

The Impact of Personality Traits on Smartphone Ownership and Use

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Abstract

This study directly tests the effect of the "Big Five" personality traits on smartphone ownership and use. Although researchers have tested the impact of personality the use of on communication technology, this is the first study that specifically examines smartphone use. Logistic regression and hierarchical linear regression were used to analyze results from a sample of 312 participants. We found that extraverted individuals were more likely to own a smartphone. Also, extraverts reported a greater importance on the texting function of smartphones. More agreeable individuals place greater importance on using the smartphone to make calls and less importance on texting.

Key Words: smartphone, personality, Big Five, extraversion, agreeableness, logistic regression

1. Introduction

In the 1980's, the personal computer became the technological advancement that changed our lives. It allowed us to collect, store, and analyze large amounts of data with ease. In the 1990's, the Internet gave us the mechanism by which we could share massive amounts of information with one another. As we begin the 21st century, the smartphone has quenched our thirst for instantaneous connectivity. The growth in smartphone use has been phenomenal. The CNN reports that 269.9 million smartphones were purchased internationally in 2010 and that in 2011 a half a billion smartphones may be purchased worldwide (Weintraub, 2010). Nielsen projects that smartphones will become the majority of cell phones in use by the end of 2011. Morgan Stanley Research forecasts that smartphone sales will exceed those of the PC in 2012 (Brownlow, 2011). The smartphone has many more functions and uses than the traditional cellphone. The smartphone allows its owners to e-mail, surf the web, play music and games, and perform a variety of other functions. Google now has \$1 billion in annual mobile advertising revenues and U. S. mobile advertising revenues are expected to reach \$1 billion in 2011 (Global, 2011). The explosion in the smartphone industry has created a completely new venue for marketers. The growth in mobile marketing is undeniable and it is imperative that marketers understand this emerging industry and how they may use it to reach their customers.

2. Literature Review

Several studies have investigated the demographic characteristics of smartphone users. Males (53%) are more likely to have a smartphone than females (47%) (Entner, 2010). Hispanic Americans and Asians are slightly more likely to have a smartphone than what their share of the population would indicate (Entner, 2010). The smartphone user tends to be younger than the general cell phone audience. The U.S. smartphone ownership is skewed towards persons ages 25 – 44, while the mobile audience overall remains comparatively flat across age groups (Age, 2010). Regarding smartphone functions, young people indicate a higher satisfaction level with texting than older people (Balakrishnan and Yeow, 2007).

A study conducted by Scarborough Research found that adults in the U. S. who use the text-messaging feature on their cell phone are 49% more likely than the average American to be between age 18-24, 14% more likely to be Hispanic and 24% more likely to be African American (Texting, 2008). Mobile email users tend to be 18-44 years old, self-employed or employed full time, affluent, and highly educated. Seventy-two percent of mobile email users have an annual household income of \$100,000 or more, though the decreasing cost of smartphones and the launch of new devices like the iPhone have begun to attract less-affluent groups (Smartphone, 2011). While marketers have been diligent in studying the demographic characteristics of smartphone users, they have ignored the impact of personality on smartphone ownership and use. The purpose of this study is to examine which personality types are most likely to have a smartphone and which functions are most important to them.

Personality is a stable set of characteristics and tendencies that determine peoples' commonalities and differences in thoughts, feelings, and actions (Maddi 1989). Many individual traits have been identified, but this study focused on the so-called "Big Five" personality factors: agreeableness, conscientiousness, extraversion, neuroticism, and openness to experience. These factors theoretically capture the essence of one's personality (Digman 1990). Costa and McCrae (1992) indicate that it is the most comprehensive and parsimonious model of personality. Barrick, (2001) stated that it is the most useful taxonomy in personality research. Briggs (1992) refers to it as "the model of choice for the researcher wanting to represent the domain of personality variables broadly and systematically." McElroy (2007) found that it was a better predictor of personality indicators for technology related issues than the Myers-Briggs Type Indicator.

Agreeableness. McElroy (2007) stated that people who score high on agreeableness are sympathetic, good natured, cooperative and forgiving. They help others and expect help in return. Graziano and Eisenberg (1997) defined agreeableness as "a compassionate interpersonal orientation described as being kind, considerate, likable, helpful and cooperative". Barrick (2001) indicated that agreeable people do well in jobs that involve considerable interpersonal interaction and teamwork. Devaraj (2008) found that agreeableness is positively associated with beliefs about the perceived usefulness of technology. When examining young people's use of technology Ehrenberg (2008) found that more disagreeable individuals spend more time on calls and that disagreeable individuals with lower self-esteem spent more time using instant messaging and reported stronger instant messaging addictive tendencies. Phillips et al. (2006) discovered that people low on agreeableness were more likely to use their phones to play games.

Conscientiousness. The hallmark of the conscientious personality is self-control, reflected in a need for achievement, order, and persistence (Costa et al, 1991). Conscientious people actively plan, organize, and carry out tasks. They are strong-willed, deliberate, and reliable (McElroy et al. 2007). They are more likely to carefully consider ways in which the use of technology would allow them to be more efficient and perform at a higher level at work (Barrick and Mount, 1991). Devaraj et al. (2008) found that conscientiousness moderates the relationship between perceived usefulness of technology and intention to use technology such that the relationship was stronger for individuals with higher conscientiousness.

Extraversion. Extraverts are describe as being sociable, gregarious, and ambitious. They are optimistic and seek out new opportunities and excitement (McElroy, et al. 2007). Those high in extraversion are social, active, and outgoing, and place a high value on close and warm interpersonal relationships (Watson and Clark 1997). Extraverted personalities are particularly high performers in jobs with a social component, such as management and sales (Barrick and Mount 1991). Extraversion is also associated with effectiveness in a team setting and with greater training proficiency (Barrick et al. 2001). Those high in extraversion are naturally inclined to care about their image and other social consequences of behaviors, and therefore are more likely to form intentions to act based upon their perceptions of the opinions of significant others. (Devaraj et al. 2008). Rogers (1983) states that the desire to gain social status is one of the most important motivations for individuals in deciding to adopt an innovation. Devaraj et al. (2008) found that extraversion moderated the relationship between subjective norms and intentions to use technology such that the relationship is stronger for individuals with higher extraversion. Ehrenberg et al. (2008) found that extraverted individuals spent more time texting.

Neuroticism. Neurotic people tend to be anxious, self-conscious and paranoid (Devaraj et al. 2008). Highly neurotic people tend to be fearful, sad, embarrassed, distrustful, and have difficulty managing stress (McElroy et al. 2007). Empirical research suggests that neuroticism is negatively associated with several constructive elements of work behavior, including job performance (Barrick and Mount 2000), job satisfaction (Smith et al. 1983.), perceived career success (Judge et al. 1999, Seibert and Kraimer 2001), and voice behavior (the tendency to offer constructive change-oriented communication intended to improve a situation) (LePine and Van Dyne 2001). Neurotic personalities are likely to view technological advances in their work as threatening and stressful, and to have generally negative thought processes when considering technological advances (Devaraj et al. 2008). Ehrenberg (2008) found that neurotic individuals spent more time text messaging and reported stronger mobile phone addictive tendencies.

Openness to the experience. Those who score high in openness have flexibility of thought and tolerance of new ideas. They actively seek out new and varied experiences and value change (McCrae and Costa, 1997). Open individuals tend to devise novel ideas, hold unconventional values, and willingly question authority (Costa and McCrae, 1992).

Openness is consistently associated with training proficiency and engaging in learning experiences (Barrick et al. 2001). Individuals high in openness are more likely to hold positive attitudes and cognitions toward accepting job-related technology in part because of their predisposition to embrace new approaches to work; they are less threatened by change implied in adopting technology (Devaraj et al. 2008).

3. Research Questions

Not only is the smartphone business gigantic, it has facilitated other businesses like the Internet, e-commerce, and mobile advertising. It is clear that, while there has been a wealth of information gathered about the demographic characteristic of smartphone owners, little is known about the impact of personality types on smartphone ownership and use. The purpose of this study is to determine if different personality types are more likely to own a smartphone and which personality types find certain smartphone functions more important. Specifically, our study addresses two research questions.

First, *are there personality types that predict smartphone ownership?* If you are marketing smartphones, it would be invaluable to know if personality plays a role in smartphone ownership. If the marketer can determine which personality types are more likely to own a smartphone, the marketer can stress those advantages to the customer in an effort to get more of those personality types to purchase a smartphone. In addition, the marketer may want to try to find a way to make their smartphones attractive to the other personality types. For example, for a neurotic person, the marketer might need to stress the security factors related to smartphones.

Second, *do different personality types place more importance on certain smartphone functions?* If the marketer can identify which personality traits are closely correlated with which smartphone functions, then the marketer can emphasize those functions in the selling process. For example, those who enjoy a lot of personal contact (the agreeables) might prefer making phone calls, and therefore the marketer may need to stress the ease of making a phone call using the smartphone. On the other hand, the neurotic might prefer email because it is less personal.

4. Methods

4.1 Participants

A total of 750 questionnaires were distributed electronically to a sample of participants who were recruited using social networking and various online techniques. Of these, 448 were returned giving an adequate response rate of 59.7%. Involvement was restricted to those who owned mobile phones and who were 18 years of age and older. After deleting those with missing data, we were left with a final sample of 312 participants (60% female, 40% male). Age ranged from 18 to 77 years with a median age of 41 and a mean age of 40. Over half of the respondents had at least a 4-year degree. Twenty-seven percent of the respondents were minorities. There were 233 respondents who indicated they owned a smartphone. Although the sample was a convenience sample, efforts were made to solicit respondents that were diverse in regard to gender, age, and ethnicity.

4.2 Materials

The study focused on consumers who owned and utilized the functions of a smartphone. Consequently, participants were asked if they owned a mobile phone that could download and process information, such as an iPhone, Droid, or Blackberry. Respondents who owned a smartphone were then asked to rate on a five-point scale (1, not important at all, to 5, very important) the importance of six smartphone functions: phone calls, texting, internet, e-mail, music, and games. We measured personality with John's (1991) Big Five Personality Inventory. Although somewhat inferior to standard multi-item scales, this instrument shows significant convergence with more widely used Big Five measures. The scale takes only a few minutes to complete, so using it in an online survey enhances the response rate. Coefficient alphas for the scales used in this study ranged from 0.74 for Conscientiousness to 0.86 for Extraversion.

In addition to personality traits, we asked respondents to report their gender, age, education, income, ethnic background, and marital status. Gender was coded as 1 for male and 2 for female. Age was reported as year of birth, but we recoded this variable to measure age in years. Participants reported their highest level of education completed from 1 (less than high school) to 7 (Doctoral/professional degree). The question about income included choices ranging from 1 (less than \$20,000) to 9 (\$90,000 or more). Due to an extremely low percentage of Hispanic, Asian, Native American, and other, these categories were collapsed with African American to form a dichotomous measure of ethnicity (1 for Caucasian and 2 for non-Caucasian). Marital status is coded 1 for married and 2 for single.

4.3 Procedure

From March 2011 to May 2011, participants were sent e-mails containing a hyperlink to Qualtrics, a commercial survey-hosting Web site. Participants then logged onto the survey site and entered their answers. The data were downloaded in raw form, screened for anomalies, and analyzed using PASW 18.0 statistical software (SPSS, Inc., Chicago, IL).

4.4 Data analyses

We conducted hierarchical (blocked) ordinary least squares (OLS) linear regression analyses to determine which factors influence the use of smartphone functions. Because OLS is a poor choice when the dependent variable is dichotomous, we used logistic regression to analyze smartphone ownership.

5. Results

The results of the logistic regression analysis indicated differences among gender, age, education, and extraversion in the ownership of smartphones ($LR\chi^2 = 384.23, p < 0.001$), with a goodness-of-fit Nagelkerke R^2 of 0.173 (Table 1). Females were less likely to own a smartphone than males. Lower age and higher levels of education were associated with an increasing likelihood of smartphone ownership. Of the five personality traits measured, only the extraversion subscale was found to significantly predict smartphone ownership. Higher levels of extraversion were associated with increased odds of smartphone ownership. The coefficients listed in Table 1 indicate the effect of a change in each estimator on the probability (or odds) of a person owning a smartphone. Because of the nature of logistic regression, however, these coefficients are somewhat difficult to interpret. It can be easier to understand the results that are reported using odds ratios (OR). Odds ratios are the comparison of the probability of one event occurring versus another. One may use odds ratios to report effect size in a similar manner to regression coefficients. For example, the model predicts that females are approximately 59% less likely to own a smartphone than males and for each additional unit of education, the odds of owning a smartphone increases by 35%. Regarding personality traits, a one-point increase in the extraversion subscale is associated with a 5.2% increase in the likelihood of owning a smartphone.

We used hierarchical linear regression to determine how much, comparatively, the Big Five personality factors help explain smartphone use. Specifically, we estimated six models in which the dependent variables were the self-reported importance of calling, texting, internet browsing, e-mailing, listening to music, and playing games on a smartphone. In step one, we entered gender, age, education, income, and ethnicity as control variables. In step two, we entered the Big Five personality factors in each analysis to test whether they add significantly to the model. For simplicity, we report only the complete models in Table 2. Controlling for the demographic variable, agreeableness is positively related to calling and negatively related to texting. Those who tend to be cooperative and good-natured place more importance on using the smartphone for spoken communication and less importance on written communication. Extraverts place a significantly greater importance on the texting function of smartphones. Neuroticism is positively associated with the e-mail function. However, the Big Five did not add significantly more predictive power beyond that explained by the demographic control variables for both the internet and e-mail function.

Although the focus of this research is the impact of personality on smartphone use, some of the demographic variables show significance in the model and should be noted. Females set greater importance on texting and less importance on e-mailing. Age is negatively associated with using smartphones for texting, browsing the internet, and playing music. Higher education is positively related correlated to using smartphones for calling, but negatively related to the gaming function. Also, non-Caucasians place less importance on calling and texting, but significantly greater importance on playing music and playing games.

6. Discussion

The present study sought to identify personality traits associated with smartphone ownership and use. Consistent with current trends in personality research (e.g., Barrick et al 2001, Devaraj et al. 2008) we have found that the Big Five personality dimensions are related to the application of smartphone technology. Extraverts were found to be more likely to own a smartphone and they report a greater importance on the texting function of smartphones. Extraverts are outgoing and sociable and have a strong desire to communicate with others. Texting is an easy and convenient tool for satisfying this purpose. Also, studies have shown that extraversion is positively correlated with number of friends (McCrae and John, 1992). It stands to reason that extraverts would find texting important. Bianchi and Phillips (2005) have suggested that extraverts use mobile technology for self-stimulatory purposes rather than socialization.

Like Phillips, et al (2006), however, we did not find that extraversion was related to the gaming or music functions of smartphones. Agreeableness is a trait that is most concerned with interpersonal relationships that are based on the equal and honest exchange of information (Coast and McCrae, 1990). More agreeable individuals reported greater importance on the use of smartphones for calling and less importance for texting, possibly because they prefer spoken communication, rather than written communication. This finding may reflect the fact that people high in agreeableness tend to have higher levels of interpersonal skills (Scealy, et al, 2002). Consistent with previous research findings, significant differences were found in smartphone ownership and use by gender, age, education, and ethnicity. Females were less likely to own a smartphone, but they place great importance on the texting function. The importance of smartphone functions declines with age, particularly texting, internet browsing, and playing music. It is not surprising, therefore, that the probability of owning a smartphone declines with age. As suggested by Dillon (2001), people with higher education tend to be more accepting of information technologies. Our findings support this hypothesis, as higher educational attainment positively predicts smartphone ownership.

The results of this study must be viewed in light of its limitations. First, participant behavior was self-reported; consequently, common-method bias is a potential weakness. Future researchers could correct for this bias by measuring smartphone use behaviorally. Second, since the questionnaire was only available via the Internet, the respondent pool was limited to those with access to the Internet. It is difficult to determine if the results would have been different if those who did not have access to the Internet had responded to the questionnaire. However, in those areas where previous data had been collected (demographics), the results were consistent with previous research that did not rely on access to the Internet. Third, the sample size was relatively small. While 312 respondents completed the survey, only about 233 of them actually owned a smartphone and therefore answered the questions related to the use of smartphones. Fourth, despite the fact that measures were taken to insure minimum representation according to certain demographic categories (age, gender, and ethnicity), the sample was not truly a random sample. Fifth, although the percentage of minorities met the minimum parameters established for the study, minorities were under represented in the sample. Sixth, even though the literature suggests the Big Five Inventory is the best instrument to use for measuring personality traits when studying the use of technology, there are other instruments that might be employed.

Seventh, overall, personality was a fairly weak predictor of smartphone ownership and use, with extraversion as the most consistent predictor. Given the small amount of variability accounted for, we should continue to identify the factors predicting people's use of this technology. There are a number of directions for future research. First, it appears that minority ownership and use of smartphones may be different from Caucasians. Therefore, a study with a larger minority population should be conducted to determine if minority ownership and use of the smartphone is truly different and if so how. Second, the smartphone has created a completely new industry--the development of smartphone applications. Research should be done to determine if personality types influence what kind of applications smartphone owners use. Third, other instruments for measuring personality traits might be employed to determine if there are other personality types that impact smartphone ownership and use.

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Table 1. Results of Logistic Regression Exploring the Relationship of Demographics and Personality Traits to Their Odds of Owning a Smart Phone (N = 312)

Independent variables	Beta	SE	z	OR
Gender	-0.884	0.281	9.914***	0.413
Age	-0.030	0.011	7.048***	0.970
Education	0.300	0.101	8.837***	1.349
Income	0.026	0.055	0.221	1.026
Ethnicity	0.180	0.326	0.306	1.197
Marital Status	-0.194	0.340	0.324	0.824
Extraversion	0.050	0.025	4.161**	1.052
Agreeableness	0.002	0.051	0.001	1.002
Conscientiousness	-0.031	0.064	0.233	0.969
Neuroticism	0.034	0.025	1.795	1.034
Openness	0.044	0.038	1.355	1.045
Constant	-0.651	1.748	0.139	0.522
Likelihood Ratio χ^2	384.23***			
Nagelkerke $R^2 = 0.173$				

*p < .10 **p < .05 ***p < .01

Table 2. Standardized Regression Coefficients (B) for Predictors of the Importance of Smartphone Functions (N = 233)

Independent Variables	Calls	Texting	Internet	E-mail	Music	Games
Gender	0.035	0.176**	-0.092	-0.148*	-0.010	0.041
Age	-0.058	-0.321***	-0.223**	-0.097	-0.239**	-0.116
Education	0.191**	0.003	0.142	0.140	-0.050	-0.147*
Income	0.053	-0.018	-0.060	0.015	0.032	-0.028
Ethnicity	-0.133*	-0.152**	-0.014	0.083	0.206***	0.153*
Marital Status	-0.047	-0.089	-0.019	0.131	-0.093	-0.050
Extraversion	0.024	0.138*	0.062	0.067	-0.109	0.048
Agreeableness	0.198**	-0.133*	-0.080	-0.094	0.019	-0.081
Conscientiousness	0.123	0.098	0.118	0.121	0.022	-0.092
Neuroticism	-0.040	-0.074	0.020	0.148*	-0.051	-0.050
Openness	-0.103	0.098	-0.039	-0.015	0.067	0.030
Adjusted R^2	0.066	0.203	0.025	0.030	0.115	0.081

*p < .10 **p < .05 ***p < .01