



Smartphone Use: Implications for Health and Physical Fitness Promotion

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Abstract

The development of smartphone has redefined most activities of man, especially physical activity. This paper reviews the dual-role smartphone use plays on the physical fitness and activities of people. A smartphone is a handheld device that combines mobile phone and computing functions into a single unit. The paper highlights the impact of smartphone use on physical fitness of the user and maintains that mobile addiction and problematic smartphone use is demonstrated to have a detrimental impact on the physical health and fitness of individual users. Smartphone use is shown to reduce the amount of physical activities people engage in; a positive relationship between smartphone use and sedentary behaviour is identified and smartphone use is negatively correlated with cardiorespiratory fitness and percentage body fat. On the positive end, this paper reviews a potential for achieving and enhancing physical fitness through smartphone use. Some smartphone activities, such as listening to music while exercising on a treadmill, can help improve fitness. Smartphone applications (Apps) that include step-counts increase physical activities in young and middle-aged people and have the potential to inspire improvements in sedentary time and physical activity. Based on the reviews, it is clear that smartphones have the capability to build or break an individual's physical fitness levels by either increasing the amount of physical activities or encouraging sedentary behaviour. As a result, there is a need to repurpose smartphones for fitness by designing and/or acquiring smartphone applications that encourage physical activity, provide psychological incentives and rewards for physical activity, assist people in setting and achieving fitness goals, and easily sharing them with friends. This include using smartphones to play songs while walking out, as well as using fitness apps on smartphones.

Keywords: Smartphones, physical fitness, physical activities, smartphone applications (Apps)

Introduction

Landlines and cellular/mobile telephones have evolved into a “do-it-all” device known as smart-phones, just like a bulldozer or tractor which can be used for clearing, cutting and uprooting stumps. Emerging from recent advancements in technology, the smartphones have graduated from a simple communication device to currently, a multi-functional device with capabilities similar to a high-end internet-connected computer system. Smartphones allow users to call, send and receive text messages at almost any time and anywhere, update social network sites (like Facebook, WhatsApp among others), watch videos and live events, play video games, and browse the internet. They are basically electronic devices that perform many functions of a computer, with a touchscreen interface, internet access and an operating system capable of running downloaded applications (Don, 2012). More recently, most smartphones are capable of multitasking.

Most activities afforded by the increasing adoption of smartphone use are activities that encourage sedentary behaviour which include activities such as gaming, watching movies and events, and surfing the internet, which require that an individual sits at a place for a long time, leading to inactivity. Multiple health conditions such as impaired lipid profiles and glucose uptake, higher energy consumption and waist circumferences, and greater risk of mortality are correlated with involvement in significant quantities of sedentary or sitting activities

(King, Goldberg & Salmon., 2010; Dunstan, Barr & Hearly., 2010). Even for people who follow weekly physical activity requirements, a prolonged involvement in large quantities of sedentary conduct, like excessive smartphone use is problematic. This is because, most smartphone functions such as sending and receiving text messages, calling, browsing the Internet and updating social network sites have continuously been referred to as sedentary lifestyles (Rosenberg, Depp, Vahia, Reichstadt, Palmer, Kerr, Norman, & Jeste, 2010).

It is clear that smartphone use can pose obvious risks to an individual's health and fitness. Nevertheless, it can be repurposed to enhance health and fitness status of an individual. For instance, it can be equipped to facilitate physical activity, (Consolvo, McDonald, Toscos, Chen, Froehlich, & Harrison, 2008; Harries, Eslambolchilar, Stride, Rettie & Walton, 2013). With the evolution of fitness-based smartphone applications (Apps) people can track their fitness levels on their smartphones, set fitness goals and compare fitness levels with others (Harries, Eslambolchilar, & Rettie, 2016). For this and numerous other reasons, it is clear to active smartphone users, that smartphone use have a potential to enhance physical fitness.

Physical inactivity has been linked to most causes of mortality and morbidity in recent human history, (Brown, Bauman, Bull, & Burton, 2018). The number of physically inactive persons is continuously rising in many countries, playing a significant role in the high prevalence of non-communicable diseases and negatively influencing the generally health and wellbeing of the masses (Lee, Shiroma, Lobelo, Puska, Blair, Katzmarzyk, & Lancet Physical Activity Series Working Group, 2012). It is important for health enthusiasts and promoters to understand the role of smartphone use in this regard so as to push relevant interventions, education programmes and where necessary exercise, fitness programmes, fitness tracking, setting fitness goals and comparing ones fitness with others (Higgins, 2016). Hence, the need to review the role of smartphone use in making or marring physical fitness of individuals. The review critically assessed and evaluated already existing studies that are related to smartphone use and how it affects physical health and fitness of individuals. Most search were done using specific keywords such as smartphone use and physical fitness, smartphone use and physical activity, smartphone and health on Google Search Engine and literature from different journal publishers including PubMed Central, ScienceDirect, Biomed Central, Journal of Medical Internet Research, Springer, BMC Public Health and CiteSeerX.

Smartphone Use and Physical Fitness

Kim, Kim, and Jee (2015) studied the relationship between smartphone use and physical activity among Chinese international students in Korea. Using a questionnaire, Kim and his colleagues gathered information from 110 international Chinese students resident in Korea. The questionnaire consisted of general features, the amount of time spent using a smartphone, and the Smartphone Addiction Proneness Scale (SAPS). The composition of the body and physical activity were calculated including the average daily number of steps and the calories consumed. The research found that high-risk users of smartphone exhibited less physical behaviours, as shown in the typical daily calories consumed and total number of steps taken. In addition, there was a substantial difference in their body composition following the measurement of fat and muscle mass. Among these variables, the relative relationship with problematic smartphone use was revealed by the amount of time spent on smartphones, whereas the average number of steps walked per day revealed a significant reverse proportional trend in smartphone addiction participants. On the basis of these findings, it was concluded that participants with mobile smartphone addiction were less likely to exercise every day. In other words, mobile smartphone addiction can have a detrimental impact on physical activity by decreasing the quantity and quality of physical activities, such as walking, which can lead to a rise in fat mass and a reduction in muscle mass associated with adverse health effects. The study illustrated how overuse and addiction of smartphone are subtly linked to poor health outcomes. An increase in the use of smartphone is equivalent to a decrease in the level of physical activity that ultimately contributes to the development of health problems related to sedentary lifestyles, including depression, heart disease, and obesity among others.

Spending time on smartphone as occasioned by civilization and modernization has become the primary leisure activity for most persons, and has discouraged conventional active socialization. Fennell, Barkley, and Lepp (2015) investigated the outcome of such development by establishing the relationship between cell phone use, physical activity and sedentary behaviour in adults aged 18-80 year. Through an online survey completed by 400 adults aimed at assessing their situational and total smartphone use, physical activity and smartphone behaviour. It was found that among all heavy smartphone users, 81% reported using their smartphone when sitting down. It was found that smartphone use was positively associated with sedentary behaviour, negatively associated with age and not related to physical activity and sex. With this in mind, it is evident that smartphone users are less physically inactive. The implication of this is that a population of as much as 3.5 billion (almost half of the world population) are at risk of health outcomes associated with smartphone use.

The issue of smartphone use is high among adolescents and young adults in both developed and developing economies. It was against this background that Penglee, Christiana, Battista, and Rosenberg, (2019) examined the amount of time college students spend on their smartphone and correlated the outcome with the physical activity levels of the students. Two hundred and forty-two (242) Americans and 194 Thais were recruited for the study using an online survey system. From the study it was revealed that there was high use of smartphone among students and this was considered a significant barrier to physical activity. On this premise, it was recommended that smartphone be repurposed in some ways to promote physical activities in college students, because as Berkey, Rockett, Field, Gillman, Frazier, Camargo Jr., and Colditz (2000) noted, physical activity is a key dimension of a healthy lifestyle.

Lepp, Barkley, and Sanders (2013) observed that there was no direct correlation between smartphone use, physical health, physical behaviour and sedentary behaviour in a study that investigated the presence or absence of these relationships among College of Health Students. After adjusting for self-efficacy, sex and per cent body fat; hierarchical regression was used to test the relationship between smartphone use and cardiorespiratory fitness. Smartphone use was found to be significantly and negatively correlated with cardio respiratory fitness, self-efficacy, and percentage of fat. For this relationship, interview data presented many potential explanations. First, for high frequency users of smartphone, there were reports of low ongoing opportunities for physical activity. Second, low frequency users were more likely to report being associated with active peer groups and which can be considered a physical activity incentive. Third, high levels of smartphone use revealed a larger trend of sedentary habits other than mobile phone use, such as watching television. Smartphone use, like other sedentary habits, can disrupt physical activity and reduce cardiorespiratory fitness.

Smartphone Use in Enhancing Physical Fitness

The development of smartphone is not totally detrimental to physical activity and fitness development. There are studies that focused on enhancing fitness through smartphone use. Consequently, Romeo, Edney, Plotnikoff, Curtis, Ryan, and Sanders (2019) investigated the possibility of enhancing physical fitness through physical activities using smartphone. This was followed by an understanding of the fact that smartphone apps can serve as an invaluable tool for delivering appealing and accessible physical activity interventions. Following a detailed meta-analysis, a potential of achieving physical activity among smartphone users through smartphone applications was identified; though, this evidence is considered a modest one and needs to be supported by future and more advanced studies.

Smartphone use sometimes can exhibit a two-fold impact on physical fitness and physical activities. This was identified by Rebold, Lepp, Sanders, and Barkley (2015) who used a within-subject design to assess the effect of some common smartphone functions on planned exercise activity. These functions were texting, talking and listening to music. From this study, findings revealed that the strength (speed and heart rate) and enjoyment of a bout of treadmill exercise can be improved by using a mobile phone to listen to music. Other common uses of mobile phones (texting and speaking), however, can interfere with treadmill exercise and decrease intensity. The results show one way smartphone can be applied to improving and enhancing physical fitness and activities as well as highlighted the fact that the association between the usage of mobile phone and the strength of exercise seemed to be unique to the feature being used on the smartphone. .

Harries, Eslambolchilar, and Rettie (2016) acknowledged that for those with no inherent incentive for exercise, smartphone is perfect for facilitating physical activity. For this reason, they tried to evaluate the effectiveness of a smartphone application in increasing the physical activity among male adults in Tanzania. In their randomized controlled trial involving 165 healthy male participants aged 18-40 years. Each participant received a smartphone pre-installed with an application that continuously recorded their steps without the need for the users' intervention. From the study, it was concluded that 'always-on mobile applications that include step-counts' can increase physical activity in young to early-middle-aged men, but there is no clear incremental effect on the availability of social input. This method could be especially appropriate for inactive people with low physical activity levels. The study showed another useful implementation of smartphone for physical health improvement (i.e., step-count). This is useful as being aware of ones level of activity with clear activity goals in mind will motivate an individual to try as much as possible to reach set goals.

Older adults are at increased risk of chronic illnesses, functional deterioration and premature mortality due to high sedentary time, poor physical activity (PA), and low physical fitness. Apps for mobile health (mHealth), and apps running on mobile devices, help facilitate healthy living. Against this background, Yerrakalva, Yerrakalva, Hajna, and Griffin, (2019) quantified the effect of mHealth app interventions on sedentary time, physical activity and fitness in old adults. The results of the study showed that in the short term, mHealth app approaches have the potential to inspire improvements in sedentary time and PA, but the findings did not

achieve statistical significance, likely because limited sample numbers were underpowered by studies. In order to understand whether apps have sustained clinically meaningful results, the need for larger studies with longer follow-up was highlighted.

Healthcare providers, particularly between patient visits, are also searching for ways to critically track and improve the health and fitness of their patients. Many insurance providers use data from applications as rewards for health enhancement and lower premiums. Higgins (2016) realized that as more and more individuals start using smartphone, they can provide a tool to help improve the health and fitness of a patient. In particular, fitness applications or "apps" on smartphone are programmes that use data obtained from the built-in tools of a smartphone to calculate health and fitness parameters, such as the Global Positioning System, accelerometer, microphone, speaker, and camera. The applications then analyse and summarize these data, as well as create individualized plans based on the goals of users, provide regular feedback, personalize coaching, and additional encouragement by enabling social media to share achievements. By investigating how smartphone applications can be useful for individuals' health and fitness, Higgins (2016) identified evidence to support the fact that smartphone applications can better help patients meet their goals in terms of health and wellness. Apps for health and wellness can assist individuals with exercise, diet, weight control, stress reduction, and monitoring of sleep. Furthermore, healthcare providers can learn about the health and fitness activities of their patients through data summaries generated by the apps. Apps that integrate strategies for modifying behaviour based on evidence are more likely to be effective. These applications may also act as a helpful method for evaluating and inspiring owners of smartphone with restricted access to healthcare (Milne-Ives, Lam, De Cock, Van Velthoven & Meinert, 2020).

Conclusions

The paper reviewed a dual-approach in consideration of the fitness and physical activity implications of smartphone use. It was found that mobile addiction and problematic smartphone use demonstrated a detrimental impact on the physical fitness and physical health of individuals as it reduces the amount of physical activities people engage in. With smartphones becoming the primary leisure activities for most persons, there is a positive relationship between smartphone use and sedentary behaviour, irrespective of the fact that smartphones were designed to be portable and encourage physical activity. Problematic smartphone use among adolescents and young adults is a significant barrier to physical health and physical activity. Smartphone use was negatively correlated with cardiorespiratory fitness and percentage body fat. Therefore, it is factual that smartphone use increases people's risk of developing health problems associated with sedentary lifestyle and behaviours. Smartphone use can may have the potential of achieving and enhancing physical fitness through smartphone activities that incorporate physical fitness activities. Based on the review, it is clear that smartphones have the capability to either build or break an individual's physical health and fitness levels by either increasing the amount of physical activities or encouraging sedentary behaviour, depending on how it is used. Continuous smartphone use as a leisure activity is positively correlated with physical inactivity (sedentary behaviour) and consequently health-related issues associated with an inactive lifestyle such as cardiovascular diseases and other metabolic disorders. These highlights the need to repurpose smartphones for health and fitness, which can be achieved by designing and acquiring smartphone applications that help people engage in physical activities, provide psychological incentives and rewards for physical activities, help people set and reach fitness goals and easily share them with friends.

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