Acceptance of Mobile Apps for Health Self-management: Regulatory Fit Perspective.

Marzena Nieroda[1], Kathleen Keeling[1], Debbie Keeling[2]

[1] Manchester Business School, University of Manchester, Manchester, M15 6PB
[2] School of Business and Economics, Loughborough University, Leicestershire, LE11 3TU
Marzena.nieroda@mbs.ac.uk, Kathy.keeling@manchester.ac.uk
d.i.keeling@lboro.ac.uk

Abstract. This study addresses (non)acceptance by individuals of mobile applications (apps) for health self-management (e.g., apps for running). Regulatory Focus Theory (RFT) and Regulatory Fit (RF) principles are used to facilitate understanding of acceptance of such apps within a goal pursuit process. First, RFT was deployed to position different apps as strategies aligned with promotion/prevention goal orientation (supporting pursuit of achievement/safety). The Promotion-Prevention (PM-PV) scale was developed to allow differentiation between such apps. Second, through experimentation it was established that RF principles can be used to understand m-health adoption where promotion/prevention oriented apps can be (mis)matched to individuals' congruent goal orientation (promotion/prevention). The experiment was a first study confirming fit effects resulting from product antecedents in combination with a chronic (individual long-term) goal orientation; this condition was necessary to understand m-health tools adoption in "real-life" situations. Implications for healthcare practitioners are outlined.

Keywords: Regulatory Fit, Regulatory Focus, mobile apps for wellness, health promotion

1   Introduction

Poor health around the world and low individual involvement in health self-management are a major threat to healthcare system sustainability [1]. Some perceive technology, particularly mobile health applications (m-health apps), as a transformation factor facilitating individual engagement with health [2], e.g., mobile tracking provides a 40% advantage for retention of weight-monitoring behavior over pen-and-paper methods [3]. Despite the promise of m-Health, evidence indicates low acceptance and adoption of such initiatives especially when individuals do not feel that tool use is compatible with their health goals [4]. Thus, understanding the role of technology in relation to individual goals may facilitate adoption of these tools and provide practical guidance for healthcare practitioners to successfully recommend use.

Technology acceptance models are traditionally used to explain technology adoption [5]. Those models predict behaviors based on individual beliefs and attitudes relating to a given behavior or technology – not on individual preferences for goal pursuit. A

growing body of literature criticizes these models for failing to recognize individual differences for taking an action, e.g., preferred ways of goal pursuit [6].

We propose a goal orientation framework for understanding m-health adoption guided by principles of Regulatory Focus (RFT) and Regulatory Fit (RF) theories [7], which focus on individual preferences for prevention or promotion oriented strategies of goal pursuit. We further propose that prospective users perceive m-health apps as promotion or prevention oriented and that a fit between user and app orientation will increase uptake. To this end, we developed the Promotion-Prevention (PM-PV) scale to differentiate between m-health tools and then conducted an experiment to test this proposal.

2   Conceptual Foundations

2.1   Mobile Apps: Promotion/Prevention Focused Strategies of Goal Pursuit?

RFT distinguishes between two individual motivational orientations dictating different concerns during goal pursuit [7]. Promotion-oriented individuals want their chosen strategy for goal pursuit (means) to help them satisfy their needs for accomplishments (gains), striving for positive outcomes from the goal pursuit. Promotion-oriented individuals see their goals as dreams or aspirations. Prevention-oriented individuals want their chosen goal pursuit strategy to help them meet their needs for safety, tending to use vigilant strategies to meet their goals believing that such strategies will help them avoid negative outcomes (losses). Prevention-oriented individuals see their goals as duties, responsibilities, and obligations [8]. RF posits that when individuals pursue their goals with a matching goal pursuit strategy, they tend to be more engaged in their goal pursuit and are more likely to progress with their tasks at hand [7].

This research proposes positioning mobile apps as promotion/prevention oriented strategies of goal pursuit, which when matched with promotion/prevention oriented individuals are more likely to be adopted. However, the evidence that products have their own focus is limited. A few scholars have implied (but not reliably measured) that different products have their own inherent promotion/prevention characteristics [10]. However, most of the studies highlight promotion/prevention attributes of a given product, [e.g., 9], concentrating on added product attributes, not inherent characteristics of the product. Products and their inherent characteristics have been verified as goal pursuit strategies appropriate for promotion- and prevention-oriented individuals, though the products were not differentiated on their promotion/prevention dimensions but rather on categories such as hedonic and utilitarian [11]. Therefore, our first objective was to demonstrate that m-health applications can be (reliably) differentiated by consumers as promotion- or prevention-oriented strategies for health self-management.

2.2   m-Health Tool + Individual (Mis)match: Regulatory Fit in Action

To understand apps acceptance in "real world" situations we need to make sure that the fit conditions can result from individual chronic (long-term) goal orientation rather than a temporary, primed (short-term) goal orientation (predominantly used in previous

studies). Knowing how people with chronic predispositions react to different tools enables provision of appropriate guidance for health professionals for successful app recommendation.

Research using behaviours or messages (not products) differing on strategies aligned with promotion/prevention goal orientation confirms that RF can have varying participative outcomes, for example, that RF correlates with individuals "feeling right" about goal pursuit [12], favorable attitudes toward the tasks at hand [13, 14] and willingness to expend effort on such goal pursuit [15]. While most of these effects resulted from primed goal orientation, Higgins [7] states that the same effects should be observed when chronic goal orientation is used as a fit antecedent. Hence:

- **H1a:** A (mis)match (nonfit/fit) between an individual user regulatory orientation and a mobile app leads to a (weaker)stronger sense of "feeling right" about using the tool.
- **H1b:** A (mis)match (nonfit/fit) between an individual user regulatory orientation and a mobile app leads to (lessor)greater input of effort to use the tool.

3 Methodology and Results

Research included a scale development process and an experiment. Scale development involved 7 studies following Churchill [16] and DeVellis [17] recommended steps. Study 1a was a health support tool categorization task validating the concept. Study 1b collected data for scale item generation; Studies 2 and 3 were two rounds of evaluation of item face and content validity and purification, Study 4 (n = 210) comprised the initial scale evaluation including exploratory and confirmatory factor analysis and evaluation of convergent and predictive validity, resulting in item reduction, Study 5 (n=86) validated the reduced scale using the same analyses and evaluation of predictive and nomological validity. Study 6 (n=242), the final validation, used different tools but the same range of analyses and range of validity checks.

The result, apart from the actual PM-PV scale (see Table 1), was support for our proposition that mobile health apps can be reliably differentiated as aligned with promotion or prevention-oriented goal pursuit strategies. An experiment, using a 2 (promotion, prevention chronic) by 2 (promotion, prevention tool) factorial design appropriate for tool manipulation, tested H1. (US respondents n =126, from Amazon Mechanical Turk online panel [18]). Experimental treatment involved promotion/prevention-oriented individuals being exposed to description and photographs of either (a) a promotion-oriented tool, e.g., a running app, or (b) a prevention-oriented tool, e.g., a health information app. The outcome variables were expected invested effort in using the app [15] and "feeling right" about app use [19].

Table 1. Final items in the PM-PV scale

PM-PV scale items
Promotion (PM) items
1. Improve their health
2. Fulfill needs for their ideal health
3. See themselves as striving to fulfill their health plans and goals
4. Focus on achieving desired health outcomes
5. Be successful in attaining future health goals
6. Achieve hopes and aspirations for their health
Prevention (PV) items
1. Take precautions to lead a safe and healthy life
2. Focus on protecting themselves from unwanted health outcomes
3. Safeguard against mistakes that might impact their health
4. Prevent health failures
5. Stop unwanted health crises

Individual respondent focus was assessed using the Regulatory Focus Questionnaire (RFQ) [20]. The questionnaire inquires about strength of chronic promotion and prevention focus. Summated scales of prevention foci are subtracted from summated scales of promotion foci and scores of the differences above median value indicate promotion focus, below indicate prevention focus. After data screening/manipulation checks, the results supported H1a, with higher perceptions of "feeling right" (M=.33, SD .74) in the case of a match (fit) between individual orientation and tool orientation than in a mismatch (non-fit) (M=-.06, SD=.97, $F_{(1: 124)}$ = 4.18, p=.04). In a test of H1b, a 2 x 2 ANOVA of participants' effort in using the tool showed a significant individual goal orientation x tool orientation interaction ($F_{(1,122)}$ = 4.57, p=.035). Effort under fit (match) conditions (M=.21, SD=.89) was significantly higher than effort in non-fit (mismatch) conditions (M=-.19, SD=.96).

4   Discussion

The main contributions are: (1) The development of the PM-PV scale for tool differentiation as promotion or prevention orientated. The scale is an important practical tool and also a contribution to RFT theory; 2) Tool-individual matching possibilities based on chronic goal orientation contributes to RF theory as the first to evaluate product acceptance when matched/mismatched to chronic goal orientation. This is important for understanding "real-world" situations in which individuals are encouraged to use self-management tools.

Recommendations for different industry stakeholders are as follows. First, different parties involved in the development and distribution of m-health tools can use the scale development research findings to design and customize m-health tools for various consumer groups. The PM-PV scale helps in the differentiation of existing tools and

whether newly developed tools have an intended promotion or prevention appeal. Second, health service providers can use the match/mismatch principles to improve tool acceptance and consequently health outcomes. For instance, a test for individual goal orientation might offer one approach for physicians and healthcare insurers [20]. Such a customized approach should make those tools more relevant for different individuals, thus making them more acceptable.

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