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# The effect of SMS notifications on time preferences

Avi Israel [a,*], Mosi Rosenboim [a], Tal Shavit [b]

[a] Department of Management, Guilford Glazer Faculty of Business and Management, Ben-Gurion University of the Negev, Beer-Sheva, Israel
[b] The Department of Economics and Business Administration, Ariel University, Israel

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ABSTRACT

In this paper we use the SMS instant messaging application to examine the effect of notifications on time preferences. To do so, we conducted a laboratory experiment with three different groups. Participants in the first (second) treatment group received SMS messages with a high (low) degree of frequency. The third group was a control group that did not receive any SMS messages. The results show that, with exposure to SMS notifications, regardless of their frequency, the tendency to favor the present increases. They also indicate that SMS notifications affect impulsiveness and stress. However, the influence of impulsiveness and stress were not the factors that activated the change in time preferences. In addition to the contribution to the literature on smartphones and human behavior, our results have real-life implications regarding how we make decisions when we are interrupted by notifications from our mobile devices.

## 1. Introduction

The twenty-first century is characterized by the proliferation of mobile devices with advanced technological features (Cheever, Rosen, Carrier, & Chavez, 2014. Smartphones provide various features that improve our lives and make them easier (Wei, 2008). Despite the advantages of using smartphones (Srivastava, 2005), excessive use can cause psychological and behavioral problems such as stress, anxiety, depression, loss of concentration, sleep disturbance, addiction, annoyance and nomophobia[1] (De-Sola Gutiérrez, Rodríguez de Fonseca, & Rubio, 2016; Jenkins, Anderson, Vance, Kirwan, & Eargle, 2016; Samaha & Hawi, 2016; Sapacz, Rockman, & Clark, 2016; Thomée, Härenstam, & Hagberg, 2011). Users of smartphones must deal with disruptions frequently, even when their phones are set to vibrate. This behavior leads to an increase in the number of interruptions to which people are exposed. Interruption is "*an externally generated, randomly occurring, discrete event that breaks continuity of cognitive focus on a primary task*" (Corragio, 1990, p. 19) and typically "*requires immediate attention*" and "*insists on action*" (Covey, 1989; pp. 150–152). This definition implies that another person or event creates the interruption and that the timing of the interruption is beyond the control of the individual. Fletcher, Potter, & Telford, 2018 suggested that one of the factors involved in interruptions are distractions, which are cognitive reactions to an external stimulus such as background music or flickering lights.

Interruptions, in general, influence people's psychological stress (e.g., Greiner, Ragland, Krause, Syme, & Fisher, 1997). They also increase the amount of time needed to complete the primary task. As a result, the pressure to finish the task increases, leading to increased stress (Kühnel, Sonnentag, & Bledow, 2012). Time pressures can also lead to the need for additional effort, which also increases stress (Mark, Gudith, & Klocke, 2008). This is also true when dealing with cumulative interruptions (Baethge, Rigotti, & Roe, 2015). The extensive use of smartphones increases users' stress (Konok, Pogány, & Miklósi, 2017; Wang, Wang, Gaskin, & Wang, 2015) for biological and psychological reasons (Thomée et al., 2011). Compulsive use of smartphones is related to a form of stress (Lee, Chang, Lin, & Cheng, 2014) known as *episodic stress* (Bailey & Bhagat, 1987), which occurs when we experience acute stress too frequently. It often affects those who feel they have both self-imposed pressures and external demands vying for their attention. Interruptions from notifications also increase stress. For example, Galluch, Grover, and Thatcher (2015) found that high and moderate levels of interruptions from ICTs (i.e. information and communication technologies) increased stress (see also Ragu-Nathan, Tarafdar, Ragu-Nathan, & Tu, 2008). A recent study by Fitz et al. (2019), which tested the impact of batching notifications (i.e., delivering them at

* Corresponding author.
*E-mail address:* isavi@colman.ac.il (A. Israel).

[1] Abbreviated form of no-mobile-phone phobia. Defined as fear of being out of reach of mobile phones or the inability to communicate through them (King et al., 2013).

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