



THE UNIVERSITY *of* EDINBURGH

Edinburgh Research Explorer

A qualitative study of sedentary behaviours in stroke survivors

Citation for published version:

Morton, S, Hall, J, Fitzsimons, C, Hall, J, English, C, Forster, A, Lawton, R, Patel, A, Mead, G & Clarke, D 2021, 'A qualitative study of sedentary behaviours in stroke survivors: non-participant observations and interviews with stroke service staff in stroke units and community services', *Disability and rehabilitation*. <https://doi.org/10.1080/09638288.2021.1955307>

Digital Object Identifier (DOI):

[10.1080/09638288.2021.1955307](https://doi.org/10.1080/09638288.2021.1955307)

Link:

[Link to publication record in Edinburgh Research Explorer](#)

Document Version:

Publisher's PDF, also known as Version of record

Published In:

Disability and rehabilitation

General rights

Copyright for the publications made accessible via the Edinburgh Research Explorer is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

The University of Edinburgh has made every reasonable effort to ensure that Edinburgh Research Explorer content complies with UK legislation. If you believe that the public display of this file breaches copyright please contact openaccess@ed.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.





A qualitative study of sedentary behaviours in stroke survivors: non-participant observations and interviews with stroke service staff in stroke units and community services

Sarah Morton, Jennifer Hall, Claire Fitzsimons, Jessica Hall, Coralie English, Anne Forster, Rebecca Lawton, Anita Patel, Gillian Mead & David J. Clarke

To cite this article: Sarah Morton, Jennifer Hall, Claire Fitzsimons, Jessica Hall, Coralie English, Anne Forster, Rebecca Lawton, Anita Patel, Gillian Mead & David J. Clarke (2021): A qualitative study of sedentary behaviours in stroke survivors: non-participant observations and interviews with stroke service staff in stroke units and community services, *Disability and Rehabilitation*, DOI: [10.1080/09638288.2021.1955307](https://doi.org/10.1080/09638288.2021.1955307)

To link to this article: <https://doi.org/10.1080/09638288.2021.1955307>



© 2021 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.



[View supplementary material](#)



Published online: 24 Jul 2021.



[Submit your article to this journal](#)



Article views: 311



[View related articles](#)



[View Crossmark data](#)

A qualitative study of sedentary behaviours in stroke survivors: non-participant observations and interviews with stroke service staff in stroke units and community services

Sarah Morton^a, Jennifer Hall^b, Claire Fitzsimons^c, Jessica Hall^b , Coralie English^d , Anne Forster^b , Rebecca Lawton^e, Anita Patel^f, Gillian Mead^a and David J. Clarke^b

^aCentre for Clinical Brain Sciences, College of Medicine and Veterinary Medicine, University of Edinburgh, Edinburgh, Scotland; ^bAcademic Unit for Ageing and Stroke Research, Bradford Institute for Health Research, Bradford Teaching Hospitals NHS Foundation Trust, Bradford, England; ^cPhysical Activity for Health Research Centre, St Leonards Land, University of Edinburgh, Edinburgh, Scotland; ^dSchool of Health Sciences, The University of Newcastle, Callaghan, Australia; ^eSchool of Psychology, Faculty of Health and Medicine, University of Leeds, Leeds, England; ^fAnita Patel Health Economics Consulting Ltd., London, England

ABSTRACT

Purpose: Sedentary behaviour (SB) is associated with negative health outcomes and is prevalent post-stroke. This study explored SB after stroke from the perspective of stroke service staff.

Methods: Qualitative mixed-methods study. Non-participant observations in two stroke services (England/Scotland) and semi-structured interviews with staff underpinned by the COM-B model of behaviour change. Observations were analysed thematically; interviews were analysed using the Framework approach.

Results: One hundred and thirty-two observation hours (October - December 2017), and 31 staff interviewed (January - June 2018). Four themes were identified: (1) Opportunities for staff to support stroke survivors to reduce SB; (2) Physical and psychological capability of staff to support stroke survivors to reduce SB; (3) Motivating factors influencing staff behaviour to support stroke survivors to reduce SB; (4) Staff suggestions for a future intervention to support stroke survivors to reduce SB.

Conclusions: Staff are aware of the consequences of prolonged sitting but did not relate to SB. Explicit knowledge of SB was limited. Staff need training to support stroke survivors to reduce SB. Sedentary behaviour in the community was not reported to change markedly, highlighting the need to engage stroke survivors in movement from when capable in hospital, following through to home.

ARTICLE HISTORY

Received 22 December 2020

Revised 22 June 2021

Accepted 5 July 2021

KEYWORDS

Sedentary behaviour; stroke; stroke rehabilitation; behaviour change; intervention development

► IMPLICATIONS FOR REHABILITATION



- Stroke survivor sedentary behaviour is influenced, directly and indirectly, by the actions and instructions of stroke service staff in the inpatient and community setting.
- The built and social environment, both in the inpatient and community settings, may limit opportunities for safe movement and can result in stroke survivors spending more time sedentary.
- Stroke service staff appreciate the benefit of encouraging stroke survivors to stand and move more, if it is safe for them to do so.
- Staff would be amenable to encourage stroke survivors to reduce sedentary behaviour, provided they have the knowledge and resources to equip them to support this.


Introduction

Sedentary behaviour (SB) is defined as any waking behaviour with a low energy expenditure while in a sitting, lying or reclining posture [1]. Prolonged periods of SB are associated with higher cardiovascular disease incidence and mortality, with evidence of a direct curvilinear (increasing with exposure) dose-response [2]. Negative health associations have also been highlighted in relation to disability, including reduced physical function [3], increased symptoms of depression [4] and frailty [5]. The UK

Physical Activity Guidelines recommend minimising SB, emphasising the importance of reducing prolonged periods of time sitting, lying, or reclining [6].

Even following good functional recovery, stroke survivors spend more time sedentary than other patient populations and healthy age-matched counterparts [7,8]. On an acute stroke unit, patients have been shown to spend 94% of waking time in sedentary activities [9], in rehabilitation hospitals 74% [10], and 75% in community settings [7]. The pattern of accumulation of SB

CONTACT Sarah Morton  sarah.morton@ed.ac.uk  Centre for Clinical Brain Sciences, College of Medicine and Veterinary Medicine, University of Edinburgh, Edinburgh, Scotland

 Supplemental data for this article can be accessed [here](#).

This article has been corrected with minor changes. These changes do not impact the academic content of the article.

© 2021 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.

This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way.

across the day is important as prolonged sedentary events are associated with increased risk of cardiovascular issues [11,12]. After stroke, people tend to accumulate sedentary time in longer, uninterrupted events [8].

Given the health risks associated with SB, it is likely to be beneficial for stroke survivors to reduce time spent sitting. In healthy populations, a relatively high level of moderate intensity activity (60-75 min/day) is needed to counteract the increased risk associated with high sitting time (>8 h/day) [6]. Examples of moderate intensity activity include brisk walking or cycling. This level of physical activity (PA) is likely beyond the reach of many stroke survivors who have been shown to have very low activity levels (4.9 min/day in moderate to vigorous activities) [7], it is more appropriate to encourage stroke survivors to break up bouts of sitting with standing or light-intensity activities spread across the day [11].

Stroke services typically employ a multidisciplinary team approach, staff include physiotherapists, occupational therapists, speech and language therapists, therapy assistants, nurses, healthcare support workers, medical doctors, and psychologists. These staff potentially play a key role in supporting stroke survivors to reduce and break up SB, in the inpatient setting and following discharge into the community. At present, no formal guidance exists; no studies exploring staff perceptions of inpatient interventions have been published, with just two studies reporting on community-based interventions [13], one of which incorporated views of healthcare professionals [14]. There is a need for innovative approaches that can support stroke survivors to reduce SB in a realistic and individualised way. Examples include co-producing interventions with stroke survivors [15,16]. Robust intervention development must be informed by current practice and should take account of the views of service providers and users [17].

The aim of this study was to use interviews and non-participant observations to explore perspectives, capability, opportunity and motivation of staff to support stroke survivors to reduce SB. Guided by the COM-B model of behaviour change, where capability relates to an individual's psychological and physical ability to engage in the behaviour, opportunity relates to physical and social environmental factors, and motivation includes reflective decision-making and automatic processes, that are based on emotional responses and associated learning and habit [17]. This approach is used in development of complex interventions and was designed to inform the intervention to be developed using findings from this study. This paper reports on staff reflections of barriers and facilitators to behaviour change, exploration of potentially modifiable determinants of SB, and considerations how, and in what context, inpatient and community stroke service staff currently discussed the topic of SB with stroke survivors or their caregivers. Findings from non-participant observations and interviews with stroke survivors and their caregivers in the same settings are reported elsewhere [18].

Methods

The study was conducted in two National Health Service (NHS) stroke units (one rehabilitation, one mixed acute-rehabilitation) with linked community stroke services. Site one was in England and site two in Scotland – both operating under the same healthcare system. Participants were not known to researchers prior to the study. We took a mixed-methods (qualitative) approach using non-participant observations, whereby the researcher observes participants, in this case stroke service staff in interaction with stroke survivors and caregivers (where present), without actively

participating, followed by semi-structured interviews [19]. This approach was informed by National Institute for Clinical Excellence (NICE) service improvement guidance, [20] and theories of co-production which incorporate service users' and providers' views and experiences in design, management, delivery or evaluation of services [21]. We drew on the COM-B model, to inform data collection and subsequent data analysis [17].

Ethics

The study received favourable ethical opinion from the Health Research Authority, the Yorkshire & the Humber – Bradford-Leeds Research Ethics Committee [17/YH/0236] and Scotland A Research Ethics Committee [17/SS/0099]. This ethical approval covered all sites and services in England and Scotland.

Non-participant observations

Non-participant observations were conducted in inpatient and community stroke services, using a qualitative observational framework (Supplementary Appendix One) developed previously by the research team [22]. In inpatient settings, observations were conducted over two weeks to include weekday and weekend mornings, afternoons, and evenings between 07:00 and 22:00. Each session lasted four to five hours and was conducted by experienced qualitative researchers (SM, JH, DJC, CF). Written informed consent was obtained for patient focused observations. Process/verbal consent was adopted for general stroke unit observations. Effort was made to ensure data were collected from different therapy disciplines, and types of sessions within disciplines, e.g., upper/lower limb therapy, cognitive assessment, and functional occupational therapy sessions, as well as interactions between nurses or healthcare support workers and stroke survivors and caregivers (where present) during routine care episodes. Researchers engaged with staff to define potential observation opportunities and maintained a record of types of sessions observed; researchers did not participate in activities or in therapy, medical or nursing interactions.

Inpatient observations were conducted in different areas of stroke units, and in group or individual therapy sessions. Observations initially collected data on stroke unit contexts, including built environment and facilities available to patients, how and where patients spent time, and understanding staff routines. Inpatient observations progressed to focus on individual patient activity with therapists or nurses. Observations made in the first three/four sessions informed choices of who and what to focus on in observations of individual or group sessions in stroke units and in community settings/patients' homes.

In community settings, focused observations took place with individual stroke survivors and, if present, their caregivers. This involved observing interactions between the patient and the therapists or nurses during home visits, or interactions with therapists and/or other health and social care staff during stroke survivor and caregiver visits to community stroke services. At the Scotland site, we mainly observed health or social care staff practice and interactions during stroke survivor and caregiver visits to community stroke facilities. Community observation sessions varied in length, from less than one hour (home visits), to a full day (community centres), depending on type of interaction observed and the duration of sessions.

Field notes documenting interventions provided by staff and activities completed by or with stroke survivors were recorded contemporaneously by researchers. The nature and focus of

interactions between stroke survivors, staff and caregivers were summarised in the field notes.

Semi-structured interviews

Researchers engaged with senior staff at sites and obtained permission to approach staff to request participation in interviews. We purposively selected occupational therapists (OTs), physiotherapists (PTs), rehabilitation assistants (RAs), nurses, healthcare support workers (HCSWs), medical staff and stroke care coordinators contributing to post-stroke rehabilitation in the stroke units and linked community services. This was to develop an understanding of views of a range of stroke service staff.

Interviews took place at participants' place of work, were audio-recorded, and transcribed. Written consent was obtained for all interviewees. The interview topic guide, informed by the COM-B model and findings from the observations, was designed to explore capability, opportunity and motivation of the stroke service staff [17] to reduce SB. Once defined, interview questions were further distilled into three sections (Supplementary Appendix Two).

Analysis

Data analysis was informed by the COM-B model of behaviour change. The non-participant observations were thematically analysed, and interviews were analysed using the Framework approach (Table 1) [23,24]. A convergent mixed-methods approach was taken, placing equal weighting on findings from both the observational and interview data during the final stage of analysis. Doing this allowed us to attain a more complete understanding of all data, than could be obtained from using either method in isolation [25]. Once analysis of both data sets was complete, summary memos from interview and observational data analysis were then reviewed and combined by all researchers to agree the analytical themes reported in the results section.

Non-participant observations

One researcher at each site coded and completed thematic analysis of observational data for each site (SM, JH); identifying common themes relating to reducing SB post-stroke. The COM-B model was used to interpret the observational data and to structure summary memos for each site which outlined observed stroke survivor, carer and staff behaviours related to SB and factors influencing capability, opportunity, and motivation to reduce SB. Site-based analysis was reviewed by a third researcher (DJC) before data were synthesised. Summary memos contributed to the topic guides developed for semi-structured interviews. For themes and associated descriptions, see Appendices Three and Four.

Semi-structured interviews

Interviews were transcribed verbatim and reviewed alongside field-notes from observations in QSR-NVivo11 (QSR International Pty Ltd, 2016). Interview data were analysed using the Framework analysis approach (Table 1) [23,24]. Six researchers (DJC, CF, SM, JH, JFH, RC) contributed to a progressive open coding process; two transcripts were coded by all six researchers, four by three researchers, and six by two researchers. A coding framework was agreed, then utilised to code all interview data. One researcher coded all interviews from each site and then five transcripts were

Table 1. Stages in Framework Analysis Approach [23].

1) Familiarisation with the data (reading, and re-reading field-notes, transcripts, memos)
2) Identifying a thematic framework (researchers jointly developing a set of codes organised into categories to manage and organise the data)
3) Indexing (systematically applying the thematic framework to the whole data set)
4) Charting (entering data into Framework matrices: spreadsheets containing cells into which summarised data are entered by codes (columns) and cases (rows))
5) Mapping and interpretation (interpretive concepts or propositions describing or explaining aspects of the data are the final output of the analysis)

independently double coded. Researchers met to review coding consistency prior to creating Framework matrices. Working in pairs, six researchers interpreted the Framework matrices and developed summary memos based on data charted in the framework matrices.

Results

Observations were conducted between October to December 2017, and interviews between January and June 2018. Forty-eight staff were recruited in England and 45 in Scotland. A total of 132 observation hours were completed – England 69h; Scotland 63.5h. Rather than focusing on specified staff, observations collected data on activity occurring at sites, including which staff (professions/grade) engaged in these activities. This approach permitted data collection on every occasion researchers were on site. Had we narrowed the focus to specific members of staff opportunities for data collection would have been limited to times when these members of staff were on shift.

Audio-recorded semi-structured interviews lasted between 30 min and 77 min, averaging 58 min (England), and 39 min (Scotland). Thirty-one staff were interviewed; 16 in England (10 inpatient; 6 community), and 15 in Scotland (10 inpatient; 5 community). Interview participants were allocated a pseudonym.

Details of all participants are recorded in Table 2, those who also participated in an interview, are indicated with an asterisk. Ages of participants ranged from 18 to 66 years old; 90.6% were female, and 9.4% were male.

Following data analysis, four themes emerged. See Table 3.

Contextual insight and service overview

Stroke services at the two sites were organised differently and provided different levels of post-stroke care, however staff practice and tasks completed daily were largely similar. At the England site, the inpatient stroke unit provided rehabilitation care only, whereas at the Scotland site, the unit provided acute and rehabilitation care. In inpatient units at both sites, patients attended rehabilitation therapy sessions based on individual need. These were planned daily, during morning multidisciplinary (MDT) meetings and were normally delivered only on weekdays. Sessions were not delivered out of normal working hours or at weekends. Most sessions took place in a dedicated therapy room. Some therapy sessions were observed to take place at the bedside, these mainly focused on cognitive type therapy, for example, placing cups in order or counting loose change (coins).

Nursing care was provided across 24-h and was based on assessment of individual need. Mobility status and movement related activity during the inpatient stay was always directed by written instructions based on assessment conducted by therapists. Community services differed considerably between sites. In

Table 2. Staff participant professions, experience in stroke, and time since qualification.

Profession/Grade	Experience in stroke (Yrs)	Time since qualification (Yrs)
England		
Physiotherapist/Band 5	<1 year	3–5 years
Physiotherapist/Band 5*	<1 year	<1 year
Physiotherapist/Band 6	>5 years	>5 years
Band 2	1–2 years	N/A
Physiotherapist/Band 7*	>5 years	>5 years
Occupational Therapist/Band 6*	>5 years	>5 years
Band 3	1–2 years	>5 years
Registered Nurse/Band 5	3–5 years	3–5 years
Student Nurse	<1 year	N/A
Senior HealthCare Assistant/Band 3	>5 years	>5 years
Stroke Clinical Nurse Specialist/Band 7*	>5 years	>5 years
Registered Nurse/Band 5	1–2 years	1–2 years
General Therapy Assistant/Band 4*	>5 years	N/A
General Therapy Assistant/Band 3	>5 years	N/A
Band 5*	>5 years	>5 years
Assistant Practitioner/Band 4*	3–5 years	1–2 years
Assistant Practitioner/Band 3*	1–2 years	1–2 years
Band 5	>5 years	>5 years
Staff Nurse/Band 5	–	>5 years
–	1–2 years	<1 year
Healthcare Support Worker	<1 year	N/A
Healthcare Support Worker/Band 2*	>5 years	N/A
Band 6	1–2 years	>5 years
Staff Nurse/Band 5	1–2 years	1–2 years
Senior Healthcare Support Worker	–	>5 years
Bank Healthcare Support Worker/Band 2	1–2 years	1–2 years
Hostess	<1 year	N/A
Senior HCSW/Band 3	–	>5 years
Healthcare Support Worker/Band 2	1–2 years	–
FY1 Doctor	<1 year	<1 year
FY2 Doctor	<1 year	1–2 years
FY1 Doctor	<1 year	<1 year
Senior HealthCare Assistant/Band 3	1–2 years	1–2 years
HealthCare Assistant/Band 2	>5 years	N/A
Band 7*	>5 years	>5 years
Occupational Therapist/Band 5	<1 year	3–5 years
Band 2	>5 years	>5 years
Occupational Therapy/Band 6*	1–2 years	>5 years
Psychologist/Band 8a	3–5 years	>5 years
Physiotherapist/Band 7*	>5 years	>5 years
Occupational Therapist/Band 7*	>5 years	>5 years
Band 6	3–5 years	3–5 years
Physiotherapist/Band 6	>5 years	>5 years
Physiotherapy student	n/a	n/a
Medical, consultant*	>5 years	>5 years
Volunteer*	>5 years	n/a
SCOTLAND		
Clinical Support Worker Band 3	>5 years	n/a
Band 2	1–2 years	not completed
Staff nurse Band 5	<1 year	<1 year
Student nurse	<1 year	n/a
Student*	<1 year	n/a
Staff nurse Band 5	<1 year	<1 year
Staff nurse Band 5	1–2 years	3–5 years
Dietitian Band 5	1–2 years	3–5 years
Healthcare Support Worker	1–2 years	n/a
Staff nurse Band 5	1–2 years	not completed
Student nurse	>5 years	n/a
Physiotherapist Band 6*	>5 years	>5 years
Band 5	<1 year	1–2 years
Band 5	3–5 years	not completed
Band 2	not completed	3–5 years
Staff nurse	1–2 years	1–2 years
Charge nurse Band 6	not completed	>5 years
Staff nurse Band 5	3–5 years	3–5 years
Student	n/a	n/a
Band 2*	3–5 years	not completed
Band 2*	<1 year	3–5 years
Band 5*	3–5 years	>5 years

(continued)

Table 2. Continued.

Profession/Grade	Experience in stroke (Yrs)	Time since qualification (Yrs)
Band 6*	>5 years	>5 years
Band 6*	>5 years	>5 years
Care and Support Worker G4	3–5 years	n/a
Grade 7*	>5 years	>5 years
Care and Support Worker G4	<1 year	<1 year
Care and Support Worker	<1 year	<1 year
Care and Support Worker G4	1–2 years	n/a
Grade 7	>5 years	>5 years
Band 6 Physiotherapist	>5 years	>5 years
Care and Support Worker G6*	3–5 years	>5 years
Care and Support Worker G6*	>5 years	>5 years
Band 6 Physiotherapist*	>5 years	>5 years
Band 5 Occupational Therapist	>5 years	>5 years
Band 6 Physiotherapist	>5 years	>5 years
Band 6 Nurse*	>5 years	>5 years
Band 7 Physiotherapist	>5 years	>5 years
Band 5 Physiotherapist	<1 year	1–2 years

Table 3. Summary of themes following analysis of interview and observational data.

Theme
1. Opportunities for staff to support stroke survivors to reduce sedentary behaviour
2. Physical and psychological capability of staff to support stroke survivors to reduce sedentary behaviour
3. Motivating factors influencing staff behaviour to support stroke survivors to reduce sedentary behaviour
4. Staff suggestions for a future intervention to support stroke survivors to reduce sedentary behaviour

England, there was a defined care pathway, with patients receiving post-discharge rehabilitation support for up to six weeks; commencing immediately after discharge from the stroke unit. Community therapy staff provided rehabilitation in patient's homes. In contrast, in Scotland, there was a broader range of community care pathways, including home and day centre therapeutic input. However, in Scotland, patients typically waited up to six months following discharge from hospital before receiving community rehabilitation. Of the community-based observations completed in Scotland, just one therapy session was in a patient's home. Home-based therapy at this site is not delivered routinely to all stroke survivors when they return home/to the community.

The built environment of the inpatient setting was, at both sites, generally restrictive to movement, with limited options of places for patients to move from the bed. Both sites had a day room with television and books, but these were small spaces, which encouraged seated activity. Staff at both sites suggested, during interviews, that a shared meal space could provide an incentive for patients to move and would also encourage social interaction. Around the wards, there was a lot of equipment, some of which was stored openly in corridors, which may have made it difficult for, and discouraged patients from, walking around.

At stroke survivors' homes, the environment was variable and space to move varied from one home to the next. Staff were observed providing advice, guidance, and instructing changes to the environment, for example, installation of handrails, to support stroke survivors to move more while at home. However, it was recognised that modifications to the home environment was limited to how stroke survivors wanted to live, for example, with cluttered or clear spaces, and cost and availability of installation of supportive structures.

In Scotland, the community day centre provided a bright and open space that actively encouraged movement and engagement with a range of activities – both seated, for example crafts, and movement based. There were activity rooms, where staff encouraged stroke survivors to engage in exercise after stroke classes, gardening, arty, and woodwork.

Theme 1: opportunities for staff to support stroke survivors to reduce sedentary behaviour

During interviews staff at both sites indicated having limited time to complete routine tasks and reported the ward was often short-staffed. This resulted, outside of therapy sessions, in many staff choosing to conduct personal care or standing and moving related activities on behalf of patients rather than encouraging them to do these independently, meaning patients were inadvertently encouraged to be sedentary.

It feels good to get them up and moving. But sometimes we're so busy we can't get everyone up and moving, we can maybe get the odd couple up, but it would be good if we could start getting everybody up and mobilising better. (Jasmine, Healthcare Support Worker, Scotland)

Encouragement of breaks in SB for inpatients occurred mostly during routine activity when staff had time (e.g., washing, dressing, toileting), and as part of scheduled occupational or physiotherapy provision. However, SB reduction was not the primary objective of these tasks. There were missed opportunities to encourage patients to move more. Outside of scheduled therapy, inpatient staff were not routinely observed encouraging patients to stand and move. Researchers at both sites noted staff did not routinely prompt patient's visitors to engage the patient in standing and moving related activity. However, it was also noted that limited space around patient beds and the ward generally was not conducive to movement or exercise type activity.

Some visitors were observed requesting to take patients away from the unit, for example, to visit the hospital coffee shop; in Scotland, typically due to safety concerns, this was advised to be done with the patient using a wheelchair. Staff felt there was opportunity to make more use of the available space around the ward, highlighting the limitations of confining movement to the patient bedside.

... it's a rehab ward and has probably got the smallest dayroom of the whole hospital; it's used for storage of a lot of big chairs, so there's a lot of limitations on that space. The ward manager would love that space to be used for more group work, even having some tables out for those that wanted to come up for their lunch so again there's some movement there. They could never do anything about the space by the sides of the beds because it's tiny isn't it?, literally it's a stand and pivot isn't it to reach anything? (Ava, Occupational Therapist, England)

Both sites were observed to be busy throughout the day – mealtimes and mornings being busiest with routine staff activities. During these times there was a high presence of equipment, for example, clinical staff computers (on trolleys), meal trolleys, and hoists. Staff activities decreased later in the day, with very little happening from after supper to lights-off, normally around 22:00, or when most of the patients were in bed.

Inpatient therapy sessions represented the main opportunity to break up SB. These were normally facilitated in a dedicated therapy room, lasted approximately 30 min, typically occurring once daily for each discipline. However, these were not associated with breaking up sitting time outside of formal sessions. Therapy sessions generally focused on addressing specific functional deficits, and reducing impact(s) of physical and cognitive disability

post-stroke and did not include interactions focused on reducing or breaking up SB. Types of activities observed included, as examples, sit-to-stand exercises and walking practice. The purpose of these was explained to stroke survivors as being related to addressing functional deficits and achieving rehabilitation and recovery goals. We did not observe staff making linkages with the application of these activities as a method for reducing SB.

OT sessions focused on regaining independence following discharge e.g., making meals in a room set up as a kitchen, or managing personal care in the bathroom, however, conversations about breaking up sitting time during the day by using these activities for this purpose were not observed. Opportunities to introduce activities that could be carried out throughout the day at the bedside (e.g., sit-to-stands) were discussed with staff during interviews and observations. Staff identified fear of falls prevented them from prescribing these types of activities without direct staff supervision. We did not observe an explicit focus on, or interactions based on, advising stroke survivors about the importance of breaking up SB or how they could do this outside of formal therapy sessions.

Community input was variable at the two sites, with the Scotland site having a less defined care pathway. This made it more difficult to identify a specific point in the community stroke care pathway in Scotland when it would be possible to consistently integrate mechanisms to reduce SB. However, opportunities were evident for most patients, for example, community stroke liaison nurses discussed locally relevant information about groups and activities with patients. In the community day centre (Scotland), staff discussed health promotion activities using a range of formats, including health awareness sessions, monitoring worksheets, and diaries. Outpatient facility visits, community exercise classes, and at discharge from service contacts were also identified as potential opportunities. At the England site, community staff utilised a "life after stroke" information booklet, with a mechanism for recording milestones, appointments and locally relevant information, over the course of community stroke service involvement. Staff in both community services acknowledged that these existing strategies did not currently focus on SB. However, recognised these approaches provided opportunities to integrate information about reducing SB.

I think it would fit in quite easily actually, within our service, definitely, and throughout all the different aspects. I was already thinking health promotion could be one way of getting it out there, that would be en-masse [...] as well as the peer support conversation. [...] It could even be something we that we could put on our trainers form, that even if we're not going to see that client again, we could just still leave them with that message, saying [...] make sure you are not sitting for long periods, or lying, [...] it will be really easy to incorporate into the work we do here. (Amelie, Care and Support Worker, Scotland)

Theme 2: physical and psychological capability of staff to support stroke survivors to reduce sedentary behaviour

Staff interviewed indicated that stroke service staff have different skills, knowledge, and confidence based on professional roles, and suggested this should be considered as part of intervention development and implementation. For example, nursing and care staff were normally associated, by all staff interviewed, with providing care to the patient – washing, dressing, medicating. Therapy staff were associated with providing therapeutic and rehabilitation input. Staff discussed how these different roles required different skill sets and approaches, and although a multi-disciplinary approach was taken there was little divergence from defined roles. Because of this, staff who have not been trained in

supporting stroke survivors to stand more, may not have the confidence or knowledge to know when or how to support a patient to reduce SB. Staff felt it necessary to overcome this as part of an intervention.

I think I would like to do a bit of training on that [SB] and seeing what I can do [...] activities we could do with them to break it [SB] up. It would be so much better, because [...] I'm sort of new to the stroke unit, well I've been here a year but I feel like I am still finding my feet a little bit, so going on a bit more training [...] I could benefit from. (Hannah, Student, Scotland)

...training up the team to be more aware of that [SB], or be more aware of the damage that it can do [...] and then strategies that they could do to prevent that. Because there is loads of stuff out there, but you wonder if some of the staff actually realise what they could be doing. (Annabelle, Activity Co-Ordinator, Scotland)

There was consensus that standing and moving related activity should be therapist led. Most nursing staff interviewed, felt they lacked capability to do this without input and detailed guidance from the therapy team. They talked about guidelines relating to early movement after stroke and waiting for a member of the therapy team to assess a patient prior to nursing staff engaging them with movement [26].

At both sites, it was clear, from the observations and interviews, that standing and moving related activity was primarily directed by therapy staff, in terms of how and when to transfer and mobilise.

Mobility wise, to get them out of the chairs, is physio led, once the physios are saying they can use a gutter frame with two, or they can use a Zimmer with two, then when they need the toilet, rather than bring a chair to them we'll walk with them to the toilet and we'll walk with them back, try and get them to do as much as they can on their own, because the whole emphasis is on promoting their independence. (Lilly, Senior Staff Nurse, Scotland)

For most staff, interviews confirmed that SB was not a familiar concept. It was often confused with absence of cognitive activity, for example sitting to read was not considered a SB because the act of *doing* was present, whereas sitting doing nothing was more likely to be considered a SB. Lack of PA was also commonly confused with SB; this was apparent across all grades of staff.

I don't really know the exact definition of it to be honest, and there might be some difference from it [physical inactivity] and there might be something added onto it rather than just like lack of physical activity. (Mia, Clinician, England)

When asked what they perceived to be consequences of spending prolonged periods sitting, many staff reported dealing with patients who were experiencing pressure sores, low mood, and reluctance to engage in social interactions. However, there was little evidence of inpatient staff making a direct connection to SB, and longer-term health impacts. Some community staff were more aware, however knowledge was often limited to physical consequences.

Well, obviously, if you're not getting up, it's not great for your heart, it's not great for your lungs, it's not great for your blood pressure [laughs] it's not great for any of those things. If you're still eating a lot, obviously you're likely to put weight on, that comes with all its own health problems. I think, muscle strength-wise, if you lose all your muscle strength you're in trouble, it's not great for your joints, it's just, overall, not great for any part of your body because we're creatures that are built to move around, not stay still. (Evie, Physiotherapist, England)

During inpatient observations, standardised procedures for passing on standing and moving or activity related information to family and friends were not observed. Nursing staff were not encouraged by therapy staff to be involved in prompting

caregivers to support patients to increase activity or reduce SB. This was discussed by community staff as having a knock-on effect. They described needing to work with stroke survivors to mitigate the effects of behaviours learned while in hospital, where inpatient staff were perceived by community staff to encourage patients to avoid moving.

We see quite often in the community, [patients stating] "but the hospital taught me to stay in bed, the hospital told me not to move", and then they [stroke survivors] deem what the hospital says, so highly, that actually they were struggling to break that. We're going, no listen, that was when you were acute, now you're home, now you need to start [moving] even more. (Maryam, Occupational Therapist, Scotland)

Theme 3: motivating factors influencing staff behaviour to support stroke survivors to reduce sedentary behaviour

In interviews, staff in both settings, were positive about encouraging patients to stand and move more. They felt providing guidance for stroke survivors about frequency and examples of appropriate movement was consistent with their rehabilitation ethos and existing practice.

One factor that reduced motivation of staff to encourage stroke survivors to increase the amount of time they spend in standing and movement activity was concerned with fall prevention. In both inpatient settings, there was a lot of information displayed in staff and patient areas about preventing falls. The inpatient culture was very much directed toward reducing falls, with the primary way of doing this being to encourage patients to remain seated or in bed. Although falls risk and falls prevention was also a key concern, community staff at both sites were less risk averse in relation to falls. The community stroke services placed greater focus on encouraging independence. During interviews, community staff talked about supporting patients to build up the distance they walked, and set goals to do this gradually. The main motivator for this was to support patients to regain a normal way of life as far as was possible. Community based staff felt there was greater opportunity to encourage stroke survivors to reduce SB if they had an active pre-stroke lifestyle and were amenable to engaging in standing and moving related activity post-stroke, including getting back to "normal".

... it's finding out what they're doing and what they did previously and whether that's something they can get back into. Do link into a lot with some of the services which are already out there, if that person wants to go to something but isn't able to at the moment, as one of their goals, for example, I would refer into another service for help with kind of just going on the buses or going and meeting a friend for coffee or something like that. (Bella, Staff Nurse, Scotland)

Staff indicated some risk was inevitable with the key being to manage situations since for most stroke survivors encouraging more standing and moving was beneficial overall. At both sites, community staff discussed, during interviews, the importance of encouraging patients to increase or maintain mobility independently or supported and discussed perceptions and understanding of the health and wellbeing consequences of low levels of PA. These discussions included suggestions for increasing levels of PA and implementing healthier approaches to lifestyle decisions including smoking cessation and diet choices. During interviews, inpatient and community staff regularly highlighted the need to be aware of the impact of cognitive impairments on understanding and behaviour post-stroke, and the need to balance encouraging and supporting activities to address these issues with awareness of need to break up periods of SB.

... the type of stroke, and the problems they've got from the stroke can hinder their progress [...] if somebody's got sensory or inattention problems, then that can make movement a lot harder for them, even though they might have some movement in an arm or limb, then that will impact on their recovery, as well obviously cognitive awareness of the stroke I think is a big problem. And mood, low mood and motivation can impact on their willingness and how they perceive themselves after stroke, so how well they progress... so lots of factors all need to be right and aligned for somebody to make the best progress... and really want to challenge the body. (Amelia, Stroke Clinical Nurse Specialist, England)

Theme 4: staff suggestions for a future intervention to support stroke survivors to reduce sedentary behaviour

In general, staff were in favour of an intervention to reduce SB post-stroke. However, suggested that any intervention should take a patient-focused approach, perhaps adapting or being incorporated in existing techniques already use during, for example, patient diary monitoring.

I think some sort of visual thing [...] like when they've got up, they have to tick it or mark it off. It's kind of like a diary, but obviously it would be a good indicator of how often in a day someone's getting up, or could we use technology in some way to do it, there's got to be something that we could do that would give us a better view of what people are doing and not doing and would encourage them to do more of it. (Evie, Physiotherapist, England)

For a SB intervention to be successful, staff felt clarity was required in terms of who the intervention was intended to be targeted at, and considerate of patients' level of post-stroke impairment. Nurses' and HCSWs routine monitoring activity such as intentional ward rounding activity could incorporate opportunities for standing and moving where appropriate for patients. This would support existing therapy activity. Emphasis was placed on developing guidelines, ensuring the developed intervention is clearly formulated so staff know their role in delivery, and to be inclusive but also challenging enough for those capable of standing and moving for longer, more frequently, or with less support.

I think sometimes some people benefit from very concrete information. So, if there were some guidelines I think for some patients it would work really well, [...] because we've had patients who've responded extremely positively to the upper limb therapy, the GRASP (programme), and they've responded so well that the benefits has been fantastic. So actually, if they've got strict, if they've got a set of guidelines it's like, do this twice a day, three times, once within the hour or something like that, you'd have a group of patients that would do that, you'd have a group of patients that wouldn't, and there might be other factors related to that, with cognition, but you would have a group that would do that. (Sophia, Occupational Therapist, England)

Staff also felt it important to define when the intervention would commence post-stroke and how staff would be equipped for consistent delivery, ensuring all patients receive the same information, and have tools for recording movement. Concern was raised during interviews about patients discharged from hospital quickly to early supported discharge services or those who attend an outpatient stroke clinic and are never admitted to a stroke unit because they may never get referred to or have access to post-stroke care and/or information. Staff highlighted the need to include these patients who may receive limited, or no community follow up, and to ensure any intervention was suitable for use across inpatient and community settings. Some staff wanted clarity about who would be responsible for delivering the intervention and what role different staff members would have during intervention delivery. Those interviewed felt that encouraging patients to stand and move more was every staff members' role,

and should be promoted as a cultural change, across organisations.

One key finding from the interviews was the need for training all staff about SB, before introducing an intervention. Staff knowledge of SB, including consequences and benefits varied greatly, and staff agreed it would be appropriate to include a package of staff training as part of the intervention - ensuring all staff are giving a consistent message to patients when discussing SB.

I think I could probably benefit from some sort of education about it, it's not something that's often discussed. I mean, we've touched on alcohol and smoking and those sort of things, there's a big focus on those but I don't think sedentary behaviour has a big focus here. (Rose, Staff Nurse, Scotland)

Discussion

This is the first study to explore staff perceptions of SB in stroke survivors using non-participant observations in stroke units and in linked community services, combined with staff interviews. We identified three themes directly related to stroke service staff capability, opportunity, and motivation that impact their approaches to support stroke survivors to reduce SB. The fourth theme reported in this paper makes suggestions for a future intervention to reduce SB after stroke.

Outside of routine therapy sessions, staff encouragement for patients to stand and move more was limited. This is consistent with studies measuring SB levels of inpatient stroke survivors within stroke rehabilitation hospitals; patients on average engage 76% of the day in non-therapy or low physical activity [10,27,28]. Evidence that staff provide limited opportunity and encouragement for stroke survivors to reduce SB in the inpatient setting cements the need for an intervention to address this. Whilst staff, at both sites, in inpatient and community settings, had awareness of the consequences of spending prolonged periods of time sitting, they lacked awareness of how the longer-term consequences of SB differ from those associated with a lack of PA. For the most part, staff also indicated that encouraging patients to move was a therapy-led activity; this was particularly the case in the inpatient units. Initial and ongoing therapy assessments determined mobility status and movement related activity. Nurses and healthcare support workers in inpatient services encouraged rehabilitation activity directed by therapists but did not make independent judgements on mobility or movement status. Observations indicated roles within services were clearly defined, staff identified closely with these roles with limited deviation from the care or therapy they have been trained to deliver. This highlights the need for staff education across the board - ensuring all are to be able to support stroke survivors to reduce SB. To ensure training, and associated intervention, can be integrated into routine practice without impact to staff who consistently reported being under time-pressures, it will be imperative that training is delivered concisely and aligned with availability of staff. "Buy-in" of senior staff would support this and would enhance acceptability and uptake of an intervention to reduce SB.

This study highlighted opportunities to incorporate breaks in SB as part of routine rehabilitation and care contacts both in the inpatient and community settings. However, for behaviour change to occur and be sustained in these settings, interventions would need to include raising awareness of the health-related significance of SB post-stroke and provide support for all stroke service staff to adopt strategies which facilitate SB reduction as part of routine care and rehabilitation. We identified a crucial barrier, reported by staff in the inpatient setting, to be concern about

falls and a ward-wide focus on mitigating the event of falls post-stroke. This focus on reducing falls influenced staff behaviour and indirectly contributed to increased SB of stroke survivors. However, while this is largely an inpatient culture, it does filter into the community setting and presents a significant issue for many stroke survivors across their recovery trajectory. Interventions designed to reduce SB must address this by working closely with stroke service staff to consider how to overcome this important issue in a realistic and safe manner. One opportunity is to support staff to understand how incorporating safe approaches to reducing SB into their routine practice could support stroke survivors to regain strength and confidence, which could reduce the incidence of falls risk in the longer term. The lack of safe, movement-friendly space in the inpatient setting also presents a barrier, effort is needed to ensure space is available for patients to be able to engage with an intervention to reduce SB.

Few studies have reported on the amount of SB in community-based stroke survivors, however, a 2013 systematic review [29] estimated daily levels of SB to be approximately 63% to 87% of the waking day, which is more than those of a similarly aged, healthy population. This figure is similar to that reported in the inpatient setting [28], indicating levels of SB are unlikely to reduce even when a stroke survivor returns home. Although our study did not explicitly measure this, we found a similar pattern, which highlights the need for an intervention that continues once the stroke survivor returns home. While the focus of this paper reports on findings from staff perspectives, the work was part of a wider study exploring the capability, opportunity, and motivation to reduce SB after stroke. Our study reporting on patient and caregiver perspectives [30] found stroke survivors engaged in SB for a wide range of reasons including wanting to rest to support their recovery, and to engage in activities they enjoy, for example, reading the newspaper and watching television. Our paper reported on stroke survivors' behaviours at 6- and 9-months post-stroke. Similar SB patterns were also recorded in two separate studies exploring SB after stroke, the first, a longitudinal study following stroke survivors for one year following their stroke [8], and the second, at 3-months post-stroke [31].

A 2020 study exploring SB and chronic illness highlighted the need to be aware of the important balance between encouraging a reduction in SB to obtain health-benefit alongside recognition of the importance of chronically ill patients engaging in sedentary activities they gain pleasure from, particularly given the physical limitations they may experience [32]. This aligns with our current findings, and those reported in our patient and caregiver paper [30]. A 2019 systematic review exploring adults' experiences of SB and non-workplace interventions also found that "cultural habits" can form based on feeling entitled to spend more time resting in later life, or after a hard day's work. These findings are similar to the study exploring chronic illness and SB [32], which found limitations and facilitators to reducing SB that are directly linked to chronic illness, as well as appreciation of encouraging engagement with activities that provide enjoyment, and recommended any interventions developed to reduce SB should consider these factors [33].

Strengths and limitations

This study adds to an emerging body of literature about SB after stroke, contributing new understanding on the perspectives of staff working in stroke care, which is less well documented. A key strength of the study was that it utilised non-participant qualitative observations and interviews with staff and analysed these

data alongside those collected from observations and interviews with stroke survivors and their caregivers. The patient views study, found that stroke survivors, in common with stroke service staff are willing to consider methods for reducing SB, with support from their caregivers and stroke service staff [18]. This study was conducted in inpatient and community settings, in two different locations – Scotland and England This permitted a broad range of data to be collected and for a realistic and complete understanding of SB after stroke at these sites. This allowed us to understand challenges and opportunities for staff within the different settings, and to understand differences in care pathways. When aligned and analysed with the COM-B approach, this was particularly useful for considering how an intervention might be developed and how this might relate to existing staff practice and the environment where stroke care is delivered. We have identified gaps in knowledge of SB within stroke service staff and have used this information to develop an intervention to reduce SB after stroke [30].

In terms of limitations of the study, since the work was undertaken at just two sites, and even though this small sample highlighted considerable differences in the care pathway, it is likely that findings from this work may not be representative of services in other locations. Additionally, our study was conducted at inpatient sites with limited communal and outdoors spaces (due to time of year), and other components that may encourage a reduction in SB, and therefore may not represent staff perceptions at all sites.

Conclusion

This study used observations at inpatient and community stroke services at two locations, and interviews with staff at the same sites to understand factors influencing SB in stroke survivors and to explore how this could be reduced. The study found that although staff are generally aware of the consequences of spending too much time sitting, there was some confusion about what count as SB. This highlighted the need for staff to be provided evidence-based training to enable them to support stroke survivors to reduce SB. Sedentary levels in the community were not reported to change markedly, highlighting the need to engage stroke survivors in movement from when capable of doing so in hospital, as well as when they return home. Findings from this study have informed the development of a SB reduction intervention that has been designed to be integrated into existing routine practice in stroke services. The development of the intervention is reported elsewhere [30].

Ethical approval

The study was approved by the Bradford Leeds Research Ethics Committee [17/YH/0236] and the Scotland A Research Ethics Committee [17/SS/0099]. Written informed consent was obtained from all interviewees, and from all participants who took part in focused observations.

Acknowledgements

We are grateful for the funding provided by the National Institute for Health Research (NIHR). The authors wish to thank the stroke service staff from the two participating stroke services who patiently and enthusiastically answered the researchers queries during observations and supported the work throughout. We

would also like to thank Dr Rekesh Corepal for his contribution to this work.

Disclosure statement

No potential conflict of interest was reported by the author(s). The views expressed in this publication are those of the author(s) and not necessarily those of the NIHR or the Department of Health and Social Care.

Funding

This report is independent research funded by the National Institute for Health Research (Programme Grants for Applied Research, Development and evaluation of strategies to reduce sedentary behaviour in patients after stroke and improve outcomes, RP-PG-0615-20019).

ORCID

Jessica Hall  <http://orcid.org/0000-0003-3622-9598>
 Coralie English  <http://orcid.org/0000-0001-5910-7927>
 Anne Forster  <http://orcid.org/0000-0001-7466-4414>

Data availability statement

The dataset generated and analysed during the current study are not publicly available to preserve the anonymity of participants.

References

- [1] Tremblay MS, Aubert S, Barnes JD, SBRN Terminology Consensus Project Participants, et al. Sedentary behavior research network (SBRN) – terminology consensus project process and outcome. *Int J Behav Nutr Phys Act.* 2017; 14(1):75.
- [2] 2018 Physical Activity Guidelines Advisory Committee. 2018 Physical activity guidelines advisory committee scientific report, U.S. Washington (DC): Department of Health and Human Services. 2018.
- [3] Gennuso KP, Gangnon RE, Matthews CE, et al. Sedentary behavior, physical activity, and markers of health in older adults. *Med Sci Sports Exer.* 2013;45(8):1493–1500.
- [4] Teychenne M, Ball K, Salmon J. Sedentary behavior and depression among adults: a review. *Int J Behav Med.* 2010; 17(4):246–254.
- [5] Del Pozo-Cruz B, Mañas A, Martín-García M, et al. Frailty is associated with objectively assessed sedentary behaviour patterns in older adults: evidence from the Toledo Study for Healthy Aging (TSHA). *PLoS One.* 2017;12(9) :e0183911.
- [6] UK, GOV. "UK Chief medical officers' physical activity guidelines." 2019. Available from: <https://publishing.service.gov.uk>
- [7] English C, Healy GN, Coates A, et al. Sitting and activity time in people with stroke. *Phys Ther.* 2016;96(2):193–201.
- [8] Tiegies Z, Mead G, Allerhand M, et al. Sedentary behavior in the first year after stroke: a longitudinal cohort study with objective measures. *Arch Phys Med Rehab.* 2015;96(1): 15–23.
- [9] Mattlage AE, Redlin SA, Rippee MA, et al. Use of accelerometers to examine sedentary time on an acute stroke unit. *J Neurol Phys Ther.* 2015;39(3):166–171.
- [10] Sjöholm A, Skarin M, Churilov L, et al. Sedentary behaviour and physical activity of people with stroke in rehabilitation hospitals. *Stroke Res Treat.* 2014;2014:1–7.
- [11] Healy GN, Dunstan DW, Salmon J, et al. Breaks in sedentary time: beneficial associations with metabolic risk. *Diabetes Care.* 2008;31(4):661–666.
- [12] Bellettiere J, Winkler EA, Chastin SF, et al. Associations of sitting accumulation patterns with cardio-metabolic risk biomarkers in Australian adults. *PLOS One.* 2017;12(6): e0180119.
- [13] Kringle EA, Campbell G, McCue M, et al. Development and feasibility of a sedentary behavior intervention for stroke: a case series. *Top Stroke Rehabil.* 2019;26(6):456–463.
- [14] Moore SA, Avery L, Price CIM, et al. A feasibility, acceptability and fidelity study of a multifaceted behaviour change intervention targeting free-living physical activity and sedentary behaviour in community dwelling adult stroke survivors. *Pilot Feasibility Stud.* 2020;6:58.
- [15] Clarke D, Gombert-Waldron K, Honey S, et al. Co-designing organisational improvements and interventions to increase inpatient activity in four stroke units in England: a mixed-methods process evaluation using normalisation process theory. *BMJ Open.* 2021;11(1):e042723.
- [16] Robert G, Cornwell J, Locock L, et al. Patients and staff as codesigners of healthcare services. *BMJ.* 2015; 350:g7714.
- [17] Michie S, van Stralen MM, West R. The behaviour change wheel: a new method for characterising and designing behaviour change interventions. *Implement Sci.* 2011;6:42.
- [18] Hall J, Morton S, Fitzsimons CF, et al. Factors influencing sedentary behaviours after stroke: findings from qualitative observations and interviews with stroke survivors and their caregivers. *BMC Public Health.* 2020;20(1):967.
- [19] Denzin NK, Lincoln YS. 2008. *Collecting and interpreting qualitative materials.* Vol. 3. Thousand Oaks (CA): Sage.
- [20] National Institute for Healthcare and Clinical Excellence. *How to change practice: understand. Identify and overcoming barriers to change.* England (UK): NICE; 2007.
- [21] Osborne SP, Radnor Z, Strokosch K. Co-production and the co-creation of value in public services: a suitable case for treatment. *Public Manag Rev.* 2016;18(5):639–653.
- [22] Clarke DJ, Hawkins R, Sadler E, et al. Introducing structured caregiver training in stroke care: findings from the TRACS process evaluation study. *BMJ Open.* 2014;4(4):e004473.
- [23] Smith J, Firth J. *Qualitative data analysis: the framework approach.* *Nurse Res.* 2011;18(2):52–62.
- [24] Ritchie J, Lewis J, Nicholls CM, et al. *Qualitative research practice: a guide for social science students and researchers.* London: Sage; 2013.
- [25] Morse JM. Simultaneous and sequential qualitative mixed method designs. *Qual Inq.* 2010;16(6):483–491.
- [26] Rudd AG, Bowen A, Young G, et al. National clinical guideline for stroke. *Clin Med.* 2017;17(2):154–155.
- [27] Fini NA, Holland AE, Keating J, et al. How physically active are people following stroke? Systematic review and quantitative synthesis. *Phys Ther.* 2017;97(7):707–717.
- [28] Simpson DB, Breslin M, Cumming T, et al. Sedentary time and activity behaviors after stroke rehabilitation: changes in the first 3 months home. *Top Stroke Rehabil.* 2021;28(1): 42–51.

- [29] English C, Manns PJ, Tucak C, et al. Physical activity and sedentary behaviors in people with stroke living in the community: a systematic review. *Phys Ther.* 2014;94(2):185–196.
- [30] Hall J, Morton S, Hall J, et al. A co-production approach guided by the behaviour change wheel to develop an intervention for reducing sedentary behaviour after stroke. *Pilot Feasibility Stud.* 2020;6:115.
- [31] Fitzsimons CF, Nicholson SL, Morris J, et al. Stroke survivors' perceptions of their sedentary behaviours three months after stroke. *Disab Rehab.* 2020;1–13.
- [32] Weedon AE, Saukko PM, Downey JW, et al. Meanings of sitting in the context of chronic disease: a critical reflection on sedentary behaviour, health, choice and enjoyment. *Qual Res Sport Exer Health.* 2020;12(3):363–376.
- [33] Rawlings GH, Williams RK, Clarke DJ, et al. Exploring adults' experiences of sedentary behaviour and participation in non-workplace interventions designed to reduce sedentary behaviour: a thematic synthesis of qualitative studies. *BMC Public Health.* 2019;19(1):1099.