Chapter 21

Pedometer Cell Phone Applications and Future Trends in Measuring Physical Activity

Anna Åkerberg
Mälardalen University, Sweden

Maria Lindén
Mälardalen University, Sweden

Mia Folke
Mälardalen University, Sweden

ABSTRACT

A huge proportion of the world population is suffering from lifestyle related and preventable welfare diseases. Physical activity is one important means of achieving beneficial health impacts and of reducing the risk of chronic disease. Pedometers are often used to measure physical activity. Nowadays, cell phones are very common, and pedometer applications enable measurements to be made by a device that is already owned. This chapter presents a study of the measurement accuracy of pedometer cell phone applications. The results show that only one combination of pedometer application and cell phone provided high accuracy when tested by different test persons. In some cases, the measurements indicate that the orientation of the cell phone used during measurement might be relevant. In addition, it would be valuable to gain knowledge about the overall and everyday physical activity pattern, which would be very valuable in contributing to a healthier population.

INTRODUCTION

Chronic diseases result in over three million preventable deaths globally every year (ISPAH, 2010) and in 2005, chronic diseases, such as cancer, stroke, diabetes, and heart diseases, were the cause of over 60% of global mortality (WHO, 2005). Calculations have been made that provide strong evidence that at least 80% of all heart disease, diabetes and stroke is preventable (WHO, 2005). Thus, morbidity in general, is an extensive public health problem throughout the

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world. The global population is growing and the prevalence of non-communicable diseases has rapidly increased (WHO, 2004). A huge proportion of the world population is suffering from welfare diseases, which are preventable, and are mainly attributable to lifestyle.

The general purpose of this chapter is to present results from a recently performed study of the measurement accuracy of pedometer cell phone applications and to reflect on the trends in the measurement of physical activity. This is done from a public health perspective to find technologies that can act as tools to motivate people to increase their level of physical activity. By evaluating available technologies concerning physical activity monitoring, our research will benefit from new tools and procedures to be used with the aim to improve public health.

Pedometer cell phone applications measure the number of steps taken, but when they are used as a form of motivation, their accuracy is important. When reliable, they are easy to use and suitable instruments to measure physical activity. In the long-term, they have the potential to contribute to an increased level of physical activity, which will improve the health and welfare of the population as a whole.

BACKGROUND

This section describes the background to this work and the topic of research. In addition to which, definitions are given of the concepts considered to be relevant for the discussion in this chapter.

The World Health Organization (WHO) defined the word “health” in 1948 as follows; “Health is a state of complete physical, mental and social wellbeing and not merely the absence of disease or disability” (WHO, 1998, p. 166).

Physical activity can be defined as any bodily movement produced by the muscles of the body that results in energy expenditure (Casperson, Powell & Christenson, 1985). The opposite, being totally physically inactive, can be defined as performing a very small degree of physical activity in daily life and is applicable to someone who is not engaged in any form of exercise or training activity (Folkhälsoinstitutet, 1999).

It is widely known that physical inactivity has a negative impact on health. In fact, physical inactivity is one of the leading causes of the major noncommunicable diseases, which include stroke, diabetes, heart disease and certain types of cancer (ISPAH, 2010; WHO, 2004; EC, 2005), and contributes to the global burden of morbidity, disability and mortality (WHO, 2004).

Physical inactivity fundamentally contributes to direct and indirect health care expenses, in addition to which, it affects the quality of life and the productivity (ISPAH, 2010). In many countries the levels of physical inactivity are rising (WHO, 2010). Research shows that it is dangerous for health to have a sedentary lifestyle (Katzmarzyk, Church, Craig & Bouchard, 2009), and there is strong evidence that sedentary behaviors are directly related to the risk of obesity (Hu, Li, Colditz, Willett & Mansson, 2003; Chau, van der Ploeg, Merom, Chey & Bauman, 2012), diabetes (Hu et al., 2003) and cardiovascular disease (Jakes et al., 2003). Prolonged sitting, independent of physical activity, is a risk factor for all-cause of mortality (Van der Ploeg, Chey, Korda, Banks & Bauman, 2012). Research shows that avoiding sedentary behavior in adulthood prevents cardiovascular disease and increases the overall life expectancy (Franco et al., 2005).

It is also generally known that physical activity has a beneficial impact on health. Physical activity has significant and positive effects on many bodily functions, for instance the metabolic syndrome, blood pressure, cholesterol, blood glucose (WHO, 2004), cognition, brain function (Hillman, Erickson, & Kramer, 2008), cognition specifically in children (Sibley & Etnier, 2003) and it is associated with a reduced risk of upper respiratory tract infection (Nieman, Henson, Austin & Sha, 2011). It has also been scientifically

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