

Means of Motivation or of Stress? The Use of Fitness Trackers for Self-Monitoring by Older Adults

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Abstract

Background Research has shown that self-monitoring can promote physical activity throughout the lifespan. Self-monitoring is defined as the documentation of exercising and health indicators supported by wearable electronic devices. Appropriate exercise is especially important for health promotion in higher age. It is, however, still unanswered how older adults actually handle devices for self-monitoring and which kind of feedback they wish and need. Also, motivational aspects and further consequences of use are rarely studied.

Aims The objective of the study was to evaluate experiences, opportunities, and obstacles of self-monitoring when applied by older adults.

Method A semi-structured group interview was conducted with participants of a preceding usability-study ($n = 6$, mean age 71.7 years). Topics discussed included individual experiences and the effects of self-monitoring on behaviour. Text data was analysed using qualitative content analysis.

Results The analysis revealed four main themes: ‘Reasons for Use’, ‘Utilization Strategies’, ‘Consequences of Use’, and ‘Functionality of the Device’.

Conclusion In general, older adults are motivated to engage in self-monitoring. Nevertheless some problematic aspects were identified including the missing suitability of currently available products for the needs of older adults. This might lead to overexertion and result in a higher demand for support during usage. Only if those requirements are taken into account can self-monitoring be effective in promoting physical activity in higher age.

Keywords Self-monitoring · Motivation · Prevention · Older adults · Fitness tracker

Motivierend oder überfordernd? Die Nutzung von Fitness Trackern zum Selbst-Monitoring älterer Menschen

Zusammenfassung

Hintergrund Studien haben gezeigt, dass körperliche Aktivität durch Selbst-Monitoring gefördert werden kann. Selbst-Monitoring bezeichnet das Dokumentieren von Bewegung und Gesundheitsindikatoren mit tragbaren elektronischen Geräten. Ausreichend Bewegung ist insbesondere zur Prävention von gesundheitlichen Einschränkungen im höheren Alter wichtig. Bisher ist ungeklärt, wie ältere Menschen Selbst-Monitoring nutzen und welches Feedback sie sich wünschen. Auch motivationale Aspekte und Folgen der Nutzung sind kaum untersucht.

Zielsetzung Ziel der Studie war es, Erfahrungen, Chancen und Grenzen des Selbst-Monitorings bei älteren Menschen zu untersuchen.

Methode Mit den Teilnehmern einer Usability-Studie ($n = 6$, Durchschnittsalter 71,7 Jahre) wurde ein leitfadengestütztes Gruppeninterview geführt. Diskutierte Themen waren Erfahrungen und Auswirkungen des Selbst-Monitorings

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auf das Verhalten. Die Äußerungen wurden mithilfe qualitativer Inhaltsanalyse ausgewertet.

Ergebnisse Die Analyse ergab vier Hauptthemen: „Gründe für die Nutzung“, „Handlungsstrategien“, „Folgen der Nutzung“ und „Funktionsfähigkeit des Geräts“.

Schlussfolgerungen Generell sind ältere Menschen zum Selbst-Monitoring motiviert. Es zeigten sich jedoch auch problematische Aspekte wie eine fehlende Anpassung aktueller Geräte an die Bedürfnisse älterer Personen. Dies kann zu möglicher Überforderung und einem erhöhten Bedarf an Unterstützung bei der Nutzung führen. Wenn diese Anforderungen berücksichtigt werden, kann Selbst-Monitoring zu einer Förderung der Bewegung im höheren Alter beitragen.

Schlüsselwörter Selbst-Monitoring · Motivation · Prävention · Ältere Menschen · Fitness Tracker

Background

Current technological progress enables individuals to survey their own behaviour with the help of wearable electronic devices [14]. The independent and individual documentation of exercising and other health indicators like weight, blood pressure, or sleep patterns [8] is an intensively growing area, denoted by the term self-monitoring [20]. Using systems for self-monitoring individuals get access to important information about themselves and might even establish a more active doctor-patient-relationship [1]. Further development and performance of sensors in smartphones [16] and other smart wearable devices fitted with health applications, so called ‘fitness trackers’ in particular promote this trend [7].

There is evidence that even basic methods of self-monitoring are effective. Studies have shown that wearing a pedometer and a daily documentation of one’s steps in an activity diary can increase the number of steps actually taken [3, 4]. Moreover, Bravata et al. [2] showed in a systematic review that outpatient adults can significantly increase physical activity and decrease body mass index and blood pressure when using a pedometer. Consequently, self-monitoring is not only a tool for the documentation of behaviour but the immediate feedback motivates to be more active and helps individuals to gain control over health-related aspects of their lives.

Appropriate exercise is recommended for individuals of all ages [26]. One of the most important target groups for a further promotion of self-monitoring might be the growing population of the elderly. In view of ageing societies [17, 21] issues of self-monitoring are also related to the question of whether its potentials can contribute to healthier aging-processes and to a longer independent living until old age. A positive correlation between physical activity and the

health of older persons is supported by numerous empirical studies. Lack of exercise is described as a central risk factor for mental and physical impairments in higher age [15, 23] and it can be stated across studies that physical activity contributes to healthier aging processes [9, 18].

Initial investigations on the effects of self-monitoring on the activity-level of older adults concluded that this target group can significantly improve their movement behaviour when using such systems [13, 22]. Other studies in this field reported no direct effect of self-monitoring on the activity level of older adults; but participants were interested in using a tested fitness tracker beyond the duration of the study [19]. These studies mainly focused on the immediate and countable effects, e. g. changes in the number of steps, when devices for self-monitoring are used by older adults. However, products and services are only used if attitudes towards them are positive [6]. It must not be forgotten, however, that these relatively new possibilities of surveying behaviour might meet with fear and refusal. People might have reservations and be afraid of being monitored by third parties or they might not be comfortable with new technologies [24].

Against this background, it needs to be inquired under which conditions self-monitoring might help to promote an active lifestyle of higher aged users. In particular motivational aspects as well as positive and negative consequences of use beyond the number of steps and issues of usability have rarely been investigated so far. It is of high importance to consider both, opportunities and obstacles for self-monitoring in the elderly. For this purpose, the present study analyses requirements and demands of older people in the context of self-monitoring. In this manner, conclusions can be drawn about the best ways to promote self-monitoring in the target group of older adults, which might then contribute to healthier ageing, less diseases, and longer independence in high age.

Method

A qualitative design was chosen for this study which allows to generate hypotheses and to explore underlying motivational mechanisms when older people engage in self-monitoring.

Data collection

Data collection was realized in form of a group discussion. This qualitative research method permits to study subjective experiences and individual meaning of behaviour. Collective opinions and the formation of opinions in groups can also be observed [12]. Prior to their participation in the

Tab. 1 Overview of all categories and subcategories

Category	Number of codes
<i>1 Reasons for Use</i>	<i>21</i>
1.1 Incentive for being active	6
1.2 Self-control	7
1.3 Hedonistic motivation	8
<i>2 Utilization Strategies</i>	<i>25</i>
2.1 Used and non-used functions	6
2.2 Pragmatism	6
2.3 Trial & Error	3
2.4 (Requested) support during use	10
<i>3 Consequences of Use</i>	<i>31</i>
3.1 Relevance of feedback for behaviour	6
3.2 Comparisons relating to performance (number of steps)	7
3.3 Comparisons relating to technology	8
3.4 Feelings of being overstrained	8
3.5 Feelings of being controlled	2
<i>4 Functionality of the Device</i>	<i>46</i>
4.1 Overall functionality	11
4.2 Usefulness of feedback	11
4.3 Desired functions/information	9
4.4 Form of presentation	6
4.5 Manageability	7
4.6 Design	2

group discussion a written informed consent was signed by all subjects.

The group discussion was conducted as a semi-structured interview divided into different thematic blocks. Topics discussed were: the importance of fitness in every-day life, individual experiences with the fitness tracker, effects of the fitness tracker on behaviour, and experiences with other technologies. The interview was guided by one of the principal investigators, recorded on tape, and transcribed for analysis.

Sample

Participants of a usability-study, which lasted four weeks, were recruited for the group discussion. In the preceding usability-study a currently available fitness tracker and a smartphone application that both provided feedback on activity level (steps per day, distance walked, burned calories, movement during sleep) were utilised and tested. Within this study participants were asked to integrate the fitness tracker into their everyday life according to their interests and needs. Subjects in the usability-study were instructed that doing 10,000 steps per day was a goal they should try to realize [19].

Six out of 15 subjects of the usability-study agreed to take part in the group discussion. Participants' age ranged

from 67 to 78 years with a mean age of 71.7 years ($SD = 4.41$). All of them were female and retired for at least one year. They had not used a fitness tracker prior to their participation in the usability study but did already own a smartphone. Five subjects still used a fitness tracker regularly at the time the group discussion took place.

Analysis

Qualitative content analysis was used to analyse the statements from the discussion. In this research method text data is analysed by systematically classifying utterances in categories. In this manner themes and patterns in the data can be identified [11]. The inductive approach of conventional content analysis was applied which is especially useful when existing knowledge is rare [11]. Coding was done independently by two researchers. Discrepancies were discussed afterwards and the respective text passages were assigned to one category in agreement.

Results

Four main categories were identified, each with three to six subcategories. The main categories were: 'Reasons for Use', 'Utilization Strategies', 'Consequences of Use', and 'Functionality of the Device'. The category 'Functionality of the Device' was coded most often (Tab. 1).

Category 1: Reasons for Use

There were three main reasons for using the fitness tracker. First of all, the fitness tracker was considered a good incentive for being more active. Although some participants described the device as a "gimmick" (C, D)¹ they acknowledged a positive effect on their activity level. The second main reason for use was self-control. The device helped subjects to monitor their level of activity continuously. Thirdly, participants admitted that using the fitness tracker contributed to their personal well-being. They reported to feel "happy" (B, D), "great" (B, E), or "satisfied" (A) when receiving feedback by the device. In this way, there also seemed to be a hedonistic motivation for using the fitness tracker.

Category 2: Utilization Strategies

Utilization strategies depended on personal interest and goals. Some participants used the device to help them lose weight and others were mainly curious about their usual

¹ The different interviewees are referred to with different letters (A to F). The interview passages were translated by the authors.

activity level. In general, ‘steps per day’ was the most important parameter for all participants. Additional information presented by the device, e. g., information on calories burned or movement during sleep, were mainly judged as unnecessary. As a consequence many functions of the fitness trackers remained unused. One participant summarizes this utilization strategy: “I rarely consider that. [...] For me, only steps are important” (B).

In general, the subjects dealt with the provided feedback in a rather pragmatic manner. They said that they did not feel pressured by the device to be more active. For instance, they stated that “exercising does not necessarily mean to work up a sweat” (F), they confirmed that the level of exercising should be “appropriate to one’s age” (A), and agreed that having pain was a good reason for being less active. This pragmatic approach was also evident in a ‘trial and error’-utilization strategy applied by those who had some experience with computers or other digital media.

This notwithstanding, participants reported having problems in handling the fitness tracker on their own and explicitly requested assistance when using the device. They complained about the manual being too short. In the event of unexpected problems with the fitness tracker the main strategy was to call the principal investigator of the usability-study and request his assistance.

Category 3: Consequences of Use

Some subjects described having changed their day-to-day behaviour as a consequence of use: “I’ve changed my behaviour somehow. I am now more likely to walk to shops. Previously, I took the car” (C). Others said that they did not change their behaviour at all: “I keep my daily routine, I don’t have the time to keep that thing in mind” (D). Regardless of whether a change in behaviour was reported participants tended to compare with each other. They either compared relating to the number of steps that could be realized or relating to technical features of their fitness trackers and smartphones. A large part of the group discussion focused on the aspired goal of 10,000 steps and whether participants were able to reach this number or not. Some utterances suggest that, relating to this goal, subjects tried to reach aims that could be harmful for their health. As one participant said: “I did not find the balance between physical activity and recreation” (F). At this point, overexerting effects of using the fitness tracker could be observed. Other negative consequences of use resulting from a more general computer anxiety include being anxious about making mistakes when handling the fitness tracker or feeling observed by the device.

Category 4: Functionality of the Device

With regards to the overall functionality of the device participants complained that the fitness tracker was not waterproof and not compatible with all smartphones. Inaccurate feedback about the number of steps and the English menu navigation were criticized. As one of them said: “The wristbands count differently, don’t they?!” (B).

The feedback about the number of steps was generally judged as useful; however, participants desired a broader functionality of the fitness tracker. They were interested in information on pulse and blood pressure and asked for some emergency functions. Some subjects complained that specific activities beyond counting steps were not recorded properly. Examples for those activities were cycling, dancing, or exercising in a gym: “When I did my strength exercises the stuff did not work. It was annoying when I worked out and didn’t see the result in the evening” (F).

The presentation format of relevant information and manageability of the device also seemed to be important factors affecting continued use. Difficult handling and missing possibilities of displaying the fitness tracker’s data on a smartphone were main reasons for discontinued utilization. An appealing design was evaluated as ‘nice to have’ but not regarded as important such as issues relating to functionality.

Discussion

The objective of the study was to find out more about motivational aspects as well as positive and negative consequences of older adults engaging in self-monitoring. A currently available fitness tracker was evaluated and utilization strategies were studied. Some important aspects that have to be considered when devices for self-monitoring are used by older individuals were identified. An important insight of the study is that, in general, older people seem to be interested and motivated to engage in self-monitoring. Positive effects on well-being and hedonistic aspects of motivation were reported in a semi-structured group interview. In this manner, assumptions about positive effects of self-monitoring in the elderly were supported. However, the analysis also revealed some problematic aspects and negative consequences of use.

A first field of tension concerns the handling of the data provided by the devices and the consequences this feedback has for future behaviour. Although subjects acknowledged that sports and exercising should be appropriate to one’s individual level of performance they used the feedback of the fitness tracker to measure up to others, irrespective of individual predispositions. In some individuals this might lead to excessive demands and behaviour that is harmful to

their health. It also implies that older adults who use systems for self-monitoring should maybe not receive a feedback including exact numbers and results but rather some feedback relating to an individually tailored goal and on whether this was achieved. The incorporation of individually adjusted ‘serious games’-elements in fitness trackers, such as playing games or simulation for serious purposes like health and prevention, might be another promising approach which has not been systematically investigated yet [27]. When evaluating fitness trackers one must bear in mind that older people are a special target group. For them, individual guidelines and personal recommendations about the appropriate scope of exercising and sports are necessary [25]. Following this approach, overexertion as a consequence of self-monitoring might be prevented.

A second important issue that has to be looked into is the fact that many of the fitness tracker’s functions were not used while other additional functions were requested. This finding leads to the conclusion that fitness trackers in their current form are not suited for older adults. In the synopsis with the reported computer anxiety in the category ‘Consequences of Use’ this might furthermore lead to the interpretation that elderly people focus on the core functions of the device because they are afraid of making mistakes. It should be the aim to create easy-to-use but customisable technical solutions. Instead of creating products that target older adults it seems reasonable to aim at universal designs which can be individually tailored to all ages and capabilities [5].

In this context, the requested support is another important issue and must not be neglected. Other empirical work has shown that older internet users face severe difficulties when they experience unexpected problems while using a web platform [10]. By providing a continuous support fitness trackers might be used more efficiently by higher-aged users.

Conclusion

These results can only serve as a starting point, and a discourse about how to handle the discussed critical aspects when fitness trackers are used by older adults is urgently needed. Based on the small, non-representative sample only first tendencies can be described. The task of future research will be to create better conditions for a useful and reasonable utilization of fitness trackers for self-monitoring. This will be a promising way to exploit their potential for the prevention of diseases and the promotion of healthy and active lifestyles into old age.

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Compliance with ethical guidelines

Conflict of interest A. Schlomann, K. von Storch, P. Rasche and C. Rietz state that there are no conflicts of interest.

The usability-study has obtained approval from the responsible ethics committee (medical faculty, university hospital Aachen, EK038/15, February 2015). Prior to their participation in the group discussion a written informed consent was signed by all subjects. Data is presented in a form which does not allow for personal identification.

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