

# Predicting Psychological Characteristics by Smartphone Usage Behaviors

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## INTRODUCTION

### Smartphone Usage

Morality-building devices refer to small hand-held computing devices, typically having a display screen with touch input and/or a miniature keyboard. In recent years, smartphone is the most popular device among various kinds of morality-building devices. Since smartphone has rich resourced powerful functions and sensors, it has been widely used across the world in recent years. According to the International Data Corporation (IDC) Worldwide Quarterly Mobile Phone Tracker, a total of 1,004.2 million smartphones were shipped worldwide in 2013, up 38.4% from the 725.3 million units in 2012. Smartphones accounted for 55.1% of all mobile phone shipments in 2013, up from the 41.7% of all mobile phone shipments in 2012 (Llamas et al., 2014). Owing to the long list of OEM (Original Equipment Manufacturer) partners, a broad and deep collection of devices, and price points, Android evidently becomes the leader in the smartphone operating system race since the year where it began.

As smartphone is built on a mobile operating system with advanced computing capability, there are millions of mobile applications developed by third-party developers and distributed on various digital distribution platforms such as Google Play and App Store. With so many choices on extend-

ing smartphone's functionalities, smartphone becomes an indispensable part of our daily lives as an attractive tool for communication and interpersonal interaction.

There are various definitions of phone usage behavior, some researchers took it as part of the functions using of mobile phones, such as telephone, calendar, SMS using frequency, etc. (Coen et al., 2002). Suh et al. (2003) took some specific phone features as phone usage behavior, such as mobile e-commerce usage. Soikkeli et al. (2011) described it as users' interactions with the device and the applications used. In this chapter, we investigated the interactions between users and their devices to explore individual's phone usage behavior, such as frequency of telephone, SMS, application use, phone switch habits, wallpaper changing, GPS using, etc.

### Psychological Characteristics

In psychology, psychological characteristics can be roughly divided into trait (represented by personality traits) and state (represented by mental health state). Compared with mental health state, personality traits are more stable over time. In this chapter, we explored 9 psychological characteristics, including Big-Five personality traits and four mental health dimensions. Their detailed explanations are described as follows.

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Generally, personality traits play a central role in describing a person in psychology. Though there is still no universal consensus on the definition of “personality” in psychology, the Big Five factors (McCrae et al., 1992) have received considerable support in psychology in the past. The Big Five personality traits are five dimensions of personality, including openness, conscientiousness, extraversion, agreeableness, and neuroticism. These factors, as described in Table 1, summarize several more specific traits and are assumed to represent the basic structure behind all personality traits.

Subjective well-being (SWB) means how people experience the quality of their lives, comprising longer-term levels of pleasant affect, lack of unpleasant affect and life satisfaction (Angner, 2010; Diener, 1994). SWB focuses on how a person evaluates his/her own life, including emotional experiences of pleasure versus pain in response to specific events and cognitive evaluations of what a person considers a good life (Diener, 2000). Positive psychologists have done much research on SWB (Lyubomirsky, 2001), and they claimed that the pursuit of happiness is regarded as one of the most valued goals in almost every culture. Some studies found that health and SWB influence each other, as good health leads to greater happiness (Okun et al., 1984), and a number of studies also found that positive emotions and optimism have a beneficial influence on health (Frey, 2011).

*Table 1. Summarizes several more specific traits and are believed to capture most of the individual differences in human personality*

Trait	Examples of Adjectives
Extraversion (E)	Active, assertive, energetic, enthusiastic, outgoing, talkative
Agreeableness (A)	Appreciative, forgiving, generous, kind, sympathetic
Conscientiousness (C)	Efficient, organized, planful, reliable, responsible, thorough
Neuroticism (N)	Anxious, self-pitying, tense, touchy, unstable, worrying
Openness to experience (O)	Artistic, curious, imaginative, insightful, original, wide interests

Depression is a state of low mood and aversion to activity that can affect a person’s thoughts, behavior, feelings and sense of well-being (Salmans, 1995). Since depressed people may lose interest in activities, have problems concentrating and remembering details, or making decisions, and may contemplate, attempt, or even commit suicide, it’s important to get people’s depression level timely, especially for major depressed people.

Interaction anxiousness is the subjective or affective component of social anxiety (Leary & Kowalski, 1993). People with social anxiety may fall into an intense fear of what others are thinking about them (specifically fear of embarrassment, criticism, or rejection), which results in the individual feeling insecure, not good enough for other people, and/or the assumption that peers will automatically reject them (García-López et al., 2008).

Loneliness is one of the least satisfactorily conceptualized psychological phenomena, which plays an essential role in the genesis of mental disorder (Fromm-Reichmann, 1959). It’s the experience of emotional and social isolation. Research has shown that loneliness is widely prevalent throughout society among people in marriages, relationships, families and successful careers (Peplau & Perlman, 1982).

### Traditional Psychological Characteristics Measuring Methods

Currently, the psychological characteristics mentioned above are generally measured by using self-reported questionnaires, in which participants fill in the related scales to get the corresponding psychological status levels. However, this method has three disadvantages as follows (Gao et al., 2014).

1. It is not convenient to collect users’ psychological status on large population. It may take a lot of manpower and material resources, and it is prone to human errors in the process of questionnaire analysis.

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