Transportation Research Part F 59 (2018) 203–211

Contents lists available at ScienceDirect

Transportation Research Part F

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

The mediating role of smartphone addiction on the relationship between personality and young drivers' smartphone use while driving

Erez kita [a,b], Gil Luria [a,*]

[a] Faculty of Welfare and Health Sciences, Head of Department of Human Services, University of Haifa, Mount Carmel, Haifa 31905, Israel
[b] Oryarok – The Association for Safer Driving in Israel, Israel

ARTICLE INFO

Article history:
Received 24 April 2018
Received in revised form 28 August 2018
Accepted 2 September 2018

Keywords:
Personality
Big 5
Smartphone addiction
Smartphone use while driving
Young drivers

ABSTRACT

Young drivers touch their smartphone screens for a number of reasons (to access text messages, Internet, social media, games, music, videos, and more), but doing so increases the likelihood of accidents. This study discusses the relationship between personality traits and the use of smartphones by 221 young drivers (64.7% male) aged 17–22 years. It focuses on the mediation effect of smartphone addiction on the relationship between personality and smartphone use while driving, using an objective measure—the number of times young drivers touch their smartphones, measured by a unique smartphone monitoring application. Results show that participants touched their smartphones on average 1.71 times per minute while driving. They also indicate a negative relationship between participants' openness to experience and smartphone use while driving, a positive relationship between both extraversion and neuroticism and smartphone use while driving, and a mediation effect of smartphone addiction on the relationship between neuroticism and smartphone use while driving. This is the first study to identify relationships between psychological variables and smartphone use while driving based on a real-time objective measurement. The ability to predict such use may lead to a personalized intervention that will reduce addiction to the smartphone and help drivers refrain from using smartphones while driving.

1. Introduction

Smartphones are becoming ever more popular. Users regularly carry their phones everywhere and interact with them an average of 150 times per day (Meeker & Wu, 2013). Those interactions while driving present a danger to the driver and other road users. A recent study, focused on the frequency of secondary tasks in driving, found that mobile-phone-related tasks were the most frequent activities that increase driving distraction (Metz, Landau, & Just, 2014) and consequently increase the number of driving mistakes (Young & Salmon, 2012) and the risk of accidents for everyone on the road (Nemme & White, 2010). According to the U.S. National Highway Traffic Safety Administration (2013), young drivers (aged 17–24 years) are more likely to use smartphones while driving than were older drivers. Further, almost 50% of young drivers send emails or text messages while driving, compared with 18% of all drivers who participated in another survey (Tison, Chaudhary, & Cosgrove, 2011). Crash rates during the teenage years are higher than at any other age for both males and females (Williams,

* Corresponding author.
E-mail address: gluria@univ.haifa.ac.il (G. Luria).

https://doi.org/10.1016/j.trf.2018.09.001
1369-8478/

2003). Young people's use of smartphones while driving, combined with their inexperience, puts them at greater risk of being involved in car accidents (Nemme & White, 2010).

The U.S. Governors Highway Safety Association (Hedlund, 2011) presented four types of distractions that result from smartphone use while driving: visual—looking at something other than the road or in a different direction, voice—listening to something or someone not road-related, hands—touching something other than the steering wheel, and cognitive—thinking about something or someone other than road-related. A cognitive distraction can occur together with other distractions or independently, and smartphone use may generate several (sometimes all) distractions simultaneously. Caird, Johnston, Willness, Asbridge, and Steel (2014), who conducted a meta-analysis (28 experimental studies) of the effects of texting on driving, found that typing and reading text messages impaired drivers' ability to focus on the road, respond to traffic incidents, and maintain speed and lane positioning control. Thus, young adults' heavy smartphone use, combined with the increased likelihood of their involvement in road accidents, creates a significant safety issue (Nemme & White, 2010). Teen drivers crash at a much higher rate than adult drivers, and in nearly six of 10 moderate-to-severe teen crashes, distraction was identified as a factor (Carney, Harland, & McGehee, 2017).

This study adds to understanding the feature of young drivers screen touches per minute while driving and examines this risky behavior through an objective measure (a smartphone application that records drivers' real-time smartphone use). In addition, we suggest smartphone addiction as a mediator between personality and the use of smartphone while driving.

1.1. Mediating effect of smartphone addiction

Problematic smartphone use is a construct often defined by excessive use that interferes with work, school, or social interaction (Billieux, Maurage, Lopez-Fernandez, Kuss, & Griffiths, 2015). Any type of compulsive use is generally considered an addiction (Peele, 1985). In this case, excessive smartphone use is considered a technological addiction that develops when people trust technology to supply them with psychological rewards such as decreased mood swings or increased social profits (Griffiths, 1996; Shaffer, 1996). Smartphone addiction relates to where, how frequently, and with whom the smartphone is used (Kim, 2013): where—unsuitable places such as the classroom, face-to-face social interaction, and driving; frequency—obsessively throughout the day; with whom—peers for maintaining social ties.

Three personality traits (*conscientiousness*, *extraversion,* and *neuroticism*) also relate to smartphone addiction. *Conscientiousness* plays the greatest part in explaining dangerous behaviors (Friedman et al., 1995). People with a high degree of conscientiousness tend to work hard and are responsible, practical, and target oriented (Arthur & Graziano, 1996). Conversely, people with a low degree of conscientiousness tend to be lazy, careless, and irresponsible; have little self-discipline; and take an illogical approach to decision making. Kuss, Van Rooij, Shorter, Griffiths, and van de Mheen (2013) found that teenagers with a low degree of conscientiousness experience more Internet addiction because they tend to avoid tasks they perceive as challenging or less enjoyable. It can be assumed, therefore, that young people with low conscientiousness have a greater tendency towards smartphone addiction because the device serves as a convenient and accessible means to connect to the Internet. These young people may also use their smartphones more in general and specifically while driving.

Garland, Froeliger, and Howard (2014) found that social media provided a means for self-expression and not just for keeping in touch or engaging in social interactions. People with a high degree of *extraversion* are socially involved, assertive, and adventurous (Lane & Manner, 2011), whereas those with a low degree tend to be shy, introverted, and cautious. Several studies have found a significant relationship between extraversion and accident involvement (e.g., Arthur & Graziano, 1996; Clarke & Robertson, 2005). Furthermore, people with a high degree of extraversion reported greater use of apps that require typing (Lane & Manner, 2011) and thus will presumably be more likely to type while driving. They were also found to be addicted to social media such as Facebook and Instagram (Andreassen, Torsheim, Brunborg, & Pallesen, 2012), applications some young drivers use while driving. Hence, people with a high degree of extraversion will presumably tend more towards smartphone addiction and use their phones more often while driving.

People with a high degree of *neuroticism* manifest insecurity, tenseness, and anxiety, whereas people with a low degree tend to be emotionally stable and calm with high self-confidence (Lane & Manner, 2011). Neuroticism has known influences on the social dimension. For example, neurotic people tend to be highly anxious about interpersonal relations (Leary, 1983) and may prefer to keep in touch with others by using their smartphones. Such interactions are easier for them to maintain than face-to-face contact (Igarashi, Motoyoshi, Takai, & Yoshida, 2008). Neurotic people also tend to be more problematic (i.e., excessive) smartphone users due to their low self-esteem and great desire for others to perceive them in a positive light (Motoharu, 2014). For people with a high degree of *neuroticism* who adapt communication patterns to avoid face-to-face contact with others, smartphone addiction could be a means to reduce anxiety (Billieux, Van der Linden, d'Acremont, Ceschi, & Zermatten, 2007) and avoid social meetings that entail physical closeness and cause or increase anxiety.

The relevant literature suggested that smartphone addiction explains the relationship between personality and increased smartphone use. That is, young people's increased use relates to their self-identity, desire to improve their social status, and quest to boost their self-confidence, as well as to entertain and develop social and interpersonal ties (Srivastava, 2005). For example, young people who show higher degrees of extraversion and anxiety, combined with lower self-esteem, may have a greater tendency to smartphone addiction (Bianchi & Phillips, 2005). Further, the more addicted the young people are to their smartphones, the more time they may spend using them (Billieux et al., 2007).

Research has shown that smartphone addiction is a mediating factor in the relationship between smartphone use and a high degree of extraversion and anxiety combined with low self-esteem (Hong, Chiu, & Huang, 2012). We believe this may