Sensor monitoring to measure and support activities of daily living for independently living older persons

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Link to publication

Citation for published version (APA):

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Chapter 7

Everyday life after a hip fracture: what community-living older adults perceive as most beneficial for their recovery

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Submitted for publication
Abstract

Background: The transition from inpatient rehabilitation to the home environment is a vulnerable period for older adults after hip fracture; during this transition, they must cope with physical and psychological restrictions that influence their everyday functioning. However, studies describing older adults’ experiences of this transition to home are lacking.

Objective: To gain insight into what older adults perceive as most beneficial to their recovery to everyday life.

Design and Methods: Semi-structured interviews were conducted with 19 older adults after hip fracture. The adults were aged 65-94 and participated in the SO-HIP study in the Netherlands. Grounded theory coding techniques were applied.

Results: Four categories were derived from the data: ‘restrictions for everyday life’, ‘recovery process’, ‘resources for recovery’ and ‘performing everyday activities’. Physical and psychological restrictions are consequences of hip fracture that older adults have struggled to address during recovery. Three different resources were found to be beneficial for recovery; ‘supporting and coaching’, ‘myself’ and ‘technological support’. These resources influenced the recovery process. Having successful experiences during recovery led to doing everyday activities in the same manner as before or differently; unsuccessful experiences led to ceasing certain activities altogether.

Discussion and Implications: The findings suggest that more attention should be paid to follow-up interventions after discharge from inpatient rehabilitation to support older adults in finding new routines in their everyday activities. These interventions must be personalized with attention to everyday activities that are meaningful for participants. We propose that interventions must contain components that support self-management and adaptation so that participants are better able to cope with their restrictions.

A conceptual model is presented and provides an understanding of the participants’ experiences and perspectives concerning their process of recovery to everyday life in the six months following the start of rehabilitation after hip fracture surgery.
Background

Hip fracture is a common injury among older adults after a fall, resulting in mortality, morbidity and loss of functional independence.1-4 Worldwide, a substantial increase in the number of hip fractures is expected mainly because of the growth of the older population.5,7 In the Netherlands, approximately 15,000 older adults are admitted to a hospital each year after hip fracture. After hospitalization for a hip fracture, approximately 40 percent of the older adults receive short-term geriatric rehabilitation.8 Many of these older adults live alone, have multiple comorbidities and do not regain their premorbid functional abilities after the hip fracture, and they experience functional decline and restriction in everyday life.2,9-11

Fear of falling (FOF) is an important factor that has been associated with functional decline after hip fracture. Many older individuals experience FOF directly related to the fall, and it is a major constraint for successful rehabilitation.9,12,13 As a consequence of FOF, older adults move less and minimize their participation in activities such as walking and performing activities in the house; they are also at risk of not experiencing a full recovery.3,13 FOF is therefore an important theme that therapists need to focus on during rehabilitation.

In the Netherlands and in most other countries, there is a trend towards a shorter inpatient rehabilitation period. The mean duration is approximately four weeks; however, the duration of functional recovery varies from 6 months to 1 year following hip fracture.14 We know little about how older adults experience the transition from inpatient rehabilitation to their home and what supports their continued recovery to everyday life. Much of the research on hip fracture recovery has focused on risk factors that explain functional recovery or functional decline after hip fracture or has focused on intervention strategies related to improving mobility and functional recovery.2,15-18 Some qualitative studies provide understanding of older adults’ perspectives on recovery after hip fracture. These studies have concentrated on functional limitations and how the impact of hip fracture varies depending on individual circumstances, particularly pre-existing health conditions.19-21 However currently missing are studies related to older adults’ experiences and perspectives that focus on the transition from inpatient rehabilitation to further recovery to everyday life at home.

Our study focuses on the impact of hip fracture on everyday life and the recovery from inpatient rehabilitation to further recovery at home. This study addresses the following research question: What aspects of the recovery process after hip fracture do community-dwelling older adults perceive as the most beneficial for their return to everyday life?

Methods

A qualitative research approach was needed to provide a rich understanding of participants’ experiences and perspectives concerning their recovery after hip fracture for their return to everyday life. We conducted qualitative interviews with older adults and used coding techniques based on constructivist grounded
theory as interpreted by Charmaz.\textsuperscript{22} This method consists of systematic, flexible guidelines for collecting and analyzing qualitative data to construct theories 'grounded' in the data themselves.\textsuperscript{10}

**Study Setting and Sample**
The study was conducted between April 2016 and December 2017 in the Netherlands. We purposefully sampled participants out of the SO-HIP study (www.sohipstudie.nl).

**The SO-HIP study**
The participants of the SO-HIP study were older adults who recovered after a hip fracture. The study, a three-arm stepped wedge cluster randomized trial, aimed to compare the effects of a transitional care rehabilitation program in which sensor monitoring was used in coaching on patient perceived performance of daily functioning of older adults after hip fracture to occupational therapy without sensor monitoring and to usual care.

The SO-HIP intervention consists of a coaching component and the use of sensor technology to support older adults in their recovery after hip fracture. The coaching is based on the principles of a cognitive behavioral therapy (CBT) program concerning falls and focuses on setting realistic goals for increasing performance in meaningful daily functioning at home. The sensor technology consists of a wearable sensor worn on the hip and a few ambient sensors at home that are used to assist the older adults in obtaining feedback on their physical activities and as a tool to assist therapists in CBT-based coaching. We compared three groups in the SO-HIP study: 1) participants who received care as usual; 2) participants who received occupational therapy based on coaching; and 3) participants who received occupational therapy based on coaching and the use of sensor technology.

The rationale and details of this intervention have been described previously.\textsuperscript{23}

**Participants**
We purposefully sampled participants out of the three groups of the SO-HIP study (n=240) who were discharged to go home and finished the rehabilitation approximately six to eight months after hip fracture. Initially, a sampling frame was developed to include the following: 1) participants out of the three groups of the SO-HIP study; 2) participants who represented a range in age; and 3) participants who were diverse in gender.

Table 1 presents the characteristics of the participants, who included twelve women and seven men. The age of the participants ranged from 65 to 94 years.

**Ethical Considerations**
The present study has been approved by the Medical Ethics Committee of the Academic Medical Centre, University of Amsterdam in the Netherlands (protocol ID AMC 2015_169). Participants were given a full written and oral explanation of the purpose of the study, confidentiality and anonymity were assured, and written informed consent was obtained before inclusion.
Table 1. Characteristics of the Interviewed Participants

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Notes: C= living alone in a home in the community; S= living alone in a senior residence
MMSE= Mini Mental State Examination. score median (range of 0 to 30); a higher score indicates better cognitive functioning
Katz ADL= modified Katz ADL 15 score, range 0-15; a higher score indicates more (I)ADL (Instrumental) activities of daily living) dependence.
Fear of falling. VAS- score 1-10; a higher score indicates more fear of falling
POMA = Performance Oriented Mobility Assessment. ≤ 18 indicates high risk of falls; 19-23 moderate risk of falls; ≥24 low risk of falls
(I)ADL=Instrumental and activities of daily living. IADL=Instrumental activities of daily living
Note that the scores are at 6 months after the start of the rehabilitation.

Data Collection
We conducted semi-structured interviews at the participants’ homes for approximately one hour. These interviews were conducted by the first author (MP) and a research assistant (MT). We used an interview guide containing several topics that aimed to reconstruct participants’ experiences with their recovery and their return to everyday life. The interview guide was adapted as the data analysis progressed. The interview guide consisted of open-ended questions followed by probing questions and was used flexibly. During the interview, the participants were encouraged to reflect and to clarify details.22 Initial questions were broad, e.g., “Since you have been back home, how have you been doing?”
More focused questions were asked regarding specific topics, e.g., “What has changed in your daily living since you had a hip fracture?” “Which aspects of the rehabilitation, or what recently, was most helpful for you in your ability to function at home again?” and “Do you think the sensor data could support or motivate you in optimizing your daily functioning?” An example of an ending question was “Of all that we discussed, what recently do you perceive as most beneficial in optimizing your daily functioning?”

Interviews were recorded digitally and transcribed verbatim. Memos made during and after the conversations were included in the analysis and provided additional information.

**Data Analysis**

As we aimed to identify older adults’ experiences regarding their recovery, we applied open coding techniques derived from grounded theory, as interpreted by Charmaz.22 Grounded theory coding consists of at least two main phases: an initial coding phase and a focused selective coding phase that uses the most significant or frequent initial codes to sort, synthesize and integrate large amounts of data.22 In the process of initial coding, a line-by-line analysis of the transcripts was performed by the first and second authors, MP and SP, while constantly comparing the data of each interview and between the interviews and comparing the data with codes (constant comparison). We described emerging thoughts about possible categories in memos. In the subsequent focused coding activities, we distributed the most useful initial codes into categories related to a core category, linking codes and specifying relationships between categories. These focused codes were more directed, selective and conceptual than the first initial codes. We performed this entire coding process first for the ‘care as usual’ group, followed by the ‘occupational therapy with coaching’ group and the ‘occupational therapy with coaching and sensor monitoring’ group. Data were managed and organized using MAXQDA version 12.

Discrepancies between MP and SP during coding activities were resolved through discussion and consensus with the research team. The final set of four major categories and subcategories was agreed upon by all authors. In the last phase of the analysis, a first conceptual model was developed, indicating the links between the categories by analyzing how the process of recovery was related to resources for recovery.

**Results**

The conceptual model (Figure 1) provides an understanding of the participants’ experiences and perspectives concerning their process of recovery to everyday life in the six months following the start of rehabilitation after hip fracture surgery. Participants described the remaining physical restrictions (being less mobile, dependence on mobility aids) and psychological restrictions (being tired and careful and concerned about falling again) after their hip fracture that had implications for everyday life (Category 1). The recovery process (Category 2), which started directly after hip fracture, was described by participants as trying and requiring practice, eventually leading to successful and unsuccessful experiences. Additionally, participants mentioned different resources that helped
them in the recovery process (Category 3): supporting and coaching, ‘myself’ and technological support. These resources resulted in performing everyday activities (Category 4) in two distinct ways: (1) engaging in the activities in the same manner as before or differently and (2) ceasing to engage in the activities. These related categories are depicted in a conceptual model (Figure 1) and are detailed below.

Category 1 - Restrictions for everyday life
All participants expressed remaining physical restrictions and psychological reactions after being discharged from inpatient rehabilitation to their home. These reactions had implications for their everyday life.

Being less mobile
All of the participants expressed that their mobility had become limited. They expressed having difficulties in standing up from a chair, in keeping balance, in walking long distances or in cycling. For example, Mrs. E told the interviewer the following: “I walk a little bit in the neighborhood, but I don’t go any further.” Mrs. D’s comments were as follows: “Cycling is the thing I miss most; I always took the bike for shopping”.

Being dependent on mobility aids
A majority of the participants had to use mobility aids, such as a walker, which they had not used or had not been using on a regular basis before the hip fracture. Some participants perceived the need for mobility aids as a lack of improvement and as representing the consequences of aging, thus making them feel old. Although the use of mobility aids provided greater safety when walking, they...
generally expressed that it also limited them in their mobility and restricted them in doing everyday activities. Mrs. A expressed this experience as follows: “I have to do everything with the help of the walker, even the housekeeping; it limits me quite a bit”. Mr. O said, “Before this, I could walk normally, but now I have to walk with the help of a walker. I’m chained to the walker”.

**Being tired**
Some of the participants indicated that they were tired much sooner than before and that they had less energy. This tiredness limited their mobility and restricted their activities. Others expressed that activities were taking up much more time, and because of their lower energy levels, they had to balance their activities. As expressed by F, “Activities take up much more time; I did the gardening in a single day, and now I need three or four days because I get tired a lot sooner, and therefore, I divide up the activities”.

**Being careful and concerned about falling again**
Almost all of the participants expressed concerns about falling again, which influenced their activities. Mrs. D expressed this sentiment as follows: “I’m worried to fall again; I have to have something to hold on to everywhere I walk”. As a result of these worries about falling, a majority of them were very careful and focused on planning their activities. Mrs. J noted the following: “I am more focused on things, and I evaluate how I walk and hold on to something, for example, the stairs. Before this, I never used to hold on to the railing. Currently, I have to. It is just taking care not to fall again”.

**Category 2-Recovery process**
Although all of the participants experienced physical and psychological restrictions, they showed different ways of coping with these restrictions. When the participants talked about the period of inpatient rehabilitation, most of them expressed satisfaction with the care and therapy they received. They realized their dependency on care and the impossibility of living independently at home at that moment. Participants mentioned that trying and practicing exercises was the central element in the recovery process and in gaining successful and sometimes unsuccessful experiences.

**Trying and practicing and successful experiences**
According to Mr. I, “Look, what they used to do is ok: ‘What you can do yourself, you should do; it was ‘trying and practicing’”. Mrs. T added, “Each day I had therapy, everyone encouraged me to practice by doing the exercises to recover”.

Some of the participants mentioned the practical things they had to practice before discharge that worked in comforting most of them. As Mrs. D expressed, “We did some cooking in the kitchen of the ward, and we practiced how you could use the walker at the kitchen sink to determine if we were able to succeed at home. For a moment, you feel you make progress and can do it”.

**Limited trying and practicing and unsuccessful experiences**
Some participants expressed disappointment and frustration that they could no longer perform their activities as they used to. Mrs. A stated, “I hardly walk
outside because I'm scared to fall; I feel more isolated because I can't go to the gym or go to the shopping center anymore”.

**Category 3-Resources for recovery**
Participants talked about different ways to adapt or find alternative ways of doing their everyday activities.

Almost all of the participants experienced the transition to their home as very difficult. They felt insecure in doing things by themselves and in seeking their independence again, as expressed by Mr. I: “The change of going home was disappointing at first. All of a sudden, you have to do it all by yourself, and there is no protection around you”. However, participants also talked about different resources that helped them in the recovery process.

‘Myself’
A majority of the participants mentioned their own will and a positive attitude as important resources for recovery and in changing their everyday activities.

*My own will*
Mrs. M explained, “My own will helped me most to do activities again; I think it is my own motivation. Because I can't accept help that is not necessary; what I can do myself I want to do myself”. Mrs. J stated, “I think it is my mind; stop moaning and groaning and keep on going”.

*Positive thinking*
Some participants expressed that their way of positive thinking influenced their recovery. Mrs. A said, “Think positively and keep on moving”. Mr. I said, “Don't give up. The most helpful thing was my own positive approach and me, who truly wanted to go for it. Keep on going with what you still can do”.

*Supporting and Coaching*
Participants mentioned different forms of support and coaching that they found helpful in their return to everyday life. A majority of the participants appreciated the talks with and the support of other rehabilitants and found these contacts helpful in their recovery, as expressed by Mr. I: “These people truly helped me to get through with this, we truly had a good time and lots of fun, and I still have contact with them”.

Family support was also an important recourse, as expressed by Mrs. D: “If your mind boggles at something when you don't dare do anything, well, you need people in your surroundings, your children or whoever”.

Half of the interviewed participants received a follow-up rehabilitation at home consisting of a few home visits and some telephone consultations, which influenced the way they performed their everyday activities.

Analysis provided insight into the different mechanisms by which this coaching changed the everyday activities of the participants by influencing the recovery process.
Emotional support
Participants experienced the support of the therapist as truly helpful in their recovery to everyday life. Some participants experienced the support of the therapist as emotional support. They could talk about difficult activities, as expressed by Mrs. M: “I truly appreciated that there was a follow-up because you suddenly go from being at the nursing home to being at home all on your own, and so it was very nice that there was somebody I could talk to about what was disappointing or what was going well”.

Boosting confidence
Others expressed the support of the therapist as rebuilding or boosting self-confidence, as Mrs. N expressed: “The aftercare has been important; we discussed what I had done, and I felt more confident in doing difficult activities”. Some participants had experienced the fall at home as traumatic, and it still had a great impact on their everyday life. When they came home again, they had to face the place where the fall had occurred. One participant, Mrs. J, expressed the support she felt from the therapist who helped her by going back to the place where she had her fall: “She observed that I was dreading to go to the bathroom where I had my fall and where I had been lying on the floor for a long time. Therefore, she said to me: ‘Shall we go to the bathroom?’, and that was very important to me.”

Exercises and practical tips
Other participants mentioned the practical tips and the practice of difficult activities at home with the therapist as very helpful. Mrs. J stated, “She was interested in the activities I wanted to do; she gave me tips and stimulated me to do these things again. It truly helped me. Also, it helps that you can ask questions about things you come upon when you have to do it yourself again”.

Technological support
A third of the respondents had received the same follow-up rehabilitation with coaching, as mentioned above, with the addition of sensor technology as a coaching tool. These participants experienced this technology as an extra support in their recovery to everyday life and described this support in different ways.

Insight in activity level
The feedback of the sensor data helped some participants to become aware of the amount of movement or the activities they had performed. Some participants were extra motivated to move more and to do more everyday physical activities because of the use of the sensors, as expressed by Mrs. M: “It motivated me to move more, for example, in the evening when I didn’t want to go on my home trainer, I thought by myself, I want to do it anyway because it is good to move. And when you had a look at the sensor data, it gave you such a good feeling, I’ve done so much”.

More personal engagement in the rehabilitation process
Some of the participants were more engaged in their rehabilitation because they could see their results on the tablet and could make their own follow-up actions
to reach their goals.

Mrs. O said, “When you looked back on the first month on the tablet and a few months later, I clearly observed the progress I made. I thought to myself, I did a good job. By means of the graphs, I realized that I truly did it all myself”.

**Sensors are reassuring**

Some of the participants stated that having sensors at home made them feel safe because they experienced a kind of control and therefore were daring to do more. Mrs. T said, “It made me feel happy because something is keeping an eye on me, and that is reassuring to me. I thought when something is going wrong, they will keep an eye on me”.

**Category 4-Performing everyday activities**

Participants expressed how they were performing their everyday activities at the end of their recovery process. Most of them had found their daily routines in everyday activities; for a few of them, these routines were nearly the same as prior to the hip fracture. Most of the participants made some changes or looked for alternatives to manage their everyday activities.

**Doing activities in the same manner as before or differently**

Some of the participants were still doing the same activities as before the hip fracture and believed that they have to go on as before.

Mrs. K. explained, “Look, if you want to walk to the shopping center because you always walked that distance, you have to try and do that again. The first time you can plan your route to the shopping center so that you can stop and rest for a while sitting on a bench, and after a few times, you become better and better at it, and you can do it in the same way as you did before”.

Most of the participants mentioned that they performed their everyday activities in a different way than before the hip fracture and in a way to cope with the implications of the hip fracture. Some of them performed their activities in a safer way. For example, according to Mrs. A, “Yes, you find out all kinds of ways to do things safely, for example, watering flowers. You become truly good at it. I put the watering can on the walker and then I hold onto my walker”.

Some of the participants make use of appliances so that they can do the activities themselves. Mr. I explained, “I moved to a senior apartment, so everything is on the ground level, and to take a shower, I make use of a stool and a handgrip”.

**Ceasing to do activities**

Participants within this category stopped doing some of the social and physical activities that they did before their hip fracture. Mrs. A explained this change as follows: “I cancelled my travel insurance because I don’t want to go on holiday anymore, and I therefore can’t go to my children who are living abroad. I can’t stand the long wait at the airport Schiphol anymore”. Mr. F said, “Before the fall, I was busy, I was always on the road. Now I stay at home more”.

Some participants rationalized this stopping of activities as a natural consequence of aging, as expressed by Mrs. G: “So yes, you become older, and old age comes with restrictions, so I have to accept that I can’t do some things anymore”.
Discussion and Implications

This study explored the experiences and perspectives of older adults after a hip fracture regarding the aspects of the recovery process they perceive as most beneficial to their return to their everyday life.

Four major categories were identified: ‘restrictions for everyday life’, ‘recovery process’, ‘resources for recovery’ and ‘performing everyday activities’. The findings show that physical and psychological restrictions are an inevitable consequence of hip fractures that older individuals must address during their recovery process and return to everyday life. The results show three different resources that are beneficial for recovery: ‘supporting and coaching’, ‘myself’ and ‘technological support’. These three resources influenced the recovery process, in which it is important to have successful experiences while trying out and practicing activities. A successful process can lead to older adults doing everyday activities in the same manner as before or differently. On the other hand, if activities are not tried out and practiced or lead to unsuccessful experiences, older individuals are inclined to cease certain everyday activities altogether.

In accordance with previous research, this study highlights the participants’ struggles to cope with the restrictions they experience after their hip fracture. Our findings show the difficulties participants experience in the transition from inpatient rehabilitation to everyday life at home and how they view support and coaching from therapists, family and co-rehabilitants as very helpful. This finding is in line with that of Magaziner, who reported that the period of greatest change in the ability to perform activities of daily living after hip fracture are the first four to six months after discharge. However, most traditional rehabilitation programs mainly focus on the first period of rehabilitation, the inpatient rehabilitation, and do not have a follow-up at home.

The present study shows that the resources for recovery, as described by the participants, activate facilitating mechanisms that help them with recovery. Coaching with the elements of education, goal-setting and practice provides emotional support, which boosts self-confidence for practicing everyday activities, after which participants feel more secure in performing these everyday activities. ‘Myself’ highlights the mechanisms of positive thinking or individuals’ own motivation that influence their recovery. Technology encourages people to become more active in developing motivation for or engaging more fully in their recovery process.

Whereas most current rehabilitation programs after hip fracture tend to solely focus on improving mobility and basic activities of daily living, the current study’s findings regarding the resources and mechanisms for recovery highlight the need for a more comprehensive approach in rehabilitation programs for independently living older adults who have experienced a hip fracture.

This study shows that participants use different methods of adaptation to cope with the physical and emotional limitations they experience. Trying and practicing are central elements in the recovery process, together with successful and unsuccessful experiences. These results are in line with the elements of the Selection, Optimization and Compensation model (SOC model of successful aging), a model that focuses on the processes individuals engage in to maximize gains and minimize losses in response to everyday demands and
functional decline. In this model, selection focuses on the selection of goals or everyday activities that are most important for a person's everyday life. Most participants in our study chose to select everyday activities that they truly want to do or made a choice to cease doing certain activities. Optimization refers to the skills or strategies used to achieve goals in performing everyday activities, and Compensation focuses on the use of alternative ways to reach a goal or to maintain a desired level of everyday functioning.

Our findings suggest that participants choose strategies or ways of adaptation that they are better able to incorporate into their routines or methods of everyday functioning despite their physical or psychological restrictions. This finding fits with the new concept of health in which health is considered the dynamic ability to adapt and to manage one's own well-being and is in line with the results of earlier research.

The findings highlight the added value of a follow-up rehabilitation after discharge to support older individuals in their return to their everyday functioning. This study adds to the current understanding that a personalized approach in rehabilitation that is focused on everyday functioning is important for participants to regain more confidence during the recovery process in doing the activities that are important for them. These findings are in line with the recommendations of a longitudinal study of older adults' experiences after hip fracture.

Finally, this research provides the new insight that the combination of coaching and technology supports older individuals in adapting their activities to retain their functioning in everyday life. The present study shows that participants experience the use of sensor technology as part of the coaching and as an extra source of support to move more and do their everyday activities. Some of the participants indicated that they are more engaged in their rehabilitation by using this technology because they can see and follow their own level of activity on a computer tablet. As such, the technology supports the participant with objective feedback about their real-time movement, and this feedback acts as a source of self-management support. Participants indicated that in addition to the feedback of the sensor data, their talks about these data with the therapists are helpful in enabling them to change some activities and improve everyday functioning. This finding is in line with the findings of recent research that show improvement in physical functioning through the combination of a monitoring and feedback tool embedded in a counseling program. To our knowledge, there has been no research on experiences with the use of this technology for individuals after hip fracture. In accordance with previous research, privacy is not seen as an issue in the use of sensor technology.

Implication for daily practice
The findings of the current study have implications for interventions that guide the transition from inpatient rehabilitation to recovery to everyday life at home. The current study highlights the strong need for a follow-up rehabilitation at home to support participants in their search for finding new routines in performing their everyday activities. Traditionally, hip rehabilitation focuses on clinical rehabilitation, so more attention should be paid to follow-up interventions at home. The present study suggests that the focus of these follow-up interventions must be personalized with special attention to the everyday activities that are
meaningful for individuals. Interventions must focus on the new perspectives on health as ‘the ability to adapt and to self-manage’ so that participants are more able to cope with their physical or psychological restrictions. Intervention components such as goal-setting, education, practice, and evaluation could be helpful for this process. Additionally, the combination of coaching and technology can be used to empower older adults to self-manage and adapt their activities for their return to everyday life.

**Strengths and limitations**
As with all aspects of qualitative research, the generalization of the results to other contexts is limited because of the small sample of 19 participants, however saturation of the data was emerged.

A strength of the study is that we had interviews with 19 participants who were diverse in gender, age, physical and cognitive functioning and living conditions, which represents the Dutch general population of older adults who undergo geriatric rehabilitation after a hip fracture. Although we sampled this wide diversity of participants, we interviewed participants who had the ability to reflect on and articulate their experience. Therefore, it is possible that we did not interview participants with more severe (cognitive) limitations that might have influenced their experiences and perspectives concerning their recovery.

A limitation of our study is that we only asked participants what helped them in their recovery and not specifically what barriers they experienced.

Because our sample came from the SO-HIP trial, we interviewed participants who have had different rehabilitation interventions. This circumstance was, in one way, a strength of the study because we had a greater diversity of experiences in our sample. A limitation is that the experiences of the participants were influenced by the specific interventions they had received and therefore cannot be generalized. However, the study is giving interesting insight into the older adults’ perspective of the recovery process from inpatient rehabilitation to home and might help to improve the rehabilitation of community-living older adults who undergo geriatric rehabilitation after hip fracture.

**Conclusion**
We identified older adults’ experiences and perspectives regarding the recovery process after hip fracture and the aspects they perceived as most beneficial for their return to everyday life. The findings provided us with a deeper understanding of how different resources for recovery could influence the recovery process and facilitate coping, despite physical and psychological restrictions. Participants highlight their own role (‘myself’) as essential for recovery. Additionally, coaching provides emotional support, which boosts self-confidence in performing everyday activities. Furthermore, technology can encourage older adults to become more active and being engaged in the recovery process. As such, interventions that make use of both coaching and technology support the participants’ own roles in their recovery, thereby empowering them. The way people adapted led to two ways of performing everyday activities at the end of recovery: ceasing to do activities and doing activities in the same manner as before or in a different manner. These findings can facilitate the development of interventions adapted to the needs of older adults after hip fracture that guide their transition from
inpatient rehabilitation to recovery to everyday life at home.
Chapter 7  |  Everyday life after hip fracture

References

B, de Rooij SE, Buurman BM. Effectiveness of sensor monitoring in an occupational therapy rehabilitation program for older individuals after hip fracture, the SO-HIP trial: study protocol of a three-arm stepped wedge cluster randomized trial. BMC Health Services Research. 2017;17(1):3.


