

## Chapter 3

# Relationships of Smartphone Dependence With Chronotype and Gender in Adolescence

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### **ABSTRACT**

*Smartphone use has rapidly developed in recent years and become an established part of daily life in many countries. As various applications have been developed as communication tools for use with smartphones, allowing the internet to become more accessible, patterns of dependence have been routinely reported particularly among adolescents. In this chapter, the authors reviewed the previous studies about the relationships of smartphone dependence to chronotype and gender among adolescents. Chronotype refers to preference for sleep-wake timing: for example, morning types go to bed, get up, and experience peak alertness and performance earlier in the day than do evening types. It was found that the light emitted from media screen in the evening before bedtime may delay the circadian rhythm. In addition, excessive smartphone use may lead to sleep disturbances. Recent studies suggested that evening types and females may be more prone to become smartphone dependent.*

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## **INTRODUCTION**

### **Smartphone Usage as a Problem**

Smartphone use has rapidly developed in recent years and become an established part of daily life in many countries. According to the Ministry of Internal Affairs and Communications of Japan, the household penetration rate of mobile phone use was 95.8% at the end of 2015, with smartphones comprising 72.0% of those devices (Ministry of Internal Affairs and Communications of Japan, 2016). Although mobile phones have several positive aspects, such as the ability to communicate by email, play video games, and utilize a variety of applications (Lepp, Barkley & Karpinski, 2014), various social issues have arisen in association with overuse, including changes in interpersonal relationships, interference with school or work, physical health-related problems such as damage to fingers and forearms (Ming, Pietikainen & Hanninen, 2006), and injuries to the vertebrae of the neck and spine, sleep disturbance (Cain & Gradisar, 2010; Demirci, Akgönül & A, Akpınar, 2015), excessive use, and even dependence (addiction). As various applications such as those associated with social networking service (SNS) have been developed as communication tools for use with smartphones, allowing the Internet to become more accessible, patterns of dependence have been routinely reported (Kwon, Kim, Cho & Yang, 2013).

Because of mobility and Internet capabilities, a smartphone can induce characteristics of dependence in users, including overuse, tolerance, problems with withdrawal, difficulty with performing study or work, and a cyber-life orientation. Smartphone dependence especially among adolescents has recently become a very important problem. Previous studies conducted in South Korea of university students have indicated associations of smartphone dependence with mental health, campus life, personal relations, self-control, and life stress (Choi, Lee & Ha, 2012; Kim & Lee, 2012). Adolescents may be at higher risk for exhibiting problems seen with the use of smartphones as compared to adults, because younger individuals typically use smartphones as their primary tool to access the Internet (Kwon et al., 2013; Kim et al., 2012).

### **Chronotype and Its Relationship to Electronic Media Usage**

Chronotype, or circadian preference, is related to the endogenous circadian clock that synchronizes humans to a 24-hour day (Adan et al., 2012). Individual circadian preferences can be used to classify individuals into three groups, as “morning type”, “neither morning or evening (intermediate) type”, and “evening type”, though they are also seen as a continuum (Natale & Cicogna, 2002). Morning types wake up

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