Abstract:
Behavioral economics (BE) has successfully informed health interventions that require one-off or short-term behavior change, such as organ donation, vaccinations, and HIV testing. BE has been much less successful in changing chronic health behaviors, and even when effective, such as for medication adherence (e.g., Volpp et al., 2008), the targeted outcomes typically return to baseline levels once the intervention is withdrawn. Given that the global health burden is increasingly due to chronic unhealthy behaviors such as obesity, smoking, or lack of medication adherence, a key BE research area is how the field can be used to bring about effective, long-term behavior change.

Theories from the field of psychology suggest that targeting habits can be effective for promoting long-term healthier behaviors (Phillips et al., 2013; Brooks et al., 2014). Conceptually, habits are automatically triggered by contextual cues, reducing the need for deliberative thought to perform the behavior (Wood & Neal, 2016). Unfortunately, few people are able to effectively self-determine their health habits: in a recent survey conducted by the authors, fewer than 15% of those trying to establish a healthy long-term behavior had succeeded after 3 months. Moreover, existing habit formation interventions are typically one-off or short-term interventions that fail to support the majority of participants during the habit formation period (Sheeran, 2002; Wood & Neal, 2007; Galla & Duckworth, 2015). Since habit formation is a long process (Redish et al., 2008; Rothman et al., 2009), taking about 3 months (Lally et al., 2010), two common BE biases may be preventing more universal habit formation: lack of salience and present-biased time preferences.

This research uses data from a BE experiment the authors recently completed that employed traditional BE incentives to promote medication adherence in order to motivate new intervention techniques for building healthier habits. In this paper we first develop a habit measure that is based on objectively verifiable, electronically measured medication adherence. It is calculated as the fraction of scheduled pills taken within a one-hour window around the moving modal time of observed pill-taking, which flexibly captures changes in participants’ daily routines. This measure is highly correlated with mean adherence ($r=0.62$) and adherence over 90% ($r=0.54$), and about 49% of the sample are classified as showing habitual adherence. Women, those over 30, and study participants without children are significantly more likely to habitually take their medication. Importantly, our quantified measure of temporal adherence is also highly predictive of future adherence: mean adherence in the first half of the study can account for 64% of subsequent adherence, but displaying habitual adherence during that time adds another 10% of predictive accuracy. This finding shows that our habit measure, while highly correlated with mean adherence, captures a second, orthogonal dimension (timing of adherence) that is ignored when looking at mean adherence alone. The habit measure is also highly predictive of behavioral persistence: mean adherence 6 months after incentives are withdrawn is associated with higher habit strength during the intervention, with a marginal effect of 0.33 (SE, 0.190), even after controlling for mean adherence and treatment group assignment during the intervention. These results suggest that providing incentives conditional on habitual pill-taking may be an effective method for combating patients’ lack of salience and present-bias during the habit formation period, leading to more persistent long-term medication adherence.

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