What about Long Term Tracking being Useful: Taking Change Management Seriously

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Abstract

In this study we take fitness or activity trackers as examples of a technology that aims to utilize long-term tracking as an aid to behavior change. Many studies have already analyzed the use of activity trackers and shown that it is in fact difficult to engage users over long periods of time. We believe that one reason for this is the reductionist approach to quantification of self these activity trackers adopt. In order to overcome this difficulty and help users to benefit from the value of long term tracking, we think it should be integrated into a broader change-management ecosystem. Rather than looking for long-term tracking as an end, we suggest to look for long-term needs supported by technological tools that can include trackers.

Author Keywords

Activity tracker, long-term tracking, behavior change.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous

Introduction

In response to the development of sensing technology, research into wearable devices and their uses has

become a significant area of interest within the HCI and ubiquitous computing communities [6,20]. Wearable devices are also central in other studies characterized as personal informatics, quantified-self or smart devices. All these studies focus on the use of these devices for the practice of collecting a great amount of data on oneself, typically as part of a self-improvement regime. However, many studies on activity trackers show a short rather than long-term use, and a large number of reasons for early abandonment have been identified [14].

When trackers fail to support real needs
As part of our research in the area of change management, we performed an ethnographic study on the use of activity trackers in the workplace [3]. We come back here to that analysis to provide insight on why it is difficult to involve users with quantified self-metrics over the long-term.

REDUCTIONIST APPROACH
Activity trackers are essentially pedometers with a gamified interface, reducing a complex and contextual concept like fitness to a step-count, and the notion of improvement in fitness to the attainment of arbitrary, usually incremental goals. The use of such trackers may be useful within the context of a broader health intervention, where goals and progress are targeted to a user, and defined outside of the environment provided by the activity tracker. On its own, however, the tracker can give users the perception that it provides an "unfair" characterization of their efforts and progress, leading users to feel frustrated, unsatisfied or disappointed [3,7]. Ultimately, for most users, progress in fitness requires a more nuanced representation than

what can be provided by virtual rewards tied to arbitrary milestones.

EXTERNAL MOTIVATION
As mentioned above, activity trackers are provided with default milestones that are bounds to a simplistic gamification setup. This, initially can have a positive impact and engage users in achieving the first milestones (for example, ten thousand steps a day). What quickly becomes less obvious for users is where to go from there. Real-life fitness milestones cannot be infinitely incremental, but quickly become repetitive if they do not evolve. The gamified layer of virtual rewards, and the social layer of sharing (or competing on) achievements within a social network do not provide users with clear, long-term end-game. In our study, this simplistic vision of motivation only based on the device rewards leads to the loss of motivation for the user and the abandonment of the tracking [3]. In contrast, there have been also studies showing that, where activity trackers have been included in workplace programs the results are more nuanced toward positive outcomes [5].

On the other side, despite these large abandonment rates, it is very reasonable to argue that many beneficial functions could be associated to the availability of extensive and continuous personal data tracking over the long term in a person's life. Long-term activity data tracking could be used to prevent and address current social health epidemics like obesity.

Our position is to defend what we call a systemic approach where we focus both on the context of the user and the personalization of the tools in order to

support specific needs such as behavior change management. For such needs, it is clear that the technologies in support cannot be reduced to a single metric, be limited to a device, and sustained only by gamification or social media mechanisms. We rather claim for the relevance of an ecosystem setting objectives, strategies and a role for the tracked data in them to monitor and sustain progress.

Tracking to support change management: the benefit of a systemic approach
In the area of behavioral change, a human habit needs to be changed: it can be a health related condition (e.g. obesity, smoking) or any other situation (e.g. a company willing the employees to optimize the use of resources, like paper documents). Our work in the area of behavior change has led us to the conclusion that the interventions to change behavior are complex and a solid unified tested approach does not exist to date, but rather various methods and approaches, still under investigation for their effectiveness [10]. Our own experiments have shown us that a promising approach is to address the problem in a systemic way [10]. This understanding is supported by behavior change models [12, 17] that model the behavior as dependent on a combination of capability, opportunity and motivation, but crucially also on the fact that an individual's behavior is dependent also on the context, and in particular the existing infrastructure and the social environment. Changing human behavior requires, therefore, first to understand the context of the user and the complexity of the change, and then to design an appropriate intervention addressing the key sources of the behavior, considering the intervention's practicability and acceptability. For example, in the office domain we studied paper use and waste and

informed the development of the Print Awareness Tool (PAT) [10] adopting a systemic approach.

PAT promotes more sustainable print behavior in a corporate work environment providing instruments at the personal, group and organizational level, exploiting their tracked printing habits both to assess their capabilities and provide awareness, and in sustaining the change. The behavior change program has been addressed by involving both the individual employee, the immediate communities surrounding them (same role, same projects, same org structure) and the work organization, in a common effort to reduce unnecessary printing and thus (paper) waste. An experimental deployment of PAT showed the effectiveness of this approach: participants reported taking it personally, thinking twice before issuing a print job, and, in consequence, adopting various changes in their print behavior.

We argue here that any approach and even more in areas that pertain health related programs should be addressed in the same systemic way, where tracking is part of a multi-agent program. For example when we studied the applicability of our approach to the topic of obesity we spent considerable time to assess what the medical experts know about the various determinants of obesity and their connections (see fig.1) like food intake [8, 9], physical activity [11, 13, 21] , socio-economic status [15, 16] (better established as determinants) and others less confirmed e.g. : microbiome [19], mental health and emotional status [2, 18, 23]. While examining the state of the art with medical experts we understood that as of today, the cause effect links are not completely known, and an approach would be to track as many as possible

variants, to devise personalized analysis of the determinants and systemic intervention schemes, typically involving the person and its social context, such as the family and the school.
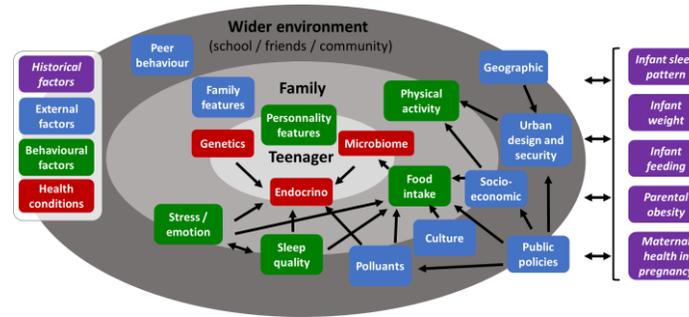

Figure 1 medical understanding on the teenage obesity determinants and how they inter-relate

Additionally, we argue that behavior change, even when treated in a systemic way and inserted in specialist programs, is also not an event in isolation, as from both the societal and the personal point of view, maintenance of the new state is desirable, but often not easy to achieve. It is well known for example that a challenge of weight loss interventions even when not as dramatic as in obesity cases, is sustaining loss after an intervention has ended [1, 4, 22]. It is recognized in the medical domain that part of the difficulty maintaining weight after a program may be that weight loss interventions have often treated a "chronic problem with brief programs" ([4] p. 369). This requires that long term maintenance programs need to be put in place, with the help of the tracked data, even if different in nature from the change behavior programs.

To conclude, we believe that trackers are still designed over a simplistic implicit message that behaviors are easy to change and even easier to maintain. Our experience, both in the office domain and in the medical domain, is very far from this simplistic approach and has shown us that programs need to surround the trackers to implement effective intervention. Additionally, long term tracking has certainly its place in the maintenance of the acquired results, but this phase as well needs to be tailored and supported by specialists of the addressed domain.

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