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# Looking for the Unusual: How Older Adults Utilize Self-Tracking Techniques for Health Management

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**Abstract**

Self-tracking applications for health management have become popular both in industry and in academia. Half of older adults in the U.S. track health indicators, but they rarely use technology for that purpose. We conduct a qualitative study to investigate older adults' self-tracking practices in order to understand their needs as potential users of self-tracking technology. Our data indicates that monitoring the onset of abnormal changes in health is a primary reason for tracking for this population. This finding suggests that self-tracking technology that targets elderly users must assist them to identify changes in health condition.

**Author Keywords**

self-tracking; self-monitoring, quantified self; personal informatics; elderly; older adults.

**ACM Classification Keywords**

H.5.2 [Information interfaces and presentation (e.g., HCI)]: User-centered design; J.3 [Life and medical sciences]: Health.

**Introduction**

According to a recent survey [4], people in the U.S. aged 65 or older are significantly more likely to track health indicators or symptoms, 52% of them do, compared to 30% of those in younger age groups. However, while 16% of adults

under 30 who track use mobile self-tracking technology, only 1% of older adults do. Most self-tracking technology is not designed for elderly users [3]. For instance, pedometers have been found to underestimate the number of steps taken by up to 25% in older adults [2]. Thus, it is necessary to study this population's current tracking practices in a natural setting in order to inform the design of self-tracking technology targeted at elderly health management.

In this paper we discuss the preliminary results of a qualitative study investigating what motivates older adults to track and what their needs are as potential users of self-tracking technology. Our data suggests that older adults have a particular goal for self-tracking: detecting any abnormal changes in health indicators. This finding introduces a new set of design possibilities for self-tracking technology.

## Background

We define self-tracking as *repeatedly measuring and recording data about oneself, and reflecting on the data collected*. Supporting behavior change and improving self-knowledge are the two main goals associated with self-tracking [7]. We refer to tracking motivated by these goals as *routine self-tracking*. Reflection is an important part of self-tracking. Li et al. [5] stress that insightful reflection is a step toward obtaining self-knowledge through self-tracking. Similarly, Kanfer's theory on the reactivity that supports behavior change includes a reflective stage called self-evaluation [6].

According to a 2013 survey [4], 71% of older adults track their weight, diet, or exercise, and 52% track health indicators or symptoms. Among those who track, 41% record their data on paper, only 2% use computer programs (e.g. spreadsheets) for tracking, and 1% use mobile tools. For 40% of older adults who track, it has had an impact on their approach to health care.

Although a significant portion of older adults self-track, their process and motivations have not been studied sufficiently. Through this project we investigate the practice of self-tracking by older adults. We focus on understanding how they engage in tracking and in identifying how technology can be employed to assist them further, augmenting the benefits of tracking for this population.

## Methods

To investigate how older adults engage in self-tracking, we conduct a qualitative study at a Continuing Care Retirement Community in California. Our participants lived independently in their own house or apartment within the community. All participants had chronic conditions, including hypertension, arthritis, cancer (in remission), diabetes, hearing loss, and gastrointestinal conditions.

We have performed semi-structured interviews with 8 residents of that community, 5 were women. Their ages ranged from 74 to 95, with a median of 82. Each interview lasted between 0.5 and 2 hours, and we inquired about each participant's self-tracking practices, as well as aspects of their lives that could be relevant to self-tracking, such as their daily routine, exercise habits, chronic diseases, technology use, and their overall approach to health management. We transcribed and coded the interviews following an open coding technique. [1].

## Preliminary findings

We have found that our participants primarily track health indicators in order to detect changes in health. Their measurements aimed to identify any abnormalities that might be occurring at the time. This practice deviates from routine self-tracking.

Our participants use self-tracking to monitor their health,

## Tracking habits

Table 1 shows what indicators our participants tracked, and the tools they used. All participants also kept records of their clinical results, including periodic blood tests.

	Indicator	Tool
Arnold	weight	memory
John	steps	app
Beth	glucose and diet	notepad
Carl	glucose	notepad
Debra	BP	notepad
Edith	BP	notepad
Fran	BP	notepad
Grace	BP	calendar

**Table 1:** Participants' self-tracking habits

and would take action if they noticed a worrisome change. For example, one participant monitors and writes down her blood pressure daily, and calls her doctor if she is unhappy with it. *"If I'm not happy with [my blood pressure], then I will call [my doctor] and say 'hey, this is getting a little high' or 'hey, it's not gotten too low yet'."*

Our participants engage in self-tracking to detect changes that might signal a decline in health and require an intervention. Due to the nature of monitoring, their current condition influences the frequency of measurements. When asked about tracking her blood pressure, Fran said, *"I check it maybe once every couple of days. Unless I'm symptomatic, [then] I'll check it every couple of hours"*. When the 'unusual' is more likely, she increases the frequency of measurements in order to be able to detect it sooner. This change in frequency is unnecessary in routine self-tracking.

Similarly, our participants expressed disinterest in tracking routine activities such as diet and exercise. Beth reported being "sketchy" at tracking her diet because it was repetitive. Other participants expressed that they are motivated to exercise by noticing how it benefits them. Arnold attends balance training classes every week, and he continues to go because he notices that they help him keep his balance. *"I can sense the benefit because I occasionally lose my balance temporarily or reach too far or something, and I find that I do get correction responses with [balance training classes]. So I guess I will continue with those."* Grace gave a similar response, expressing that her body provides her with enough reason to exercise daily, thus self-tracking would not improve her motivation. *"If I don't have a swim in the morning, my body just feels all crapped out, [...] my back is hurting a lot. But once I get over there, and into the pool, and then horizontal, it feels much better."*

John was the only participant who used self-tracking technology, he used a mobile pedometer app continuously, and another on long walks. He denied having a goal to walk a certain distance or a number of steps daily. Instead, he reported noticing a sedentary day naturally. *"If I feel that my day is kind of sedentary I'll get up and walk on the park. But, do I have a budget that I'm meeting everyday? No. I don't."* John engaged in routine self-tracking because he was interested in seeing data about his physical activities, and has done it for many years. As he told us, *"I did it before [my doctor] was born."*

Instead of tracking to motivate themselves to have healthier habits, we observed older adults self-tracking to detect unusual changes in condition. This goal only warrants a short period of reflection: reading and registering the data, and making a decision about whether it warrants an action. We asked our participants if they engaged with the data further, but their answers indicate that they do not. For example, Debra said: *"I don't usually go back and look at the past because I know mentally that I'm way down from where I was when I started. [...] I judge where I am and how I feel. And I know that I am better today than I was in February."*

Overall, our findings indicate that the elderly have particular needs for self-tracking, that their main motivation is to monitor changes in condition that might be alarming and warrant an intervention.

## Discussion

Our data indicates that *detecting the unusual* is a primary reason that leads older adults to engage in self-tracking. Because a body becomes more fragile with age, a decline in condition can have serious and lasting effects on elderly people. Self-tracking for the unusual allows older adults to detect changes early.

Our data indicates that the reflection stage is short. Due to the purpose of checking that a certain health indicator is within a certain range, reflection happens very briefly. Given the brief reflection stage, examining if further reflection and engagement with their data could be beneficial for elderly people is also necessary.

These findings are relevant for the inclusion of elderly users in the design of pervasive software that supports self-tracking. Such tools should support the goal of detecting unusual changes in order to effectively meet this population's needs. Offering data analysis tools to detect changes that may be subtle and difficult for a person to recognize would support their goals to identify abnormalities.

The findings discussed in this paper do not necessarily apply exclusively to older adults. Our participants managed conditions that can also affect other age groups. Therefore, it is possible that these results apply to other demographics, particularly those who have chronic conditions.

### **Conclusion**

In this paper, we describe a project investigating the self-tracking habits of older adults. The majority of older adults engage in self-tracking, and our data suggests that they focus mainly on detecting abnormalities. Self-tracking systems that intend to target the health management of elderly users need to support the detection of unusual changes in condition. Designing better suited tools could increase the proportion of older adults who use self-tracking technology, and empower them in their own health management.

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