

Self-determined Behavior Change Goals are Dynamic, Diverse, and Intrinsically-Motivated

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Abstract. Behavior change often involves externally-determined goals, including goals that are static over time, focused on specific domains, and/or externally-rewarded. We study self-determined behavior change goals over time, without external rewards or without focusing on a specific behavior change domain. We conducted a 4-week study, N=10 participants, and noted the participants' weekly behavior change goals. We recommended a goal, i.e., to 'stay hydrated', and the participants could report maximum 3 goals each week. The participants had dynamic goals – each week, each participant had an average of 1.725 total goals, added an average of 0.41 goals, and abandoned an average of 0.47 goals. Also, each participant chose diverse goals per week and over the weeks, e.g., related to sleep, emotions, etc. Finally, most participants chose intrinsically-motivated goals via self-reflection, not our recommended one. We recommend increased flexibility and self-reflection in behavior change goalsetting to facilitate self-determined diverse, dynamic, and intrinsically-motivated goals.

Keywords: self-determined behavior change goals, user study, goal-setting

1 Introduction

Behavior change applications, both in research and industry, mostly focus on externally-determined, domain-specific, and/or static behavior change goals over time. While the goals may be guided by health recommendations, e.g., 10,000 steps a day, or motivated by different theories, e.g., social rewards, they may not necessarily be aligned with people's intrinsic motivations and goals.

Self-Determination Theory outlines that autonomy, competence, and relatedness are important for user's motivation, in particular, intrinsic motivation for behavior change [3]. Research also suggests that sustained personal motivation is key for long-term maintenance of behavior change [5] and that behavior change is an internal rather than an external process [14]. Lastly, self-guided behavior change is the most common form of long-term real-world behavior change [2].

We investigate user's real-world self-determined behavior change goals over time. In particular, we had three research questions – **RQ1:** What are people's free-living behavior change goals? **RQ2:** How do those goals change over time?

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RQ3: What drives the users to set and change their goals? We conducted a 4-week study with 10 participants to track free-living behavior change goals over time and allowed each participant to list up to 3 behavior change goals per week.

Our results show that the participants' goals were dynamic, diverse, and intrinsically-motivated – *i. Dynamic:* Each week, each participant had an average of 1.725 goals, out of which they added an average of 0.41 goals and abandoned an average of 0.47 goals; *ii. Diverse:* Each participant chose diverse goals each week and over time, e.g., goals related to sleep, diet, emotional well-being, work, chores, and exercise; *iii. Intrinsically-motivated:* Most participants chose intrinsically-motivated goals via self-reflection and not our recommended one.

We propose adding more flexibility and periodic self-reflection to the behavior change goals-setting, self-tracking, and rewards so that the users can reflect on their rewards and motivations and set their goals accordingly.

2 Related Work

Self-Determination Theory suggests that intrinsic motivation is key for behavior change [3], and intrinsic motivation is also considered helpful for long-term maintenance of behavior change [5]. Rapp et al. conducted user interviews, which suggest that behavior change is an internal rather than external process [14]. Finally, self-guided change is the most common form of long-term and maintained health behavior change [2] and is also important for environmental behavior change [1]. Thus, research highlights the importance of self-guided behavior change [2].

Personalization is a common theme in behavior change, and self-determined and personalized goals have been explored for specific behavior change domains, e.g., personalized step goals [15]. Goal-setting is a key part of behavior change support systems (BCSSs) and BCSSs “emphasize autogenous approaches” by building on “own motivation or goal” [12]. Our research explores self-determined behavior change goals, not confined to specific behavior change domains.

Self-experimentation has also been explored [6], e.g., for irritable bowel syndrome support [4] and for behavior change plans using just-in-time support [9]. There are also guidelines for supporting personalized behavior change goalsetting and plans [9,8,7]. However, there are no investigations like ours, which focus purely on self-determined behavior change goals, not behavior change plans or implementations, over time. We investigate users' free-living behavior change goals over time, without confining them to specific plans or implementations.

3 Study Design

We conducted a 4-week study with 10 participants and inquired the participants about their free-living behavior change goals each week for the 4-week study.

3.1 Procedure

We allowed the participants to list up to three behavior change goals per week. The participants could choose each week's goals independently of the previous weeks. We conducted the study in a free-living real-world setting.

Each week, we sent the participants a weekly survey form via Google Forms. The participants could add up to 3 behavior change goals each week and the survey had the following open-ended questions for each goal: *Q1. What is your behavior change goal? Q2. What do you plan to do to/how would you implement the goal? Q3. Why is the goal helpful or important to you?*

We suggested one behavior change goal, i.e., “*stay hydrated, e.g., drink a glass of water in the morning*”. After the first week, we also included two additional survey questions to learn more about the participants' behavior change experience: *Q4. How was your behavior change experience last week? Did you learn something? Did something change? Q5. Anything you would like to add?*

3.2 Participants

We sent a recruitment email to our university's department mailing list. We received 10 responses (N=10; μ = 23 yrs, σ = 2.36 yrs; 7 males, 3 females; all students), and included the participants without any inclusion or exclusion criteria. The participants did not receive any financial or other compensation. The participation was voluntary and the participants could drop out of the study at any point. None of the participants dropped out of the study.

3.3 Data Analysis

We coded the qualitative responses and performed thematic analysis. Additionally, we calculated the total number of goals listed by each participant each week and also computed the number of goals added and abandoned by each participant each week. We considered modifications in goal implementations (Q2), e.g., changes in the frequency, time, or duration as the same goal, not a new goal.

4 Results

We conducted a 4-week study, N=10 participants, to investigate the participants' behavior change goals over time. The participants could add up to 3 open-ended goals each week and we recommended a goal of staying hydrated. We share below (i) weekly goal statistics for total, added, and abandoned goals, (ii) weekly goals categories, and (iii) qualitative participant feedback. Our results show that the participants chose dynamic, diverse, and intrinsically-motivated goals over time.

4.1 Dynamic Goals

The participants could choose up to 3 goals per week, independently of their goals last week. Each week, each participant chose an average of 1.725 goals ($\sigma = 0.14$), added an average of 0.41 goals, and abandoned an average of 0.47 goals, indicating a ~50% change in weekly goals $(0.41+0.47)/(1.725) = 0.51$.

After the first week, when the average number of goals per participant was 2.3, the average number of goals declined to around 1.6 or 1.5 in weeks 2-4. In week 2-4, the participants added around 0.4 or 0.5 goals per participant per week, meaning that around 4 or 5 participants in a group of 10 added a new behavior change goal per week. Similarly, in weeks 2-4, the participants abandoned around 0.4 or 0.5 goals per participant per week, meaning that around 4 or 5 participants in a group of 10 abandoned one behavior change goal from last week. Two participants went back to their previously abandoned goals when adding new goals whereas the rest of the participants added new goals.

The results for the total chosen, added, and abandoned goals for each week are in Figure 1 and the results for the total chosen, added, and abandoned goals for each participant are in Figure 2.

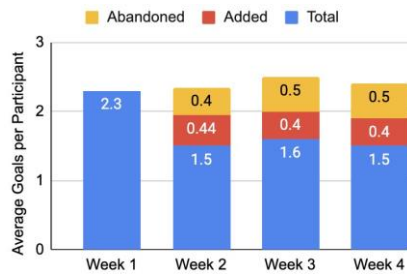


Fig.1. Average total, added, and abandoned goals per participant per week for 4 weeks.

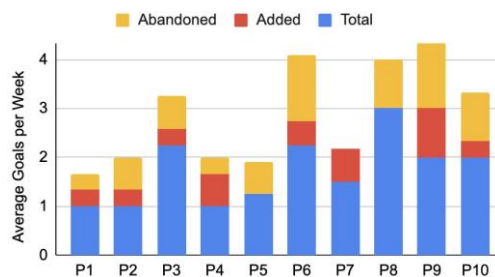


Fig.2. Average total, added, and abandoned goals for each of the 10 participants per week.

4.2 Diverse Goals

The participants chose diverse and personalized goals (Q1). Even when the goal was similar (Q1), e.g., exercise, different participants chose different implementations for

the same goal (Q2), e.g., stretching versus running versus gyming for exercise. Also, not only did different participants choose different goals, but also, the participants, who chose multiple goals in a week or changed goals over the weeks, chose different and diverse goals in a week and over time. We categorized the goals into seven categories and share the list of goal categories (Q1) chosen by each of the participants over 4 weeks in Figure 3.

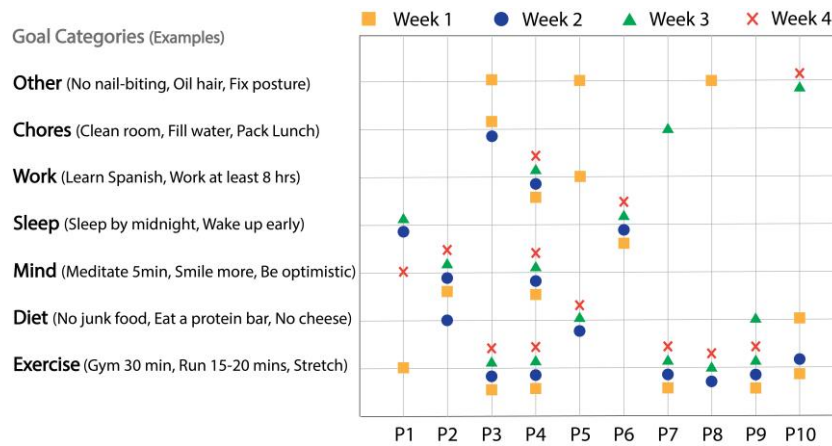


Fig.3. We categorized the open-ended goals listed by 10 participants over time into 7 categories. The goals were diverse for each participant and also across participants.

4.3 Intrinsically-motivated Goals

We recommended a goal to stay hydrated but only two participants chose it as their goal - one participant chose “staying hydrated” for only one out of the four weeks, and the other chose it for three out of the four weeks. Even when the participants chose staying hydrated as their goal (Q1), they entered different ways to implement their goals (Q2). The other goals were all personalized.

Moreover, the participants had personalized reasons for choosing their goals (Q3). For example, “*Smiling signifies happiness. I really want to learn how to appreciate life better. Notice all the great details. Care for the people around me. Even perhaps turning my happiness into meaningful experiences. If I can successfully wrap my mentality around this mindset, then I can be happier.*”, “*It is important because water = health! And I don’t always get enough water, especially during the school weeks.*”, “*digital devices are distractions, need high level of dedication and need to prioritize*”, and “*(sleeping early) Helps the next day to be more productive and proactive*”.

Finally, the reasons for changing or continuing goals were related to the participants’ changing self-knowledge (Q4,5), e.g., “*I realized that sometimes I don’t put achievable goals*”, “*I’ve yet again surprised myself at how quickly my emotions can come and go.*”

I need to try harder to focus on the good stuff”, “That it takes effort, and in my case, I do need to work extra hard to get into a rhythm of self-care.”, “I need to form a fixed schedule to be successful with my habits.”, and “I learned that I like working hard in bursts and taking breaks in between. I just need to incorporate stretching and exercising into those breaks!”.

5 Discussion

We conducted a 4-week study to investigate the free-living behavior change goals of everyday users over time. We discuss the key findings, implications, and limitations of our study below.

5.1 Findings

Our results show that in a free-living real-world setting, behavior change goals were dynamic, diverse, and intrinsically-motivated: *i. Dynamic* as the behavior change goals changed over time, i.e., the participants added or abandoned their goals based on changing external circumstances and changing self-knowledge; *ii. Diverse* as the behavior change goals for different participants and for each participant over time were related to diverse behavior change categories; *iii. Intrinsically-motivated* as even though we suggested a goal, the participants picked personalized goals via self-reflection, i.e., had personalized reasons for choosing, changing, and continuing their goals.

5.2 Implications and Recommendations

Our research investigated self-determined behavior change goals and we found that people have dynamic, diverse, and intrinsically-motivated self-determined behavior change goals. We believe that self-determined goals are important because is ethically important to give agency to the users to allow them to set, update, and evaluate their behavior change goals according to their behavior change personalized needs and preferences. Also, previous research has shown that users prefer personalization, diversity, and choice in behavior change applications [13]. Thus, diverse, dynamic, and intrinsically-motivated self-determined behavior change goals are important ethically and for personalized support.

Moreover, previous research shows that self-determination and intrinsic motivation are key to behavior change [3,5], especially since behavior change is an internal process [14]. Also, self-guided behavior change is the most common form of long-term real-world behavior change [2]. Short-term behavior change adherence and long-term behavior change retention are key challenges in behavior change [11]. Based on previous work in self-determined and self-guided work in behavior, we believe that it may be worth investigating dynamic, diverse, and intrinsically-motivated self-determined goals to improve short-term behavior change adherence and/or long-term behavior change retention.

Lastly, self-reflection has been key in behavior change, especially via self-experimentation [9,7] and self-tracking [10]. Our study shows that users set intrinsically-motivated behavior change goals via self-reflection.

We recommend increased support for self-determination and self-reflection to allow for dynamic, diverse, and intrinsically-motivated behavior change goals, which may boost behavior change autonomy, personalization, and even efficacy.

5.3 Limitations

We note three key limitations of our work. *First*, our work focuses on goalsetting and we do not track actual behavior change. In addition to goal-setting, successful real-world behavior change may need more support techniques like self-tracking and interventions. *Second*, what users desire may not be necessarily efficacious or optimal for them but it is, nonetheless, important to consider the free-living self-determined behavior change goals of users, especially since self-determined behavior change has been shown to be helpful [2]. *Third*, our study is a preliminary study, done with a convenience sample from a college population. Larger and more diverse studies may be needed to understand the needs of different user groups and populations over time.

6 Conclusion

Previous research suggests that intrinsic motivation is important for behavior change [5], that behavior change is an internal process [14], that users prefer personalized behavior change support [13], and that self-guided change is the most common form of real-world long-term behavior change [2]. However, most behavior change applications focus on externally-decided narrow, unchanging, and externally-rewarded behavior change goals. We investigated people's real world behavior change goals over time.

Our study highlights that people have dynamic, diverse, and intrinsically-motivated goals, supported by self-determination and self-reflection, over time. We believe that self-determination is not only important ethically and for personalization, but may also improve behavior change efficacy as self-determination and intrinsic motivation are helpful for behavior change [5,2,3]. We, thus, recommend more flexibility and self-reflection in terms of behavior change goal-setting to support diverse, dynamic, and intrinsically-motivated behavior change goals.

In particular, we recommend the following to enable users to align their goals with their changing self-knowledge, personal motivations, and external circumstances: i. Enable the users to add and abandon goals over time; ii. Allow users to set multiple, diverse, and personalized goals; iii. Facilitate self-reflection on goals and their intrinsic rewards.

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