Computers in Human Behavior 34 (2014) 267–272

Contents lists available at ScienceDirect

Computers in Human Behavior

journal homepage: www.elsevier.com/locate/comphumbeh

Constantly connected – The effects of smart-devices on mental health

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ARTICLE INFO

Article history:
Available online 6 March 2014

Keywords:
Smart-devices
Smart-phones
Mental health
Depression
Stress
Addiction

ABSTRACT

A number of studies have demonstrated the mental health implications of excessive Internet-browsing, gaming, texting, emailing, social networking, and phone calling. However, no study to date has investigated the impact of being able to conduct all of these activities on one device. A smart-device (i.e., smart-phone or tablet) allows these activities to be conducted anytime and anywhere, with unknown mental health repercussions. This study investigated the association between smart-device use, smart-device involvement and mental health. Two-hundred and seventy-four participants completed an online survey comprising demographic questions, questions concerning smart-device use, the Mobile Phone Involvement Questionnaire, the Internet Addiction Test and the Depression, Anxiety and Stress Scales. Higher smart-device involvement was significantly associated with higher levels of depression and stress but not anxiety. However, smart-device use was not significantly associated with depression, anxiety or stress. These findings suggest that it is the nature of the relationship a person has with their smart-device that is predictive of depression and stress, rather than the extent of use.

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1. Introduction

According to Ofcom, adult smart-device (i.e., smart-phones and tablets; e.g., iPhone and iPad) users have very strong relationships with their devices, with 37% considering themselves to be highly addicted (2011). Sixty-three percent of entrepreneurs reported that it would be tougher to go for a day without their smart-devices than a week without their "significant other" (Lesonsky, 2011).

Previous research has looked into the effects of addictive and problematic use of various activities that can be accomplished on a smart-device. Excessive use of the calling and texting features of mobile phones have been linked to depression, anxiety and stress (Jenaro, Flores, Gomez-Vela, Gonzalez-Gil, & Caballo, 2007; Lu et al., 2011; Strassberg, McKinnon, Sustaita, & Rullo, 2013; Thomee, Dellve, Harenstam, & Hagberg, 2010; Walsh, White, & Young, 2010; Yen et al., 2009). Lu et al. (2011) suggested that individuals who send a large number of texts can develop "text message dependency", becoming increasingly worried about why they have not instantly received a reply to their message, increased feelings of isolation or neglect and ultimately increased anxiety. Thomee, Harenstam, and Hagberg (2011) have linked excessive mobile phone use with sleep disturbance and muscular skeletal problems due to texting, factors which they suggest are contributing to the feelings of depression, anxiety and stress. The majority of their participants reported that they felt they were expected to be available around the clock, which increased feelings of stress. Considering the finding that on average, smart-phone owners call and text more than traditional mobile phone owners (Ofcom Report, 2011), the effects on their mental wellbeing could be even more severe.

High Internet use, something that is common on smart-devices (Ofcom Report, 2011), has been consistently linked with depression and anxiety (Cash, Rae, Steel, & Winkler, 2012; Jenaro et al., 2007; Ko, Yen, Chen, Yeh, & Yen, 2009; Lam & Peng, 2010; Lu et al., 2011; Morrison & Gore, 2010; Tonioni et al., 2012; Young, 1998). Ko et al. (2009) reported that depression and anxiety are predictive of Internet addiction at a two-year follow up, suggesting they could be important factors in the causal pathway of pathological Internet use. Another study (Lam & Peng, 2010) suggested that it is Internet addiction that is predictive of depression. Despite the lack of a clear causal relationship, the Internet allows an individual to develop a "virtual self" which allows them to escape from the real world (Lu et al., 2011). In the past, computers were relatively immovable objects meaning that eventually the user would be

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http://dx.doi.org/10.1016/j.chb.2014.02.006
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forced to discontinue their current Internet session. With the development of smart-devices, users have the ability to be constantly connected to the Internet, with health repercussions which are as of yet, unknown.

There are other functions that can be achieved using a smart-device that, on their own, have been linked to mental well-being issues. Excessive gaming and Internet gaming have been linked with depressed mood, low self-control and loss of self-esteem (King & Delfabbro, 2013; Kwon, Chung, & Lee, 2011; van Rooij, Schoenmakers, Vermulst, van den Eijnden, & van de Mheen, 2011; Yang & Tung, 2007). Social networking is a commonly used function on smart-devices, especially among the teenage population (Ofcom Report, 2011). Experts have described social networking websites as "addiction prone technologies" (Tarafdar, Gupta, & Turel, 2013; Turel & Serenko, 2012), with the potential for strong habit formation leading to pathological and maladaptive psychological dependency. Overall, this research has shown that gaming, social networking, Internet browsing, emailing, phone calling and texting, when done in excess, are linked to stress, anxiety and depression.

Smart-device use and smart-device involvement are not necessarily synonymous. Whereas an individual's smart-device use can be measured in terms of, for example, the of amount of calls made or number of emails sent, smart-device involvement includes aspects that are largely out of the users conscious awareness and is therefore harder to measure. Walsh et al. (2010) described a user's mobile phone involvement as having two distinct components, cognitive and behavioural. The cognitive component involves thinking about the phone, the desire to check if something has happened and the anxiety, depression and social isolation that can occur if the user is not able to access their phone. The behavioural component relates to the constant checking of the phone and the maintaining of close physical proximity. For example, someone who has high mobile phone involvement would be very aware of the location of their phone, be anxious that they have not received replies to messages or worried that they are not up to date on the news. Their behavioural reaction to this anxiety would be to compulsively check their device for any messages or updates. People who display these behaviours may not necessarily record high use, as quickly checking the device may not be time consuming. However, these people are still heavily preoccupied with their phones and may be distracted from other tasks. Although smart-device use and involvement are likely to be highly related, someone who has high smart-device use but uses their device to serve a practical purpose might not record high involvement.

Neal, Wood, and Quinn (2006) found that when a specific course of action has been consistently rewarded, respective goal-seeking behaviours are automatically triggered with expectations of subsequent rewards. These automatically triggered behaviours can lead to the formation of habits and in extreme cases addiction. Smart-devices can provide salient rewards quickly to facilitate this habit formation. They help people avoid boredom and cope with a lack of stimuli in everyday situations as well as make them aware of interesting events and social networks (Oulasvirta, Rattenbury, Ma, & Raita, 2012). The rewards afforded by smart-devices could lead to checking habits and contribute to the extent of involvement the individual has with their smart-device as well as overall use.

It is important to develop an understanding of why individuals might immerse themselves in these smart-device practices and develop high usage patterns and high involvement. Suler (2004) referred to the online disinhibition effect, the act of feeling more confident online, which some individuals experience when communicating online or not using face-to-face methods. In this context, smart-devices provide opportunities for users to undertake this form of communication more often, whether that communication is social networking, sending SMS messages or calling. Tokunaga and Rains (2010) reported that, compared to well-adjusted youths, youths who report symptoms of anxiety actually prefer communicating with others online than in person and seek emotional support from others online when feeling lonely and depressed. People with higher levels of depression, social anxiety, shyness and loneliness may use these types of communication as a means of social compensation (Valkenburg & Peter, 2007), utilising the less anxiety-provoking, non-personal means of communication. Individuals experiencing increased social success when communicating via their smart-devices, rather than in person, could feel rewarded, therefore increasing the future likelihood that they will form a habit of communicating via their smart-device and become overly involved in the process. One concern of this type of communication is that it often leads to the development of artificial and weak online relationships. Furthermore, the perceived benefits of online communication may prevent some users from seeking alternative "offline" strategies which facilitate the development of social connection and emotional stability (Caplan, Williams, & Yee, 2009; Morahan-Martin & Schumacher, 2003).

There is extensive evidence demonstrating the impact of excessive calling, texting, Internet use, gaming, social networking and emailing on mental health. However, to date, no study has investigated the mental health impact afforded by being able to complete all of these functions on one portable smart-device. Whether high use or high involvement has positive or negative effects, smart-devices appear to encourage high use and involvement (Ofcom Report, 2011) and therefore the consequences need to be investigated. The aim of this study is to examine the association between smart-device use, smart-device involvement and mental health. It is hypothesized that (1) higher smart-device use will predict poorer mental health; and (2) higher smart-device involvement will predict poorer mental health.

2. Method

2.1. Materials

2.1.1. Demographics and extent of smart-device use

Participants completed an online survey comprised of demographic questions (age, gender and occupation), and questions concerning participants' smart-device use (call, text, email and application use). Call use scores were calculated by averaging responses to four questions concerning frequency of use, each measured on 5-point Likert scales. Text and email use scores were both calculated by averaging responses to four questions concerning frequency of use, each measured on 6-point Likert scales. Application use scores were calculated by averaging responses to 18 questions concerning frequency and length of use for six different purposes (information-seeking, awareness-seeking, organisational, social networking, gaming and media), each measured on 7-point Likert scales. Scores ranged from 1 to 5 for call use, from 1 to 6 for text and email use and from 1 to 7 for application use. In all instances, higher scores related to higher use. Finally, a smart-device use score was calculated by totalling the call, text, email and application use scores; scores therefore ranged from 4 to 24.

Participants also completed the following:

2.1.2. Mobile Phone Involvement Questionnaire (MPIQ)

The MPIQ is an 8-item self-report questionnaire relating to cognitive and behavioural associations to mobile phones (smart-devices in the context of this study) (Walsh et al., 2010). The MPIQ includes items measuring withdrawal, cognitive and behaviour salience, euphoria, loss of control, relapse and reinstatement, conflict with other activities and interpersonal conflict. Responses were provided using 7-point Likert scales ranging from 1 (strongly

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