Exploring the Antecedents of Technostress and Compulsive Mobile Application Usage: Personality Perspectives

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Abstract. Mobile social applications make people's communication easier, but the overuse of smartphones will bring negative effects on our lives. Past research has demonstrated that personality traits were associated with excessive mobile phone use. However, few studies use personality theory to explore the antecedents of compulsive mobile application usage. There, this study explored the effects of the big five personality traits on compulsive usage of mobile social application and examined the influence of compulsive usage on technostress. A total of 389 valid questionnaires were collected by online survey method. The seven hypotheses proposed were examined by SmartPLS software. The results showed that neuroticism, extraversion, and conscientiousness had significant effects on compulsive usage of mobile social applications. In addition, neuroticism, openness to experience, and compulsive usage significantly influenced technostress. Finally, this study discussed the implications of these findings and offered directions for future research.

Keywords: Personality traits · Compulsive usage · Mobile application · Technostress

1 Introduction

With the development of mobile technology, mobile devices have become a necessity for many people. More and more services are provided through mobile devices and Internet to help people with their daily lives. For example, people can shop, make payments, book tickets, and watch videos via these devices. In particular, the software designed to run on mobile services is called mobile application (mobile APP). Mobile APP can be put into categories such as games, social networking, entertainment and finance. People can choose and download the mobile APP they need to accomplish works that can only be done by computer (Hung et al. 2015).

Although mobile APP eases our lives, it could cause many concerns when not properly used. Some researchers have indicated that personality traits are related to

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smartphone use. Person with specific personalities will overuse smartphone (Lee et al. 2014). Roberts et al. (2015) examined the relationship between the big five personality traits and smartphone addiction. The big five personality dimensions include openness, neuroticism, extraversion, agreeableness and conscientiousness. The study demonstrated that personality traits influence addictive use of smartphone. Therefore, it is important to explore the antecedents of compulsive behavior and its influence on technostress. Though past studies have demonstrated the relationships between personality traits and compulsive behavior (Hung et al. 2015; Lee et al. 2014), little research have used personality traits to explore the factors influencing compulsive use of mobile APP. Hence, this study adopts personality traits to investigate the antecedents of compulsive use of social mobile APPs, and examine the relationships between such behavior and technostress.

2 Research Model

We adopted the big five personality traits in our research model, shown in Fig. 1. This research model is based on the model proposed by (Hirschman 1992) in which traits theory was used to explain the relationship between personality and compulsive behavior. Several studies have examined the relationship between personality, problematic use of cell phone, and addiction (Bianchi and Phillips 2005; Takao et al. 2009). In psychological literature, extraversion and materialism were used to predict compulsive behavior (Chak and Leung 2004; İskender and Akin, 2010). According to past literature reviewed, we assume personality is correlated to compulsive use of mobile APP. Furthermore, we focus on the most popular mobile APPs: social APPs. In this study, the five personality traits mentioned above are used to explore the relationship between personality and compulsive use of mobile APP. The definitions of each construct and hypotheses are presented below.

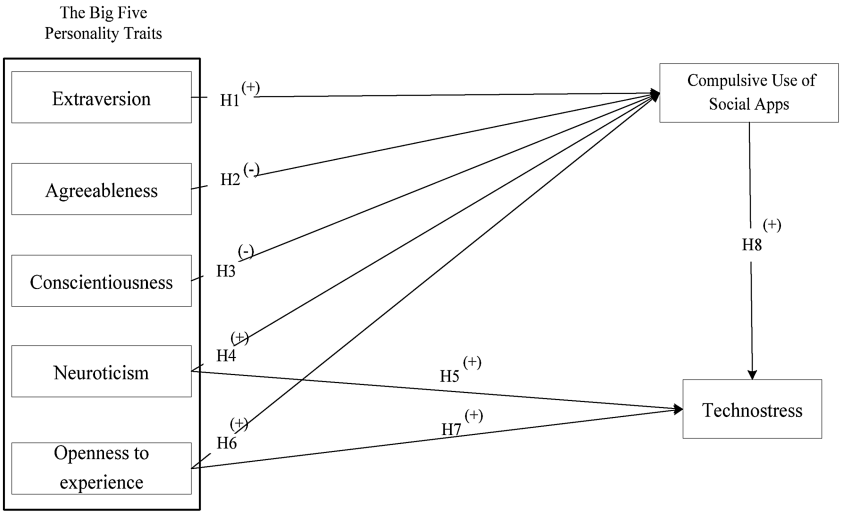

Fig. 1. Research model

Extraversion. Extraversion reflects the extent to which people are comfortable with direct social interaction (Costa and McCrae 1992b). Extraverted people are dominant in social interaction, enthusiastic, talkative, and gregarious. They also tend to be impulsive and venturesome. Individuals who rate high on extraversion tend to use virtual social services and have more online social experiences (Gosling et al. 2011). Ross et al. (2009) stated that extraversion is positively related to communication through social networking sites. Ryan and Xenos (2011) confirmed that extraversion is highly associated with Facebook use. In terms of cell phone use, extraverts always carry their cell phone anytime, and are hardly disturbed by others when using smartphones in public places (Roberts et al. 2015). Therefore, we expect that extraverted persons will be addicted to mobile devices and mobile APP, especially social APP and games APP, and these addictive habits will eventually become compulsive. We therefore proposed the following hypotheses:

H1: Extraversion will have a positive influence on compulsive use of social APP.

Agreeableness. Agreeableness is defined as being sympathetic, considerate, kind, trusting, and tolerant (Costa and McCrae 1992b). Researchers found that low agreeableness may be associated with cell phone misuse and other problematic cell phone use. A recent study showed a significant negative correlation between agreeableness and addiction to smartphone (Andreassen et al. 2013). People low on agreeableness spend more time using instant message service (Butt and Phillips 2008; Ehrenberg et al. 2008) and are more likely to use their mobile phones to play games (Phillips et al. 2006). Based on the above findings, we posit that agreeableness is related to cellphone misuse, and could result in compulsive use. Thus, we proposed the following hypotheses:

H2: Agreeableness will have a negative influence on compulsive use of social APP.

Conscientiousness. Conscientious people are described as thorough, responsible, ordered, and show self-discipline (Baumeister 2002). They pay attention to their own behavior, and are more organized and productive at school or work (Costa and McCrae 1992a). Conscientiousness is found to be negatively related to impulsiveness. Those who measure high on conscientiousness think and act less impulsively (Mowen 2000; Roccas et al. 2002). A study on adults demonstrated that those low on this trait will spend more time sending text messages. Therefore, we ask the following research questions:

H3: Conscientiousness will have a negative influence on compulsive use of social APP.

Neuroticism. Individuals who rate high on neuroticism are described as emotional (Roberts et al. 2015), moody, anxious, and worried. Neurotics tend to show strong emotions and aggressive behaviors when being irritated. Bianchi and Philips (2005) found that neuroticism is related to extreme behaviors and addiction. A lot of research has suggested that problematic cell phone use is associated with stress, anxiety, and emotional instability (Augner and Hacker 2012; Beranuy et al. 2009; Ha et al. 2008;

Jenaro et al. 2007; Reid and Reid, 2007). Therefore, it is predicted that neurotic or emotionally unstable people may be sensitive to technostress and will use smartphone to reduce stress and anxiety (Roberts et al. 2015).

H4: Neuroticism will have a positive influence on compulsive use of social APP.
H5: Neuroticism will have a positive influence on technostress.

Openness to Experience. Costa and McCrae (1992b) define openness to experience as being curious and receptive of new ideas. People who score high on this trait tend to be imaginative, artistically sensitive, active, intelligent, broad-minded, and adventurous. They have broad interests, long for new experiences, and are willing to try new media tool (Butt and Phillips 2008; Tuten and Bosnjak, 2001). When Facebook was first launched, it was an innovation for people having high openness score. This could explain why openness is positively related to using Facebook as a communication tool (Ross et al. 2009). Consistent with this finding, openness has been found to be correlated to use of instant message and SNS (Butt and Phillips 2008; Correa et al. 2010). Wang et al. (2012) also discovered that people high in openness are more likely to play online games. Accordingly, it is expected that individuals high on openness are more likely to install different kinds of mobile APP. Moreover, developers of social APP keep launching promotional activities and release new versions of APPs to attract users. Driven by curiosity and openness to experience, individuals may start using new functions of APPs or participating in activities, increasing the frequency and the amount of time they use mobile devices, and thus develop compulsive use and technostress. Hence, we proposed the following hypotheses:

H6: Openness will have a positive influence on compulsive use of social APP.
H7: Openness will have a positive influence on technostress.

Compulsive Usage and Technostress. Smartphones provide an efficient way for users to receive and reply to messages instantly, which encourages people to check their mobile devices more frequently. Constant phone checking has been seen as a compulsive behavior (Oulasvirta et al. 2012). Nowadays mobile APPs are a leading trend, which makes people overuse mobile APP and causes pressure and depression (Matusik and Mickel 2011). In this study, we define compulsive use of social APP as using these APPs continuously, repeatedly, and excessively. Studies exploring relationship between compulsive behaviors and negative emotions have found that compulsive behaviors have negative influence on patients' physical health, mental health, and social ability (Eisen et al. 2006; Hauschildt et al. 2010). Hence, compulsive use of social APP could make users feel irritated and mentally fatigued, and finally experience technostress (Lee et al. 2014). Therefore, we proposed the following hypotheses:

H8: Compulsive use of social APP will have a positive influence on technostress.

3 Measurement Development and Data Collection

The questionnaire contained two sections: demographic profile and construct items. The items used to operationalize the constructs included in the model were adapted from relevant prior studies and were slightly modified to fit the target context. Items for measuring Big Five personality traits were adapted from John et al. (1991). Items for measuring compulsive usage of mobile app were adapted from Lee et al. (2014). Items for measuring technostress were taken from Tarafdar et al. (2007). All items were measured using a 5-point Likert scale, ranging from "strongly disagree" (1) to "strongly agree" (5). In order to modify ambiguous expressions, the wording of the scales, and the length of the instrument, a pretest was performed with 2 experts and 12 respondents familiar with mobile apps.

The data for this study were collected via an online survey questionnaire. This research targeted the users of mobile social and game applications in Taiwan. Participants were recruited via popular virtual communities of mobile apps, and participation was encouraged by offering a raffle. They spent 12 min to fill a questionnaire out averagely. After incomplete responses and duplicates were eliminated, 389 usable responses remained. Analysis of the sample shows that 56 % of the respondents were female, most respondents were between 18 and 25 years of age, and 73 % used Android smartphones. About 120 of the respondents had more than one smart device.

4 Results

4.1 Tests of the Measurement Model

To test the proposed research model, this study used SEM to examine the hypotheses. The estimation of the proposed casual models in SEM involves two components: the measurement and the structural models. The two components were assessed by AMOS 23.0 software package.

A confirmatory factor analysis, using AMOS, was conducted to test the proposed measurement model. Several fit indicators in Table 1 were evaluated to assess how well the model fitted the data. The results show that the model fit was good: ratio of chi-square statistics to the degree of freedom (df), the standardized root mean squared residual (SRMR), and root mean square error of approximation (RMSEA) are less than the recommended values while goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), comparative fit index (CFI), incremental fit index (IFI) are greater than

Table 1. Measures of the model fit

Goodness of fit measures	$\chi 2/df$	GFI	AGFI	CFI	IFI	RESEA	SRMR
Recommended value	$\leqq 5.00^a$	$\geqq 0.85^b$	$\geqq 0.9^b$	$\geqq 0.9^b$	$\geqq 0.9^b$	$\leqq 0.08^c$	$\leqq 0.1^d$
CFA model	2.56	0.862	0.829	0.904	0.905	0.064	0.065
Structural model	2.37	0.858	0.827	0.903	0.904	0.059	0.065

Source: [a]Bentler (1989) [b]Bagozzi and Yi (1988) [c]Browne and Cudeck (1993) [d]Hoang et al. (2006)

the suggested threshold. According to the above test outcomes, it can be summarized that the hypothesized measurement model fits the data well.

4.2 Structural Model and Hypothesis Testing

AMOS 23.0 was used to access the structure model and hypotheses by examining the path coefficients and R^2 values. The fitness measures of the structure model also indicated a good level of fit (see Table 1). The path coefficients are standardized regression coefficients and are used to explain the direction of relationships among variables. R^2 values represent the proportion of variance in the endogenous variables and are shown as a representation of the explanatory power of the structure model. The results are showed in Fig. 2 with non-significant paths as dotted lines, the path coefficients next to each line between constructs.

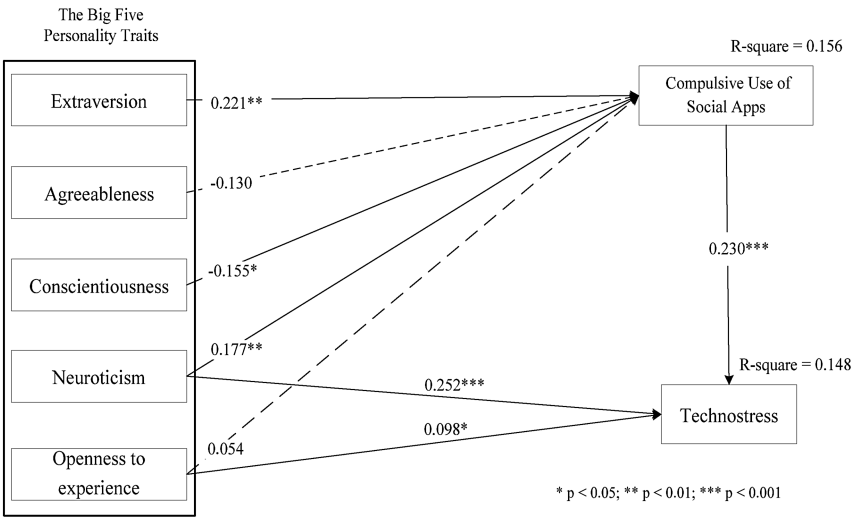

Fig. 2. Analysis results

With regard to the big five personality traits, only extroversion and neuroticism had significant positive effects on compulsive social application usage whereas only conscientiousness had negative impact on compulsive social application usage, supporting H1, H3, and H4 ($\beta = 0.2219$, $p < 0.01$; $\beta = 0.177$, $p < 0.01$; $\beta = -0.155$, $p < 0.05$), but not H2 and H6. In line with expectations, extroversion and neuroticism were found to have significant positive effects on compulsive social and game application usage ($\beta = 0.252$, $p < 0.001$; $\beta = 0.098$, $p < 0.05$), supporting H5 and H7. In addition, the results revealed that compulsive usage had positive direct effects on technostress ($\beta = 0.230$, $p < 0.001$), thereby supporting H8. Finally, the results show that 15.6, and 14.8 percent of the respective variance of compulsive social application usage and technostress can be explained by the research model.

5 Discussion

This study proposed eight hypotheses to understand the relationships among personality traits, technostress, and compulsive mobile application usage. According to the analysis results, six hypotheses were supported but two hypotheses were not supported. The similar result was also found in the past research. For example, Marshall et al. (2015) indicated that agreeableness did not influence Facebook users' behaviors of updating their profiles and messaging. In addition, social apps do not count for new services anymore and have become less attractive for those who rate high in openness.

This study is subject to certain limitations and results should be interpreted and accepted with caution. First, our survey was conducted using online questionnaires and employed nonrandom sampling. The online survey method was appropriate for collecting data from a sample which was free of geographical constraints and included only respondents with mobile app experience. Future studies could implement more systematic sampling methods from more diverse samples. Second, our study focused specifically on social apps. Other types of apps should also be investigated.

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