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Information tailoring and framing in wearable health communication☆

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ABSTRACT

Wearable devices, including smartwatches, smart glasses, and fitness trackers, are becoming increasingly popular, and greater emphasis is being placed on their health-related functions. In light of this new development, this study explores the role of smartwatches as mobile health communication tools and proposes information tailoring (personalization vs. customization) and regulatory framing (promotion vs. prevention-framed) as potential strategies for promoting the tendency for self-preservation. Results from a between-subjects experiment ($N = 100$) revealed that a customized as opposed to a personalized health message was more effective in promoting self-preservation and inducing positive attitudes toward and representativeness of the message. Meanwhile, regulatory framing was found to have no effects on the outcome. Theoretical and design implications of the key findings are discussed.

1. Introduction

The worldwide popularity and increasing dissemination of wearable devices have diversified the ways in which information is accessed, acquired, and shared in the mobile context (Kim & Shin, 2015). The emergence of wearable devices reflects the increasing desire among users to be constantly informed of environmental conditions and emphasis on the dissemination of health information that may lead to preventive measures. In particular, smartwatches are becoming popular tools for health communication because they are literally attached to the wrist and are able to track users' physical health conditions, including skin temperature, heart rate, number of steps taken, calories burned, perspiration, and sleep patterns (Blakeway, 2014). In the context of intensive care, they can also be used for monitoring patients' vital signs and accidental seizures (Klingeberg & Schilling, 2012).

Interactive digital media are believed to extend the range and flexibility of the intervention options available in preventive medicine via their instantaneous interactivity, convenience, flexibility, multimodal interface, and automated processing of information (Fotheringham, Owies, Leslie, & Owen, 2000). Smartwatches, in particular, have a strong potential to be effective means for the prompt delivery of health information, owing to their anywhere-ness (mobility) and anytime-

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ness (availability) that lead users to believe they have real-time, boundless access to desired information and services (Kim & Shin, 2015; Shin, 2015). Therefore, it is both theoretically and practically imperative to probe into the role of smartwatches as health communication tools and explore ways in which health information can be more effectively delivered via this relatively new medium.

Accordingly, this study proposes information tailoring and framing as two possible strategies for increasing preventative outcomes though the medium of health care messages. Tailoring refers to the optimization of information to enable individualized communication and provide the most appropriate information that matches the user's interests and needs (Shin, 2011). Traditional media had typically allowed only limited tailoring of information, presenting health information in the form of unilateral notifications. Meanwhile, the rapid adoption of interactive digital media and drastic advancement of related technology in recent years have enabled users to acquire more useful, relevant information through more sophisticated and interactive tailoring processes (Shin, 2016). Users can now choose either to receive personalized information tailored by the system or tailor the information themselves through customizing the system to include/exclude specific contents of interests (Serino, Furner, & Smatt, 2005; Sunder & Marathe, 2010).

Framing refers to varying the ways in which the same contents are delivered to users, which can be done through such means as utilizing different modes of presentation (e.g., text, video) and emphasizing what may be promoted or prevented by a certain decision (Higgins, 1997). As one of the primary goals of health information is to motivate individuals to adopt or avoid certain behaviors that either *promote* desired outcomes or *prevent* undesirable outcomes, the promotion- and prevention-based framing strategy is particularly applicable to the context of health communication. That is, health information framed with a promotion focus would emphasize the value of advancement that can be gained from engaging in a certain behavior, whereas that with a prevention focus would highlight the value of safety that can be strengthened by avoiding the behavior. Therefore, individuals' behavioral responses to health information are arguably a function of not only the tailoring of information but also the promotion- and prevention-based framing of it (Spiegel, Grant-Pillow, & Higgins, 2004). Together, the ways in which information is tailored and framed are central to the success of wearable health communication. The *wearable* nature of smartwatches, for instance, limits the systematic, intensive processing of a large volume of information. Consequently, efficient strategies are needed, including tailoring and framing, to optimize the preventive outcomes of health information. The present study intends to validate the role of different types of information tailoring (personalization vs. customization) and framing (promotion vs. prevention) strategies in shaping user attitudes toward and perceptions of health information and increasing the tendency for self-preservation.

2. Theoretical background

2.1. Information tailoring: personalization vs. customization

Information delivered via digital media can be tailored in two ways: personalization and customization. Personalization involves system-initiated tailoring, in which the system (e.g., computer, website) tracks users' individual needs and interests and then provides information that matches their identified preferences (Serino et al., 2005; Sunder & Marathe, 2010). Personalization collects data either by directly asking users for their demographics (e.g., name, gender, birth date, phone number) or by indirectly observing and tracking user behavior (e.g., web history; Sunder & Marathe, 2010). An online shopping mall that remembers users' past purchase and recommends related products on the next visit is a precise example of an automatic personalization system that has been widely utilized for a while now. Such a personalization system is especially effective in the context of health communication because it increases the relevance of health information without requiring much effort from users (Shin, 2011). Personalization and personalized information refer to recommendation and information recommended by the system, respectively, based on both overtly and covertly collected data on user behaviors and/or personal information.

In contrast, customization is a highly user-driven process (Nielsen, 1998) that enables greater user control and involvement by giving users direct control and allowing them to dictate their interaction with the system (Shin, 2013; Treiblmaier, Madlberger, Knotzer, & Pollach, 2004). Therefore, users are active organizers of information in customization, whereas they play a relatively passive role in personalization (Treiblmaier et al., 2004). Customization has been found to render significant positive effects on health-related behaviors and persuasive outcomes (Noar, Benac, & Harris, 2007; Sundar, Bellur, & Jia, 2012). According to the agency model of customization (Shin, 2013; Sundar et al., 2012), customization triggers a "self-as-source" schema and leads users to believe they are the source of information, which ultimately provides a strong sense of control and autonomy. Greater positive effects can be expected especially by "power users" with strong self-efficacy and clear outcome expectations (Sunder & Marathe, 2010). Power users are those who tend to spend a large amount of time engaging with the various functions offered by technology (Bhargava & Feng, 2005) and prefer to have precise control over their interactions (Marathe, Sundar, Bijvank, van Vugt, & Veldhuis, 2007). By allowing users to be active agents who control the tailoring process and information delivery system (Coner, 2003), customization induces a greater sense of agency and involvement in information contents, which results in a positive attitude toward and evaluation of the conveyed information.