RESEARCH



Identifying mediators of healthy lifestyle adoption after stroke: a focus group study using a Theoretical Domains Framework guided analysis



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Abstract

Background Lifestyle measures in addition to pharmacotherapy are recommended to optimise stroke secondary prevention. Adopting and sustaining good health behaviours after stroke necessitates ongoing motivation, influenced by complex social and cultural factors. This study analysed stroke survivors' experiences of addressing their lifestyle-related risks through a comprehensive theoretical lens addressing cognitive, affective, social, and environmental influences. Patient and public involvement (PPI) enhanced the research quality and transparency.

Methods Eight focus group discussions (N = 35 stroke participants; N = 3 family members/informal carers) were facilitated using semi-structured questions co-developed with a PPI panel. Purposive sampling ensured adequate representation (e.g. urban/rural location and stroke-related disabilities). Data were first coded and categorised inductively and mapped to the Theoretical Domains Framework (TDF) deductively to identify relevant constructs and theories of behaviour-change.

Results Participants reported risk reducing lifestyle changes as largely self-directed activities they figured out themselves. Their experiences mapped to 10 of the 14 theoretical domains of the TDF. The most reported behaviourchange mediators discussed were in the domains of *Knowledge and Social Influences*, seen as encouraging change and supporting emotional reactions. *Goals* were discussed in a limited way indicating underutilisation. Reminders, reinforcements, and rules to observe for maintaining healthy behaviours, mapping to the *Reinforcement* and *Behavioural Regulation* domains, were valued constructs. Psychosocial challenges, emotional responses and cognitive difficulties (*Memory, Attention & Decision Processes and Emotions domains*) were strongly evident, resonating with the experiences of our PPI contributor and interfacing with behaviour change processes and knowledge uptake. Health-beliefs, self-identity and perceived ability to change behaviour were considered to assert both positive and negative influences on behaviours, mapping to *Social/Professional Role & Identity, Beliefs about Consequences* and *Beliefs about Capabilities* domains. 'Know how' was highlighted as largely lacking for behaviour change, with the associated theoretical domains *Intentions, Skills, Environmental context & resources* to encourage skills development and *Optimism* about change notably absent from discussions.

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Conclusions The TDF proved a valuable tool to link stroke survivors' secondary prevention experiences and unmet needs with recognised constructs for behaviour-change. Results have important theory-driven implications to guide future interventions designed to support individuals in risk reducing behaviours following stroke.

Keywords Stroke, Secondary prevention, Behaviour change, Theory, Patient public involvement

Introduction

Modifiable risk factors account for up to 90% of all strokes at a population level, the majority of which are amenable to lifestyle modification [1]. As stroke survival rates increase, the burden of recurrent stroke also increases [2]. Recurrent strokes are associated with higher mortality rates and greater disability levels [3, 4], making secondary prevention an escalating priority [5]. Secondary prevention guidelines identify that all modifiable risk factors for recurrence need to be targeted and managed well for optimised secondary prevention [6-8], evermore so, as reductions in recurrence rates related to pharmacological management have largely plateaued over the past decade [9]. Adherence with recommended lifestyle-related risk reducing behaviours after stroke remains low [10, 11], and presents a clear target for secondary prevention. Stroke secondary prevention was defined by Delphi consensus as a strategy that "supports and improves long-term health and well-being in everyday life and reduces the risk of another stroke, by drawing from a spectrum of theoretically informed interventions and educational strategies" [12]. Stroke secondary prevention guidelines further recognise this need for proven theoretical models and behaviour change techniques to support health behaviours, noting advice alone is insufficient to affect positive change [7].

Changing any health-related behaviour for the better is a dynamic process which is constantly evolving [13]. Adopting and sustaining individualised health behaviours, while a key strategy in stroke secondary prevention [14], is additionally challenging as it necessitates ongoing motivation, and is influenced by complex social settings and cultural factors [15, 16]. Moreover, supports provided to promote change need to be guided by established theories and strategies rooted in evidence-based practices [12, 17]. In delivering complex interventions for stroke secondary prevention, healthcare professionals are required to better understand behaviour-change processes and the mediators by which to affect behaviour change [18]. Low to moderate certainty evidence supports behaviour change interventions after stroke as effective in reducing future cardiac events, reducing hypertension, improving physical activity participation and medication adherence, and reducing post-stroke depression [19-23]. However, a recent overview of reviews highlighted limited theory-based research and use of behaviour-change mediators in stroke secondary prevention complex intervention trials [19, 24].

Qualitative research has previously examined peoples' experiences of receiving stroke secondary prevention information and engaging in risk reducing activities [25– 30]. Physical barriers such as pain, mobility, and fatigue; mental/emotional barriers including anxiety, fear, cognitive problems; lack of clear information provision; poor access to social supports and environmental factors were reported impediments to adopting and sustaining healthy

behaviours post-stroke [15, 26–28, 31]. Perceptions of health information messaging after stroke were formerly considered under the theory of planned behaviour, where confusing or contradictory advice regarding healthy lifestyle behaviour was seen to negatively influence behavioural intentions [26]. Family members and peers were noted to exert either positive or negative influences on behavioural patterns, and the influence of healthcare professionals on behavioural intentions was rarely perceived. A meta-synthesis of qualitative research addressing secondary prevention group-based interventions, from the perspective of stroke survivors and family members, identified benefits that included feeling supported by others with shared understanding and by knowledgeable health professionals, and acquiring new knowledge and gaining confidence, which indirectly speak to mediators for behaviour change [32].

No study to date, however, has explicitly mapped individuals' experiences and perceptions of their risk reducing activities after stroke to theories or theoretical frameworks of behaviour change and their constructs. Therefore, this study aimed to better understand how individuals address lifestyle related risk factors along their stroke journey, identifying enablers for any positive behaviour changes made, and barriers and unmet needs related to ongoing risks. To better understand these experiences in the context of behaviour change theory, focus group discussion results were mapped to the Theoretical Domains Framework (TDF) [33], a comprehensive psychological model used to identify and understand factors influencing health behaviour change. It encompasses a range of theoretical domains such as knowledge, beliefs, and social influences [34]. New knowledge generated in this study about helpful or underutilised behaviour change constructs should help to inform future content, delivery and reporting of complex interventions addressing stroke secondary prevention.

Patient and public involvement (PPI), defined as "research carried out 'with' or 'by' members of the public rather than 'to', 'about' or 'for' them" [35] was embedded

in this study. To enhance quality and transparency, throughout the research process, this study aimed to actively involve a PPI panel of stroke champions, purposely assembled to represent the lived experience of stroke. PPI champions collaborated as research partners at all stages from study development to interpretation and synthesis of findings. Their perspectives are important to guide and inform future secondary prevention intervention development.

Methods

Study design

A qualitative exploration study addressing people's experiences adopting personal risk reducing behaviours after stroke. Consolidated criteria for reporting qualitative research (COREQ) guidelines [36] were followed (Additional file 1). Data were collected using focus group discussions(FGD). This methodology, used successfully with stroke survivors [26, 37, 38], facilitates exploration of the participants' experiences, feelings, and ideas and provides an opportunity to encourage and observe interaction amongst participants [39]. Interpretation of the shared and compared experiences of importance to people after stroke should help contribute to a better understanding of healthy behaviour adoption.

Research team and reflexivity

The research team comprised a primary investigator (PI), an experienced cardiovascular nurse specialist and researcher with prior experience of delivering stroke secondary prevention interventions (N=1 female, PH); an early-stage researcher from a middle income country undergoing mentoring in research methods (N=1 female, PP); and a senior academic, experienced in qualitative research methods and stroke service delivery (N=1 female, OL). While the study PI who conducted the focus-group discussions, was an independent researcher undertaking the study as part of academic endeavour to PhD, she had worked in both stroke support organisations previously, providing education and facilitating stroke support groups.

Participants and recruitment

Community-based Stroke Support Groups represent individuals and families after stroke living in the community. They meet on a monthly basis, facilitated by the voluntary organisations, to socialise, learn more about stroke and give and receive peer support.

Recruitment flyers and information leaflets (Additional file 2) were shared by the voluntary organisations supporting the research with their Stroke Support Group membership. Subsequent to this, the researcher visited each interested group to provide more detailed information and suggest potential focus group dates (Fig. 1). Both individuals after stroke and family carers were welcome and mixed participation in the groups was anticipated. This would ensure broad demographic inclusion in age, gender, urban/rural, socio-demographic status, range of stage and ability post-stroke. The intention was to host four to six FGDs each with approximately 6/7 participants to stimulate group discussion, ensure sufficient rich data was generated that could identify issues and provide broad understanding, as guided by the literature [39].



Fig. 1 Recruitment flow chart

Purposive sampling ensured a mix of urban and rural areas, which included deprived and affluent areas, were represented. Community dwelling adults>18 years of age, at least 6 months post stroke were eligible to take part. Individuals with mobility and/or communication impairment were eligible to participate if they had capacity to attend an hour-long discussion with other stroke survivors. To maximise inclusivity, a specially facilitated focus group with speech and language therapy support was provided as an option for people with post-stroke aphasia. Exclusion criteria included individuals with severe receptive aphasia; significant cognitive impairment limiting capacity to understand the study or the consent process; acute or unstable illness. Recruitment of family members/informal carers occurred directly when in attendance at stroke support group meetings. The inclusion of informal caregivers in the focus groups provided an alternative perspective from family/caregiver experiences. Stroke survivors and family members/informal carers, volunteers by self-selection, who expressed interest in participating were given a participant information leaflet (which included a QR code link to an online presentation in an accessible format) and a consent form. Informed consent was provided by participants prior to attending FGDs.

Data collection

Each FGD was guided by a semi-structured question schedule to explore experiences and perceptions of where and how lifestyle related risk factors were addressed along their stroke journey, and any identified barriers and facilitators to adopting personalised risk reduction behaviours. The topic guide was developed and reviewed with the project's PPI panel contributors (Additional file 3) and questions were asked in a conversational manner. The focus group facilitator introduced herself, explained the purpose of each focus group, establishing a rapport with participants and making sure they understood the reason for the focus groups. Four main areas were identified to explore:

- Knowledge of stroke risk factors in relation to lifestyle behaviours/daily habits or activities.
- Whether planning for healthy living after stroke was discussed and with whom.
- Perceived ease/difficulty in changing lifestyle behaviours.
- Barriers and facilitators to maintaining behaviour change.

All FGDs were one hour in duration and were conducted by the PI (PH) with field notes recorded after each session. A second moderator attended the first three FGD to observe and take notes until the primary researcher was comfortable nothing was being missed. The focus groups were held in-person in the support groups' usual meeting places (N=7) or on-line using virtual conferencing on Zoom (N=1), between September and December 2022. The discussions were digitally recorded, transcribed verbatim and pseudo-anonymised.

Data analysis

Analysis employed a framework approach [40], moving from the inductive in the first instance to the deductive, where descriptions of accounts and experiences were reflected and described in relation to the fourteen domains of the TDF. The TDF synthesises 33 theories of behaviour change and their constructs, into groupings that make behaviour-change theories more accessible. Comprising 87 component parts across fourteen overarching domains, the TDF covers a breath of relevant constructs and lowers the risk of constructs being missed with the use of a single theory [34](Additional file 4). This integrative and flexible framework (TDF) is documented as allowing comprehensive appraisal of behavioural constructs in qualitative studies, with an inductive aspect to analysis recommended [33].

Inductive analysis commenced by repeated listening to the focus group recordings, allowing immersion in the data as a whole, and transcribed verbatim by the primary researcher (PH). Each transcript was read and re-read multiple times and associated field notes checked for further insights to gain a sense of the data as a whole. Transcripts were then open-coded line by line independently by two researchers (PH and PP) in a qualitative content analysis approach to identify initial meaning units that related to healthy lifestyle adoption that were then coded from the raw data [41]. Following detailed examination, constant comparison and discussion between coders (PH and PP) occurred to reach consensus and improve data trustworthiness. Related codes were split, grouped together or removed to form broader agreed categories that minimised overlap, before moving to the deductive step with the TDF theoretical lens. Minor differences and discrepencies in initial data coding and category development were discussed with a third researcher (OL) and resolved by consensus. NVivo (qualitative analysis software) was used to support this process. This flexible reflective process helped maintained focus on the specific experiences of lifestyle behaviour change post-stroke. The TDF provided an overarching framework where the identified categories could be mapped deductively to its domains. Any identified categories that were unrelated to stroke secondary prevention were mapped to non-TDF themes.

Patient and public involvement (PPI)

A panel of stroke survivor champions worked alongside the research team and actively contributed to informing the research question and refining the study processes. This panel comprised five adults (N = 2 male; N = 3female) with a variety of experiences along the stroke pathway. We adapted our protocol for recruitment and data collection based on their feedback, including developing more accessible recruitment materials in different formats. Consultation for example on the content and design of a participant information leaflet resulted in a more inclusive product which included an online oral and visual presentation. A schedule of questions prepared by the researcher as a focus group topic guide, was reviewed and refined in a roundtable consultation event to ensure the content reflected questions that were relevant to and used appropriate language for people with lived experience of stroke. The topic guide and focus group discussion was piloted in a practice run with the panel, prior to data collection, and refined to incorporate visual props/ prompts during the discussions and ensured timing of discussions was short enough to minimise fatigue. The unique insights from one champion (N=1, female, JH)helped with the interpretation and reporting of the findings. The revised Guidance for Reporting Involvement of Patients and the Public (GRIPP)2 (short-form) [42] (Additional file 5) was used to report PPI influence in the study.

Table 1	Participan	ts demogra	phic details

Variable	Participants		
Age			
Average (median)	68.7 years (69)		
Range	33–86 years		
Gender		Stroke survivors	Family members
Male		21	
Female		14	3
Marital status			
Single/never married	4		
Married/with partner	29		
Divorced/separated	2		
Widowed	3		
Living arrangements			
Alone	7		
With other/s	31		
Employment			
Full-time	0		
Part-time	2		
Unemployed	1		
Disability	7		
Retired	28		
Previous stroke			
Yes	3		
No	35		

Results

Participant characteristics

Eight focus groups were conducted between September and December 2022. Thirty eight individuals (N=35 stroke survivors and N=3 family members/informal carers) participated (Table 1). No participant who signed and returned the consent form withdrew from the study. Each focus group constituted between 2 and 10 participants; the average number per group was 5 participants. All groups comprised a mix of men and women. The focus group that was co-facilitated by a speech and language therapist for participants with aphasia had 10 participants.

Themes

A total of sixty-nine initial meaning units were identified after initial codes were converged or split and agreed between the two independent coders following discussions. Twenty-two broad categories were identified from these meaning units, mapping to ten of the fourteen possible TDF domains. Some meaning units mapped to more than one category and some categories mapped to two TDF domains. No categories that were identified mapped to the TDF domains addressing Skills, Optimism, Intentions, Environmental Context and Resources. The remaining categories identified mapped to one non-TDF theme related to life after stroke addressing general recovery, physical rehabilitation and roles and responsibilities rather than specific stroke secondary prevention health behaviours. No category identified mapped to a construct for behaviour change that was not addressed by the TDF domains. Results are presented for each TDF domain identified with quotes illustrating the behavioural mediators elucidated by participants (Table 2).

TDF domains

Knowledge

The knowledge domain of the TDF addresses individuals' understanding and awareness of health behaviour/s. Participants across all groups reported understanding the concept of a healthy lifestyle in general and discussed health behaviours necessary to reduce the risk of stroke/stroke recurrence (healthy diet, regular exercise, not smoking, safe alcohol consumption). When explored in more detail, some participants could personalise this knowledge and identify prior behaviours as contributory to their stroke and that required action going forwards:

"But I was drinking too much beer, you know, and I consider that and the smoking certainly contributed to the, the stroke" (Participant 4 (male), FG4).

And

Incentives;

Do's and don'ts

Reinforce the information

Table 2 Codes and categories mapped to TDF domains

Table 2 Coues and categories mappe			
Codes	Categories	Quotes	TDF Domain
Awareness of risk factors; Awareness of risk of recurrence, cardiovas-	Knowing/not knowing (awareness/understanding of stroke)	<i>"I never thought I'd have a stroke…"</i>	1. Knowledge (awareness of the existence of something)
cular events or death; Consciousness of			
Lack of understanding about the stroke:			
Information provided: Understanding			
stroke risk; Recognising warning signs			
A lot of information to absorb; Barriers to	Information needs/unmet informa-	"what I found was nobody	
accessing information; Being invisible;	tion needs	told us how!"	
Needing to know why and how to; Readi-	(need for active and passive informa-		
ness for information; Reinforcement of the information; Unexplained orders	tion, importance, lack of guidance)		
A lot of information to absorb; Cognitive	Cognitive overload	"She got a lot of informa-	
function;	(difficulties experienced due to infor-	tion, but she couldn't It	
Fatigue	mation overload or mental fatigue)	went over her head."	
Memory and cognition;	Thought processing and sense	"I was getting a lot of infor-	
Need to be heard;	making (remembering retaining thinking or	mation in the hospital and l	
Stroke consequences	comprehending)	coulant process it	
			2. Skills (ability or proficiency acquired through practice)
Consciousness of healthy behaviours as-	Self-identity	"I was a postman for 38	3. Social/Professional role
sociated with roles; Identity	(social role and established habits)	years and I always had a sort of a routine"	& identity (a coherent set of behaviours and displayed qualities
Identity	Different person	"I just miss the old me."	of an individual in a social or work
	(impact of loss of role identity)		setting)
Confidence and ability; Determination;	Confidence/lack of confidence	"I think the more you can	4. Beliefs about capabilities
Independence;	(ability to adopt healthy habits and	do something for yourself,	(acceptance of truth, reality,
Motivation	sustain behaviours)	the more confidence it gives you"	validity of ability, talent, can put to constructive use)
Persistence;	Perceived control	" was up to me to make	
Responsibility for self-care;	(established habits and discipline)	sure we have a healthy diet."	
Routine		<i>"</i>	
Barriers to adopting healthy habits; Deal-	Barriers to change	"I could walk but to go for	
Eatique		a waik. I just startea very slowly"	
Tulgue		Jowy	5. Optimism (confidence things will happen for the best, desired goals attained)
Alternative health beliefs;	Personal health beliefs	"The more active you are,	6. Beliefs about consequences
Feeling lucky;	(acceptance and denial of the outcome	in my opinion, the longer	(acceptance of truth, reality, valid-
Safety concerns;	of behaviours)	chance you have of living."	ity of outcomes of behaviour)
Uncertainty			
Being healthy is hard;	Expected outcomes	"I did cut back now eventu-	
Consciousness of healthy behaviours;	(staying healthy is not easy)	ally I did now, but uh I	
Sustaining nealthy lifestyle		rouna that, un, a struggle,	
		the sweet things"	
Comparison with others post-stroke. Life	Anticipated impact of stroke	"I do tell myself this will	
after stroke:	(comparing with others and staving	prevent vou from ever anina	
Life as before;	positive)	through what you went	
Positive mindset		through again"	
Additional supports;	Enabling change	" reminders to keep	7. Reinforcement (increasing

(external factors supporting behaviour

change)

Sanctions

reminding us about these

"you have to follow the

things,"

(the do's and don'ts or rules to observe) rules... you can't ignore it"

ng probability of response by arranging dependent relationship, or contingency, between response/ stimulus)

8. Intentions (conscious decision to perform behaviour/resolve act)

Table 2 (continued)

Codes	Categories	Quotes	TDF Domain
Goals and intentions	Goal setting (identifying targets to work towards and planning to achieve)	"It was like [getting back to golf] a goal that I I could look forward to"	9. Goals (end states individual wants to achieve)
Memory and cognition; Need to be heard; Stroke consequences	Thought processing and sense making (remembering, retaining, thinking or comprehending)	"I don't even remember going home"	10. Memory , Attention , Decision Process (retain information, focus, choose between alternatives)
A lot of information to absorb; Cognitive function; Fatigue	Cognitive overload (difficulties experienced due to infor- mation overload or mental fatigue)	"there's so much happening around you, plus the fact I think that the sheer shock of having the stroke, the realisation,"	
			11. Environmental context and Resources (discourages/ encourages development of skills/ abilities, independence, social competence, adaptive behaviour)
Familial support; Peer-support	Support from family, friends, peers (having the support of others)	"My sister brings me now and takes me shopping"	12. Social influences (interper- sonal processes that cause change of thoughts, feelings, behaviours)
Community support resources; Social support; Unsustained social support	Community support (structured supports and resources in the community)	"And the interaction with people with the same condi- tion in the past,"	
Carer responsibility; Family dynamics	Potential conflicts (struggles or conflict when caring and receiving care from family)	" and sometimes it could be a little bit tetchy"	
Emotional reactions; How to manage emotional aspects; Loneliness; Religion and spirituality; Uncertainty	Emotional reactions (acknowledging and attempting to deal with emotions)	"It took me a long time to accept it and I'd be really angry"	13. Emotion (complex reactions, experiential, behavioural, physi- ological, in attempting to deal with personally significant event)
Emotional self-management skills; Positive mindset; Religion and spirituality	Mood management (enabling self-regulation of emotions and minding their mental health)	<i>"I had a tape that just for eh to calm me down, used to listen to that"</i>	
Goals and intentions; Routine; Strategies to be healthy	Strategies (action planning to perform healthy behaviour)	"when I wake up in the morning, get up and get dressed and get out for a walk"	14. Behavioural regulation (aimed at managing/changing actions- objectively observed/ measured)
Monitoring risk factors and behaviours; Regulating behaviours	Self-monitoring (establishing a method to monitor and record performance)	"I make sure to get me 10,000 steps in everyday"	

"So cholesterol, I'd never thought about it, I'd eat the fat off bacon! But when I, then had the stroke. And this is now obvious, this is what caused the stroke.... the lifestyle." (Participant 2 (male), FG1).

Others focussed in on aspects of a healthy lifestyle such as fitness as protective against stroke but then struggled to rationalise these beliefs in the face of their own stroke:

"I never thought I'd have a stroke... up every morning at half 7, to swim. Walked every day, walked about for an hour every day. Did the garden. Did the hoovering [vacuuming] and stuff at home like that. Now you can't put it down to health because I thought I was very fit" (Participant 1 (male), FG5). Some participants highlighted their knowledge and understanding of stroke risk were largely based on the people they knew who had experienced stroke and centred on non-modifiable factors such as age:

"because like, the only person I ever knew to have a stroke was my grandfather. Even the night I was having my stroke, I was like! There's no way I'm having a stroke... I'm a young one" (Participant 1 (female), FG4).

Consistently across groups, participants referenced many unmet needs related to understanding secondary prevention. They reported receiving little or no individualised information that helped them to better understanding their stroke risk when they were in hospital

"well, I never knew what kind of stroke I had or anything. I was never told...they told me absolutely nothing." (Participant 2 (female), FG3).

And

"Well, yeah. How to prevent it? What's his cholesterol, blood pressure, all that kind of thing that you wouldn't have known before this"(Participant 10 (female), FG7).

Participants provided insights into the knowledge they required to enact lifestyle changes, and again highlighted unmet information and support needs. Participants regularly discussed in their groups how they (and their families) had to work things out for themselves:

"I was told that I had to lose weight, that I had to eat healthy, that I had to manage my cholesterol, to manage my blood pressure, I had to exercise more... But what I found was nobody told us how!...and then we figured it all out ourselves! but nobody actually told us"(Participant 1 (female), FG4).

Across the groups, participants acknowledged the role voluntary organisations play in providing stroke secondary prevention information and how again these supports were not signposted for them. They further highted that the timing of accessing these services was sub-optimal:

"And I mean they're all very good (lifestyle talks and about blood pressure), but they're all nearly too little, too much, too late. You know, we need these things beforehand" (Participant 2 (female), FG5).

And

"my daughter spotted that thing about Headways (voluntary organisation), and she said I'm going to [call], other than that I would be left sitting in the sitting room..."(Participant 1 (female), FG3).

When reflecting on the optimal time to receive targeted secondary prevention information and whether the message should extend beyond the person to the wider family members, participants differed in opinions. Results highlighted the complexity of the post-acute stage and an overlap between the TDF *Knowledge* domain and that of *Memory, Attention, Decision Process* in relation to processing information and information overload during the acute phase of stroke:

"There's so much happening around you, you're not really absorbing. It's only coming later that it kind of dawns on you..." (Participant 2 (male), FG1).

And

"She got a lot of information, but she couldn't... It went over her head." (Participant 3 (female), FG7).

And

"I was getting a lot of information in the hospital and I couldn't process it because I was tired and my brain wasn't working" (Participant 1 (female), FG6).

Social/professional role & identity

This TDF domain addresses the influence of one's social or professional role on health behaviours. During group discussions about risk reduction after stroke, the construct of self-identity was noted to play an evident role, notably for individuals who perceived themselves and their roles pre stroke to be essential for their healthy lifestyle:

"I was a postman for 38 years and I always had a sort of a routine. I went to bed at 10 o'clock almost every night, give or take. I'd get up at 6 or 5 rather and I'd start work at 6" (Participant 4 (male), FG2).

One family member/informal carer shared the effect his social role (as grandad) within the family helped her husband build and maintain healthy habits:

"Tommy (not real name) had stopped walking by himself! We were looking after our grandson one day and he said Granddad, will you bring me down to the (football) pitch. And you did.... And then I said, if you can do it with (grandson), you can do it yourself. So most days he takes a short walk down around the field himself." (Participant 10 (female), FG7).

Others described the impact of perceived loss of their identity or feeling like a different person after stroke e.g. when talking about emotional self-regulation and their ability to engage with a healthy lifestyle:

"I just miss the old me. I know my sense of humour is different and I know it's in there. But to get it out. I just can't." (Participant 1 (female), FG3).

This loss of identity was particularly noted when communication difficulties were a consequence of the stroke, evident in the focus group, co-facilitated by a speech and language therapist for participants with aphasia. Discussions about receiving information and guidance about stroke risk, resulted in consensus amongst the group members about how people talk around them, not to them directly and how this made them feel invisible or dismissed:

"people talk, talk around you" (Participant 4 (male)) "Yeah, yeah, that's exactly it..."(Participant 6 (female)) "Talk down to me. That's true"...(Participant 4 (male)) "And he said, don't know what you're saying, or what you said"(Participant 3 (female)) (FG7).

Beliefs about capabilities

This TDF domain encompasses an individual's self-confidence and perception of their ability to perform health behaviours. During focus group discussions, participants talked about their confidence or lack of confidence in their own ability to adopt healthy behaviours, and how this influenced their attitudes towards particular behaviours, for example, being physically active:

"I think the more you can do something for yourself, the more confidence it gives you... I just started very slowly down the road and back to the house, until I could go around the block." (Participant 2 (male), FG2).

And maintaining or not, a healthy diet:

"I was sweet eater, and diabetic. Now you said look, you don't need them. And I said, Oh yeah, but I have to have something there in case I do want to." (Participant 3 (female), FG2).

Some participants also described their struggles dealing with addictions, primarily in relation to smoking cessation after stroke. They discussed how not having another stroke was a strong motivating factor and how formal support services contributed to their engagement and perceived ability to stop:

"she said you keep smoking here, you'll finish, you'll get another stroke 10 years time and you'll finish up in a wheelchair.... So the following Friday I stopped smoking." (Participant 1 (male), FG6).

A family member/informal carer verbalised her lack of confidence in her husband's ability to adopt healthy eating into his lifestyle by himself. She went on to discuss how she perceived it as her responsibility to provide a healthy diet to enable his capacity for risk reducing behaviours: "I had to come to the realisation that I was responsi-

ble. It was up to me as the person who does the shopping to make sure we have a healthy diet." (Participant 4 (female family member), FG1).

Beliefs about consequences

This TDF domain refers to the perceptions of positive or negative outcomes associated with health behaviour/s and the expectations individuals hold relating to their actions. Here focus group discourse largely concentrated on the negative consequences associated with sustained unhealthy behaviours and discussed how fear was their motivator for adopting better health behaviours:

"because I'm so scared of something happening. But I do tell myself this (gym class) will prevent you from ever going through what you went through again" (Participant 1 (female), FG4).

And

"I'm more conscious of food... Is it going to impact on stroke recurring." (Participant 2 (male), FG1).

And

"the biggest factor I think, which is all [of us] is we don't want another stroke and we don't want to die." (Participant 3 (male), FG6).

In most of the discussion groups, participants described their beliefs about the benefits of adopting good lifestyle behaviours on health as a general concept but did not personalise this to their own behaviours:

"The more active you are, in my opinion, the longer chance you have of living." (Participant 1 (male), FG5).

And

"keep away from unhealthy food. Eat healthy food. Go for walks every day" (Participant 6 (female), FG4).

However one participant reported not caring about the consequences, related for example to a healthy diet:

"I don't think about something that's healthy or unhealthy. If I want to eat steak, I eat steak, I don't care if it's high, in anything. You know, I don't think about those things..." (Participant 4 (male), FG4). This attitude was not shared widely in this group, nor did it arise in other FGDs.

Reinforcement

This TDF domain acknowledges the external factors that can encourage or discourage health behaviours. In relation to enabling change and increasing the probability of maintaining new health behaviours, participants reported the importance of receiving external reminders and regular reinforcement of participants' active and positive health behaviours:

"it's no harm to keep reminding us about these things, because you can get complacent." (Participant 2 (female), FG5).

Participants also welcomed external provision of rules to follow as an important mediator for maintaining behaviour change:

"They've done so much work on me, it'd be foolish to ignore it, you have to follow the rules, like that's it." (Participant 3 (male), FG6).

However, when external factors dictated a health behaviour without respecting personal autonomy, this was very poorly received. For example, one participant recalled being told he was no longer a smoker in hospital:

"The consultant, came round to see me in the hospital and he said... You were a smoker... He just closed the book like that (demonstrated closing a book) He walked away." (Participant 2 (male), FG1).

Goals

This TDF domain addresses goal setting and action planning to achieve the necessary outcomes for adopting healthy behaviours. Notably, as a behaviour change construct it did not arise in many of the discussion groups. One participant did explain how she has set an activity goal for herself to track her steps, but how due to her irregular gait she cannot use digital counters to facilitate this:

"I set myself up a target, I try to walk 2000 steps every day. So when I'm walking from A to B I count my steps." (Participant 2 (female), FG5).

Another participant described how her goal to return to playing golf motivated her to stay connected with an active social life, supported her mental health and eventually enabled her to achieve her goal: "I played a lot golf, I'd a good social life, plenty of friends. that was a saviour from when I had my stroke, because I was able to go back to that, even though I couldn't play golf, just meeting the people really brought me out of myself again and that gave me a goal, even though it took 2 years to get back to that [golf" (Participant 3 (female), FG8).

Memory, attention, decision process

This TDF domain addresses the cognitive factors that affect the adoption of health behaviours. During the focus group discussions, many participants reported how their memory and cognition were affected by stroke. This was most evident in the initial period post-stroke and at hospital discharge when much of the information relating to risk reducing behaviours is provided by health professionals:

"[re stroke information] I knew nothing. I don't even remember going home from hospital." (Participant 1 (female), FG3).

And

"[my wife] is capable of asking. Yes. But I couldn't remember," (Participant 4 (male), FG7).

Their ability to make sense of the information that was provided about stroke and secondary prevention and process it for behaviour change was also discussed in the groups as being challenged:

"there's so much happening around you, plus the fact I think that the sheer shock of having the stroke, the realisation," (Participant 6 (male), FG1).

Mental fatigue was identified as an important barrier in maintaining attention and concentration when addressing lifestyle-related risk factors:

"I was getting a lot of information in the hospital and I couldn't process it because... I was tired and my brain wasn't working" (Participant 2 (female), FG6).

Social influences

This TDF domain acknowledges the impact of others on individuals' health behaviour/s and includes social norms and support. In all focus group discussions, participants described the influence social groups/networks and family had on their subsequent knowledge, understanding and engagement in healthy behaviours. One aspect of this related to their perceived lack of information provision from health professionals: "My kids were good. They're in their 30s and 40s and my eldest daughter, she's kind of well up on it... so it was her told me what I can and can't eat." (Participant 1 (female), FG3).

Relying on friends or family for support or help with healthy behaviours and associated activities elicited some positive experiences:

"My sister brings me now. She comes down on a Friday and takes me shopping" (Participant 3 (female), FG2).

Negative experiences were also discussed with support for risk reduction leading to potential conflicts within family relationships and dynamics:

"... and sometimes it could be a little bit tetchy because [my husband] he likes loads of sweet things" (Participant 4 (female family member), FG1).

And

"my head doesn't work so I have... beans all the time but... Just leave me alone... if I want to eat it [beans] every day... Leave It, that's it." (Participant 6 (female), FG7).

Being a member of a community stroke support group was perceived as a very positive influence and a motivator to engage in healthy activities:

"And the interaction with people with the same condition in the past, I swear to God. It's like you know them for years. [Yeah]." (Participant 6 (male), FG1).

And

"The exercise is better because you get to know the people and you feel you're getting the benefit out of exercise and you sort of look forward to it. Meet the people and do the exercise." (Participant 1 (male), FG5).

And

"the heart foundation has done it's part too. It's had a dietitian on a few times, to its stroke groups, and you know, if they keep that up, some of it will eventually stick" (Participant 5 (male), FG8).

Family/friends and support groups were credited with supporting and encouraging mood management as a health behaviour:

"just meeting the people, really, really brought me out of myself again because you can, with stroke, you can go in to yourself" (Participant 3 (female), FG8).

And

"someone even just to say your brain is healing, you're going to go through a lot of emotional changes. Talk to someone. This is the number to get you sorted" (Participant 2 (female), FG6).

However, often during the group discussions participants reported how they found out about community supports through informal networks, word of mouth or simply by chance:

"At some stage we got information there was a stroke group, health group in the area. So after further inquiries we discovered this place and have been coming since," (Participant 1 (male), FG2).

Emotion

This TDF domain recognises the role emotions can play in influencing health behaviour/s. Discussions on risk reducing activities in the focus groups tended to centre around participants' emotional reactions to having a stroke and how this impacted on their general acceptance and coping abilities. Participants discussed negative emotions related to acceptance of the stroke itself:

"It took me a long time to accept it and I'd be really angry. You know it, it was not depressed, but more anger. And possibly I would have cried once or twice at, at night, grieving for myself, I guess." (Participant 6 (male), FG1).

And

"because I get up in the morning and I know when it's time for crying. My tummy tells me... I could be out walking, and people have seen me crying and stopped and said what's wrong with me? And I say, ah you know, just a headache or something like that..." (Participant 3 (male), FG3).

The effect of emotions on participating in healthy activities was also evident. Negative affect post-stroke was commonly acknowledged as a limiting factor to healthy lifestyle engagement. Having a positive outlook or attitude was reported as enabling and motivating towards healthy activities: "So it's all to do with your own mental attitude, I think. Just get up and go and get to do what you can" (Participant 1 (male), FG5).

It was evident that some participants recognised mood as a risk factor for recurrence and had adopted strategies to self-regulate mood as health behaviours:

"I had a tape to calm me down, used to listen to that. You know the sort of thing just to be calm in yourself, calm and relaxed." (Participant 4 (male), FG2).

And

"I know when I get stressed, everyone knows... but then I just walk away and go and sit down. I say don't talk to me for a while, I know I just manage my breathing. And it only takes a couple of minutes and then I'm back to normal." (Participant 1 (female), FG3).

Behavioural regulation

This TDF domain addresses individuals' ability to selfregulate and control their health behaviour/s. During group discourse, participants highlighted how they plan and monitor their lifestyle habits in order to stay on track. Routine was considered an important component to sustained behaviour change:

"Now when I wake up in the morning, get up and get dressed and get out for a walk and if I don't do that I just sit all day, but I have to get up and get out straight away." (Participant 2 (female), FG3).

Others described ways of monitoring and keeping track of their new behaviours:

"Adjustments, in the beginning you have to train the mind for regulating everything. But now it's automatic" (Participant 5 (male), FG1).

And

"I keep an eye on the weight, maybe every day and If I see it going up I [cut back]" (Participant 1 (male), FG2).

This TDF domain was extended by participants beyond the first person to include family in monitoring and regulating behaviours:

"They bought me a Fitbit and I make sure to get me 10,000 steps in everyday and they check." (Participant 1 (female), FG3).

And

"it is balanced because we have discovered that you can buy a sealer and we can get a bottle of wine and it will do us three nights." (Participant 4 (female family member, FG1).

Patient and public involvement (PPI)

The analysis of study findings and interpretation of key messages was enriched through the unique insights from one PPI champion (JH). This level of research participation helped to highlight the vulnerability stroke survivors feel on the realisation of the risk of recurrence and how this can have both positive and negative impacts on lifestyle behaviours. Our champion recognised the "very obvious knowledge gap" after stroke and the importance of mental health as a lifestyle factor. Memories of her own experience were triggered which helped confirm our behavioural mediators during mapping. By providing a different perspective and identifying with the participants, JH helped lend credibility to our findings.

Discussion

Adopting and sustaining healthy behaviours after stroke is challenging, influenced by many elements from individual needs and preferences to external community and environmental factors [43, 44]. This qualitative study explored the real-world, lived experiences of adopting healthy lifestyle behaviours after stroke to reduce future risk. The study findings, examined under a comprehensive framework (TDF), allow a better understanding of the theoretical constructs that influence real world secondary prevention risk reducing behaviours. The results generated contribute important information that has relevance not only for prevention in cardiovascular conditions, but for health behaviour change processes that have wider utilisation in health promotion. Engagement with risk reducing behaviour change was largely discussed as a self-directed activity where people generally figured things out themselves. Participants were open to and welcomed additional direction and support to build knowledge and ability to make and sustain lifestyle changes however. The TDF provided a comprehensive lens through which to view the different influences or mediating factors for health behaviours after stroke. All mediators identified during the focus group discussions were exhaustively covered by this framework. No new constructs for behaviour change were identified despite adopting an inductive approach to data analysis in the first instance [33, 45]. Results, which mapped to ten of the fourteen possible TDF domains [45], help to better understand what works well, what doesn't work well and where gaps to proactively reduce all modifiable, lifestyle

related risk factors through behaviour change still exist after stroke.

Knowledge (e.g. nature of stroke, risk factors and lifestyle-related factors) was identified by participants in this study as a key construct for behaviour change. Qualitative studies previously highlighted the importance of information provision for addressing lifestyle risks after stroke [19, 25-27, 46], with quantitative evidence further supporting interactive and tailored information with feedback as effective in improving health behaviours after stroke [24, 47-49]. During focus group discussions, information provision received in the acute hospital setting primarily, could be described as passive provision. In contrast, active information provision, with opportunities for clarification and reinforcement, has been proven to improve stroke-survivor knowledge and reduce anxiety and depression after stroke [50]. While the current study identified that participants could easily discuss what constitutes a healthy lifestyle, many lacked personalised knowledge to relate their own lifestyle-related risk factors, and the Intentions behaviour change domain was not apparent when discussing their lifestyle and risk reducing activities. This lack of knowledge and awareness of personal unhealthy behaviours has been associated with poor intention to change behaviour after TIA or ischaemic stroke previously [15]. While knowledge is an important construct for behaviour change, information provision alone has been shown to be ineffective in affecting positive behaviour change [7, 17]. Additional factors need to be explored in tandem with active information provision to understand when and how people change their behaviours to lower their stroke risk [51]. Notably in this study, no behavioural change discussion categories mapped to the TDF domain of Skills, where proficiency is acquired through practice, or that of Intentions indicating a personal and conscious decision to perform a behaviour. Most participants valued reminders, reinforcements, and rules to observe for maintaining healthy behaviours, mapping to the *Reinforcement* and Behavioural Regulation constructs of the TDF. These may all be important components by which to complement knowledge and addresses the currently identified lack of "how to" identified in this study. As constructs, they can be incorporated easily into multimodal secondary prevention interventions comprising targeted health education and behaviour change activities focused on lifestyle and psychosocial health, as recommended in international guidelines [7, 8] and supported by high level evidence synthesis [19].

This study identified health beliefs as being important after stroke in adopting lifestyle changes. Illness perceptions after stroke have previously been explored using the theory of planned behaviour [26] and the health beliefs model [51]. When addressed, appropriately challenged, misperceptions corrected and evidence of necessity provided, a positive impact on health behaviours after stroke is evident [52, 53]. The predominant evidence available in this area addresses medication adherence which interestingly did not arise in focus group discussions as a risk reducing health behaviour. Personal health beliefs and perceived ability to change behaviour/s were evident and often overlapped with participants' understanding of the benefits of healthy lifestyle behaviours. For many participants in the study, previous roles that promoted a healthy lifestyle, or strongly perceiving they had a healthy lifestyle prior to stroke (mapping to the TDF Social/ professional role & identity) positively influenced their engagement in healthy activities, mirroring Antonovsky's theory on salutogenesis where the way people view their life has a positive (or negative influence) on their health and coping ability [54]. It is interesting in this context to note that categories identified in this study that mapped to Beliefs about consequences in relation to health behaviours tended to the negative or punitive aspect (e.g. if you don't do this you will have another stroke) and notably no categories mapped to the TDF domain of Optimism. The paradigm shift towards more positive messaging focusing on behaviours that support psychological well-being in cardiovascular disease needs to extend to the stroke secondary prevention population [55].

Psychosocial stress and depression are both recognised risk factors for stroke [1] and it is well acknowledged that stroke survivors often experience emotional changes, such as depression, anxiety, anger, or apathy [56]. Mapping to the *Emotions* domain of the TDF, psychosocial challenges and emotional responses encountered after stroke were strongly evident in group discussions where participants discussed how they negatively impacted their ability to engage in health promoting activities. However, the direct association between mood and stroke recurrence was more tenuous. This was an aspect that resonated with our PPI representative who felt strongly that this must be better recognised and addressed along the stroke care pathway. Psychosocial interventions after stroke that address emotional self-regulation as a risk-reducing health behaviour have been addressed at systematic review level [56-61]. A best evidence synthesis across these reviews identifies moderate certainty evidence [62] supporting psychological talk therapies to reduce post-stroke depression, whilst low certainty evidence supports multimodal interventions to reduce anxiety and psychological distress [19]. No focus group participant specifically referred to availing of either of these strategies when talking about managing their mood. Rather, participants' experiences related to self-taught strategies, congruent with evidence from mindfulness-based cognitive therapy [63, 64] to address self-regulation of low mood after stroke [24].

Our findings emphasise social interactions and supports as a commonly cited and positive mediator for risk reducing behaviours after stroke. Social influence and behaviour change "occurs when an individual's opinions, emotional states and behaviours are affected by others" [65], as identified in the current study. Several studies report social (family, friends, community) supports as predictive of community participation and functional recovery after stroke as well as enabling healthy behaviour engagement [32, 66-68]. Peer support groups [69, 70] and group-based programmes including cardiac rehabilitation after stroke [37] have been found to enable peers to provide and receive relevant emotional support and practical information. In this study voluntary stroke support groups proved an important vehicle in promoting positive health and wellness messaging and were seen as a shared space for obtaining new knowledge, understanding and engagement in healthy behaviours, with the added value of camaraderie without having to explain themselves amongst peers. Many participants expressed a need for ongoing reinforcement and refreshed guidance and information on health behaviours. Structured peer support programmes may provide opportunity for this reinforcement of messaging as well as goal setting and action planning, which was not optimised by our study participants in their current stroke pathways.

Studies to date have not explored secondary prevention needs after stroke directly mapped to behaviour change constructs, as encompassed in the TDF. Participants in the current study highlighted unmet practical, psychosocial and educational needs related to changing health behaviours. They further identified items that did not facilitate health behaviour change after stroke. For example, participants reported a need for clear, accurate, personalised and timely information from reliable sources e.g. healthcare professionals. Much of the information they received however, was in the acute phase of stroke and was not processed well by them, as previously evidenced in the literature [26] where the subacute, active rehabilitation phase is potentially more optimal [71].

A major health event such as stroke can motivate individuals to adopt a healthier lifestyle [65]. This is known as the 'teachable window' [72], a period of psychosocial sensemaking that presents an opportunity for providing lifestyle counselling to change health behaviours. However, even when receptive to receiving lifestyle information after stroke, the pedagogical approach taken may still play a significant role to successful adoption of health behaviours. Evidence suggests, as also identified in this study, that up to 80% of information delivered by health care practitioners is immediately forgotten [73] and recall of the information is often incorrect [74]. Guidance on optimal person-centred health educational strategies to employ for stroke secondary prevention remains a

significant knowledge gap. However strategies such as checking patient understanding, as used in the teachback method [75, 76] for example, have shown to be effective across a range of healthcare settings and clinical populations for learning-related and health-related outcomes [77]. This further intersects with the domain of Memory, Attention and Decision Process where cognitive difficulties, stress, mood and fatigue problems after stroke have negative implications that include information processing speed, attention, and recall, with consequences that extend to health status and quality of life [78-81]. These particular barriers require practical strategies to counteract them [82] that must also be harnessed for health behaviour change also, alongside more careful consideration about the timing of risk reduction education and the need for reinforcement. Drawing from the evidence garnered in this study, greater attention to appropriately timed intervention and inclusion of these theoretical constructs could support healthy lifestyle after stroke.

Goal setting and action planning are essential components of theoretically informed behaviour change [83]. The stark absence of information and support about how to affect behaviour change discussed in this study was highlighted by the absence of the Skills domain of the TDF in current secondary prevention experiences. When considered together with the underutilisation of mediators for change such as Goals and the absence of Intentions and Environmental Context and Resources domains, current experiences of secondary prevention actions after stroke suggest a lack of structured assistance to promote, motivate and support behaviour change. Effective self-management [22, 84] and enhanced secondary prevention intervention trials post-stroke employing these domains have demonstrated improved overall risk factor control [85]. The absence of the TDF domains of Skills, Optimism, Intentions, Environmental Context and Resources in our mapping process, represent missed opportunities to optimise health behaviour change, likely reflecting a lack of availability of theoretically informed programmes for secondary prevention in stroke care pathways [24] alongside more negative health messaging pervasive in stroke care [86]. These significant gaps in theory-informed supports currently provided, signal opportunity to better direct effective and targeted interventions in the future.

Strengths and limitations

This study adds to the literature exploring healthy lifestyle adoption after stroke. Its unique focus on experiences of stroke secondary prevention behaviours, examined using a comprehensive theoretical framework of behaviour change and their constructs, has direct relevance and lessons for secondary prevention interventions and stroke support services development and delivery. A strength and novelty of the study is that it explores the person's lived experience of adopting health behaviours after stroke, examining the behavioural mediators that influence their choices. Embedded PPI strengthened the conduct and insights drawn from the study. The study strived to include a diverse sample of participants and maximised inclusivity by facilitating a communications group with post-stroke aphasia, a broad range of ages and an urban/rural mix. However, as the recruitment approach relied on members of support groups, it is likely that they had more information and support than others who choose not to join such groups. They are also more likely to be individuals who gravitate towards groupbased activities. Most participants in the individual focus groups were known to each other as members of the support group which may have impacted (positively or negatively) on the discussions. The primary author had worked in both organisations a number of years before the study was conducted which may have blurred the insider-outsider boundaries of being a clinician and a researcher. Whilst an inductive deductive approach to analysis was applied using the TDF, different results may have emerged if a different framework or approach to data analysis was used.

Risk of stroke and stroke recurrence are influenced not only by individual behaviour but also by environmental and social determinants of health [87]. Whilst *the interand intrapersonal aspects for behaviour change were* the focus of this research, it is important to acknowledge the complex influences income, education, social isolation, ethnicity and environmental factors contribute to disparities in health behaviours and warrant consideration in the context of behaviour change.

Patient and public involvement (PPI).

Reflecting on PPI as an integral part of this study, the stroke PPI panel and co-author (JH) were involved in a range of activities which provided key insights and understanding for the rest of the research team. Trouble-shooting prior to recruitment and data collection ensured a smoother transition. Overall, champions reported their involvement as partners as a positive experience and felt supported in the process. Understanding the key messages generated by this study were enriched through the interpretation of findings from our co-author's perspective. JH who contributed to this process provided personalised insights into the theoretical constructs that influence lifestyle behaviour and checked the validity of the conclusions from a stroke survivor's perspective. She particularly empathised with the importance of emotional support as a contributor to secondary prevention and knowledge gaps beyond the acute phase. Planning PPI activities from the outset made this level of involvement possible and was facilitated in this study by an already established and well-functioning stroke PPI panel and inclusion of an experienced co-researcher. PPI related challenges encountered related to the quantity of information to process for PPI participants alongside their competing work and life demands. However, the quality of their engagement throughout was excellent, motivated in part by the study's potential to positively contribute to future intervention development and service provision for those coming after.

Conclusions

This qualitative study explored the real-world, lived experiences of adopting healthy lifestyle behaviours after stroke. The TDF proved a valuable tool to link stroke survivors' secondary prevention experiences and unmet needs with identified constructs for behaviour-change. Participants reported largely self-directed activities where domains of Knowledge, Beliefs and Social influences played a key role in lifestyle behaviour. Identity, Emotions and Memory domains intersect strongly with their ability to adopt and sustain healthy behaviour change. Despite most participants not setting explicit goals, they still tracked and adjusted their actions. The absence of domains Skills, Optimism, Intentions and Environmental context & resources likely speaks to the lack of structured theory-based programmes providing opportunities to support risk recognition by linking to goal setting and action planning, practice, and environmental prompts to promote and motivate behaviour change. The absence of the Optimism domain in particular, suggests a current lack of emphasis on positive health messaging. These findings require careful consideration to address missed opportunities to better direct additional strategies for effective targeted intervention development.

Supplementary Information

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Supplementary Material 1	,
Supplementary Material 2	
Supplementary Material 3	
Supplementary Material 4	
Supplementary Material 5	

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Author contributions

PH and OL contributed to the concept/idea/research design. PH project managed the study, recruited participants, conducted the focus group discussions, transcribed, analysed and interpreted the data, drafted and

revised the manuscript. OL provided supervision, reviewed the procedures for data generation, analysis and interpretation, and reviewed, revised and edited the manuscript. PP analysed and interpreted the data and reviewed reporting of findings. JH engaged with the methodology, research design, interpretation and reporting of findings. All authors read and approved the final manuscript.

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Data availability

The raw data transcripts generated during the current study are not publicly available to ensure anonymity of participants but aggregated anonymised data are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from University College Dublin Health Research Ethics Committee (LS-22-23-Hall-Lennon). The Irish Heart Foundation (IHF) and Croí Heart & Stroke Charity, representing key stakeholders, contributed as gatekeepers to participation, distributing information to eligible participants from community-based stroke support groups. All participants signed an informed consent to participate.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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