: 'We know exercise improves physical function, but also that behavioural change following such interventions is a challenge over time. Therefore, we wanted to develop an intervention with small bouts of activity integrated into daily life situations.' The programme isn't so much aimed at counting the number of steps taken or calories burnt, but about specific abilities such as balance and strength and daily physical activity in general.

TECHNOLOGY AND THE OLDER PERSON

While the potential benefits of such a system of data collection are obvious, the one flaw in the current level of technology is the inability of many older people to understand or embrace the technology. Most modern smartphones are derivatives of earlier models and failure to embrace that technology in its infancy is liable to leave users less able to grasp it in later years. This is the case with much of the equipment used to collect data and the use of the apps on a smartphone, and the PreventIT team acknowledge this. To help make the gathering of data easier, the team have addressed this issue and are in the process of designing bespoke apps that are focused on the needs of that specific user group, and that have been developed with those users' best interests and abilities in mind.

The other element the project needed was a detailed programme of intervention and exercise for the participants to follow. The PreventIT project looked to earlier investigations when it came to establishing exercise routines and built upon work carried out in the Australian LIFE Program, aimed at improving balance and strength in older people in order to reduce falls. The same vision of lifestyle-integrated exercises has been adapted to the younger end of the age group and will focus on balance,

strength and certain physical activity domains.

While the physical activity domain includes such aspects as walking longer and faster, as well as reducing periods of inactivity, there is also a balance domain such as being able to stand on one leg for set periods of time, and staggered walking techniques. In addition, there are strengthening activities that vary from higher intensity such as squats, to simple tasks like emptying the dishwasher or washing machine. Typically, the intervention can be personalised with ease, ensuring a participant gets the right kind and level of exercises in everyday situations.

A PAN-EUROPEAN PROJECT

The PreventIT team have now identified 180 participants using data models from large epidemiological studies to determine risk levels of functional decline, have a disability, or are fit and healthy, to establish a balanced sample group. The participants are typically retired, aged between 60 and 70, and based in the cities of Stuttgart in Germany, Amsterdam in the Netherlands, or Trondheim in Norway, but if successful, it may be extended further.

This project is a major step forward in understanding functional decline in young seniors and may well lay the foundations for exercise regimes based on bespoke apps, which can be accessed through smart devices aimed at the elderly. With the mHealth system now in beta-testing, the team are running a feasibility randomised controlled trial on the participants and start the test proper. If successful, this could introduce an effective means of monitoring and assessing people as they enter the younger senior stage of life and on into old age, keeping them healthier for longer.

PROJECT COORDINATOR BIOS
Jorunn Helbostad is Head of Department at Department of Neuromedicine and Movement Science at Faculty of Medicine and Health Sciences, Norwegian University of Science and Technology. She is currently coordinating the EU project PreventIT, which is a personalised health and ICT project. She is also Principal Investigator for a project financed by the Norwegian Research Council aimed at assessing and intervening on fall risk at old age by use of body worn sensors.

Beatrix Vereijken is Professor at the Department of Neuromedicine and Movement Science at the Faculty of Medicine and Health Sciences, Norwegian University of Science and Technology. She is co-coordinating the EU project PreventIT. She is also the Principal Investigator for the NTNU Health project EXACT, which focuses on developing exergames for active, healthy ageing and rehabilitation.

PreventIT

This project is funded by the European Union

NTNU
Norwegian University of Science and Technology

HORIZON 2020