

LESSONS FROM A FAILED ATTEMPT AT INCREASING SUSTAINED USE OF A MOBILE APP PROVIDING DIGITAL FEEDBACK ON WATER DRINKING



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Background: Drinking enough water is associated with a range of health benefits. However, many people do not meet their daily water needs. A smartphone application that delivers tailored feedback on water drinking could support people in reaching their water drinking targets. Recent literature [1] supports the potential of mobile phone apps for behavioural change. Unfortunately, evidence from practice indicates that most smartphone applications fail to engage users over time [2, 3]. Little is known about how to increase the retention rates of these apps.

Objective: The aim of the current analysis was to understand the factors associated with continued use of a behaviour change health app. We looked at the effect of age, gender, motivation, perceived self-efficacy, expected use, and feedback properties – *feedback valence*, *cooperative feedback*, and *competitive feedback* – on app retention rates. Due to the number of users who abandoned the app, we lacked the statistical power to gauge the impact of the app on behaviour change.

Methods: 538 participants were recruited through the iOS app store. After downloading and installing the app, all participants completed a questionnaire about age, gender, motivation to record and change water drinking behaviour, perceived self-efficacy in doing so, and the appropriateness of five potential goals for app use [4]: documentary (*‘how much water do I drink?’*), diagnostic (*‘has my water drinking an effect on fatigue?’*), behaviour change oriented (*‘I want to drink more water’*), reward-oriented (*comparison to others, badges, etcetera*), and ‘fetishized’ (*interest in gadgets for their novelty value*).

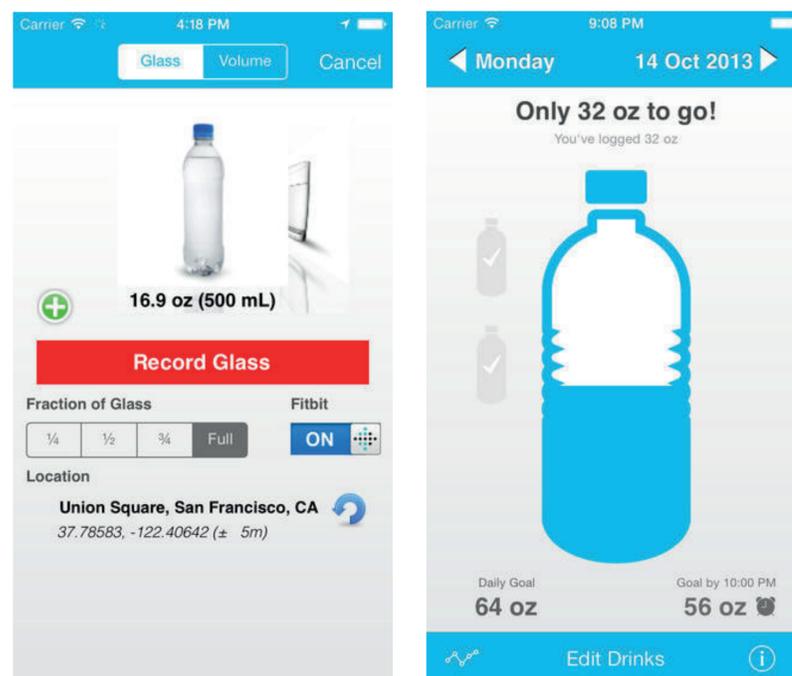
Participants recorded water-drinking behaviour using the smartphone app as they saw fit, with no requirements on duration and frequency of use: participants were free to skip measuring days, or abandon the trial altogether. The trial lasted for 68 days, starting on the day the questionnaire was completed. All participants started within the first week of recruitment. Participants were randomly assigned to one of five conditions: *app-as-is* ($n=146$), app with *negative feedback* ($n=96$), app with *positive feedback* ($n=91$), app with *feedback to foster competition* with other users ($n=94$), app with *feedback to foster cooperation* with other app users (common goals, $n=111$).

Results: Of the 538 participants, 23.8% (128 participants) downloaded the app, but never used it. A further 23.6% (127 participants) only used the app once. Only 129 users (24%) made it past the first week, and none of the participants made it to the end of the 68-day trial period. All participants were highly motivated to use the app upon download ($\mu=5.38 \pm 1.36$ on a seven-point scale), but it required very high motivation ($B=.25$, $SE=.08$, $p<.01$, $Exp(B)=1.28$, 95% CI $1.09 < Exp(B) < 1.51$) and the goal to change drinking behaviour ($B=.61$, $SE=.30$, $p<.05$, $Exp(B)=1.83$, 95% CI $1.02 < Exp(B) < 53.2$) to actually start using the app. Once in use, gender (women more than men, $B=-3.63$, $SE=1.77$, $p<.05$, 95% CI $-7.41 < B < -.15$), and having the concurrent ‘documentary’ goal ($B=4.59$, $SE=1.56$, $p<.01$, 95% CI $1.52 < B < 7.67$) had a positive effect on sustained use. Condition, i.e. our experimental manipulations, did not affect sustained use.

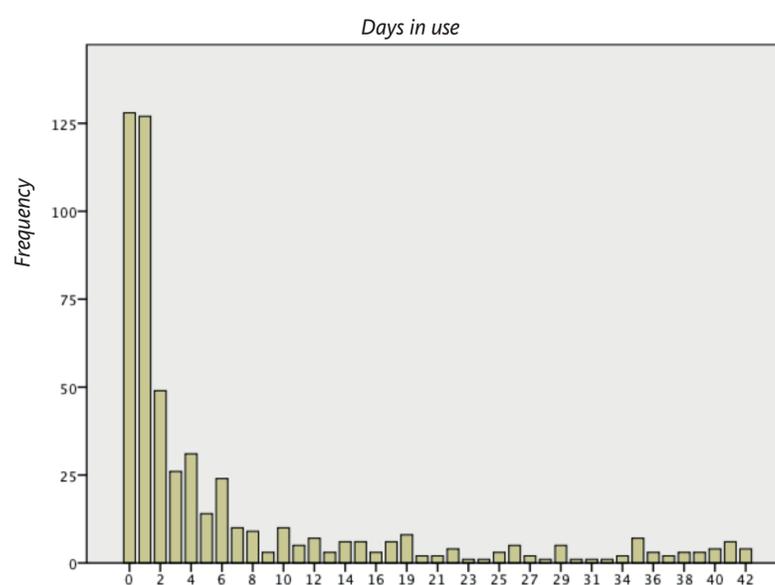
Conclusions: These findings shed light on some of the challenges associated with voluntary use of mobile apps to promote behaviour change. The user attrition rate for this app is very high; with 75% of users abandoning the app within one week, which is comparable to retention rates in other domains [2]. Furthermore, it takes a very high initial motivation to start using this app, and a good fit between user needs and app deliverables to keep on using it long enough for behaviour change to occur. This result also calls into question the efficacy of feedback message manipulations ‘per se’. Feedback valence, and message framing for cooperation or competition did not affect sustained use. This study supports the notion of ‘lived informatics’, the idea that people will actively select those resources that best support the behavioural change they seek, rather than the notion of ‘persuasive technology’, the idea that technology is capable of driving behavioural change itself.

References

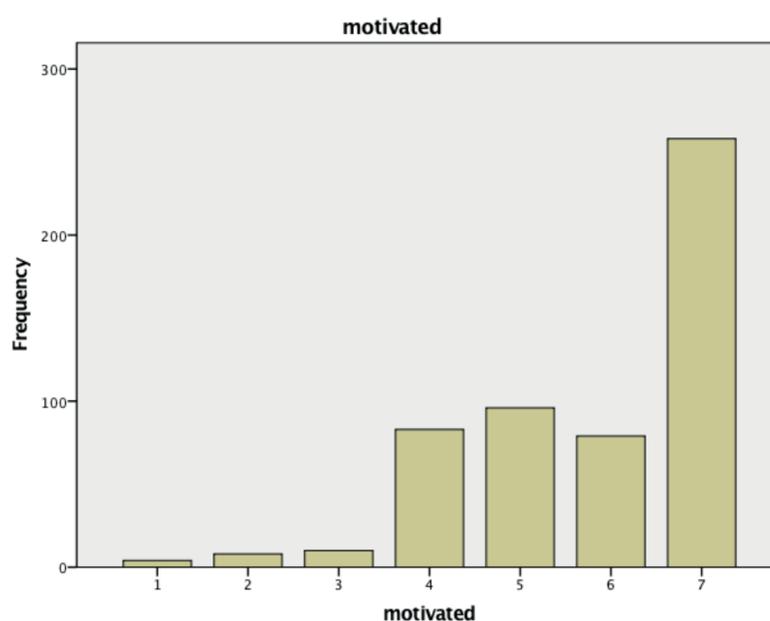
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Record screen (left) and feedback screen (right) of the app used in the experiment



Frequency of the number of days participants used the app during the 68-day trial period



Distribution of initial motivation to use the app