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It is like someone holding your hand when you need it – Lived experiences of patients with cardiovascular disease participating in a digital health intervention focusing on the maintenance of physical activity after cardiac rehabilitation

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It is like someone holding your hand when you need it – Lived experiences of patients with cardiovascular disease participating in a digital health intervention focusing on the maintenance of physical activity after cardiac rehabilitation

Purpose: To explore patients with cardiovascular diseases' lived experiences of the support given by a text message intervention focusing on the maintenance of physical activity after supervised cardiac rehabilitation.

Methods: In a qualitative study, participants from the feasibility trial FAIR were interviewed individually twice to disclose their lived experiences during and after the trial. Transcribed interviews were analysed based on a phenomenological-hermeneutic method, inspired by Paul Ricoeur's philosophy on narrative and interpretation.

Results: Interviews of eight patients with cardiovascular disease (3 females, median age 57 years (range 37 to 74 years)) revealed two themes, *The FAIR intervention as a bridge builder in the transition to being physically active in everyday life* and *Meaningful conditions for maintaining physical activity*. Action plans guided physical activity, while text messages facilitated actions and left an impression of still being under supervision. A frame of reference with physical activity, family, being monitored, having to report back, and getting feedback, were incentives for being physically active.

Conclusion: From a patient perspective, the text message intervention in the feasibility trial FAIR was valuable to support the maintenance of physical activity in the transition from a supervised exercise-based cardiac rehabilitation programme to everyday life on an individual basis. Participants experienced the intervention to hold their hands in changing behaviour and redefining themselves. Yet, there is an extended need for belonging and personal interactions in future interventions.

Keywords: Cardiovascular disease, rehabilitation, Digital health, physical activity, qualitative

Implications for rehabilitation

- Patients with cardiovascular disease experience a need for support to maintain physical activity after completing a supervised rehabilitation programme, which is not a part of standard practice
- In a sample of patients with cardiovascular disease, a text message intervention was experienced to provide useful support in the transition from supervised cardiac rehabilitation to being physically active in everyday life
- Changing behaviour is challenging, and digital health interventions give the advantage of influencing health behaviour in real-time with the potential to reach a vast population

Introduction

For patients with cardiovascular diseases (CVD), lifelong maintenance of physical activity is important as it is associated with reduced cardiovascular mortality and hospitalisations, improved quality of life and physical and mental health (1–3). However, maintaining physical activity after completing a supervised cardiac rehabilitation programme to meet the recommended levels of physical activity is a challenge for patients with CVD worldwide (4–10), as it requires continuous behaviour change (11,12).

In health research, there is an increased focus on the use of technology, and digital health solutions have proven to be an effective way to promote physical activity in rehabilitation in a wide range of patient groups, also patients with CVD (13–15). Mobile phones are frequently used among patients (16), thus being a valuable and easily accessible assistive technology to promote physical activity. Further, having the potential to deliver personalised and adaptive interventions to engage and support patients (17), which enables it to influence health behaviour in real-time (18). Research on interventions using text messages on mobile phones and behaviour change theory concerning CVD has primarily targeted physical activity as part of cardiac rehabilitation programmes (7,19,20). As such, there is a knowledge gap in interventions targeting the important maintenance aspect of physical activity. To fill this gap, we developed an intervention for a feasibility trial called ‘Maintenance of physical activity after cardiac rehabilitation’ (FAIR) (21). FAIR is an intervention aiming to support the implementation and maintenance of physical activity in everyday life in a lifelong perspective through action planning and weekly text messages based on behaviour change theory.

FAIR intended to support patients with CVD in the challenge of maintaining physical activity and, and by a text message solution guide them in their transition from being physical active in a supervised centre-based rehabilitation setting and to transfer this to an everyday life physical activity modus. In health care, it is essential to focus on this transition, as patients must learn and incorporate new knowledge, change behaviour, and develop a new way of understanding and defining themselves (22). Long-term health behaviour change may be affected by various social, emotional, and cognitive factors (11). Yet, little research has explored the experiences regarding the maintenance of physical activity and health behaviour change among patients with CVD, (4,7,8,23) nor in combination with digital health interventions (10,24).

The aim of the current study was therefore to explore patients with cardiovascular diseases' lived experiences of the support given by a text message intervention focusing on the maintenance of physical activity in everyday life after completing a supervised cardiac rehabilitation programme, often referred to as phase II (3).

The knowledge gained from this study may be a valuable source for qualifying and optimising future digital health interventions to facilitate transitions in intended behaviour more effectively, and to retain as many patients with CVD as possible physically active in everyday life.

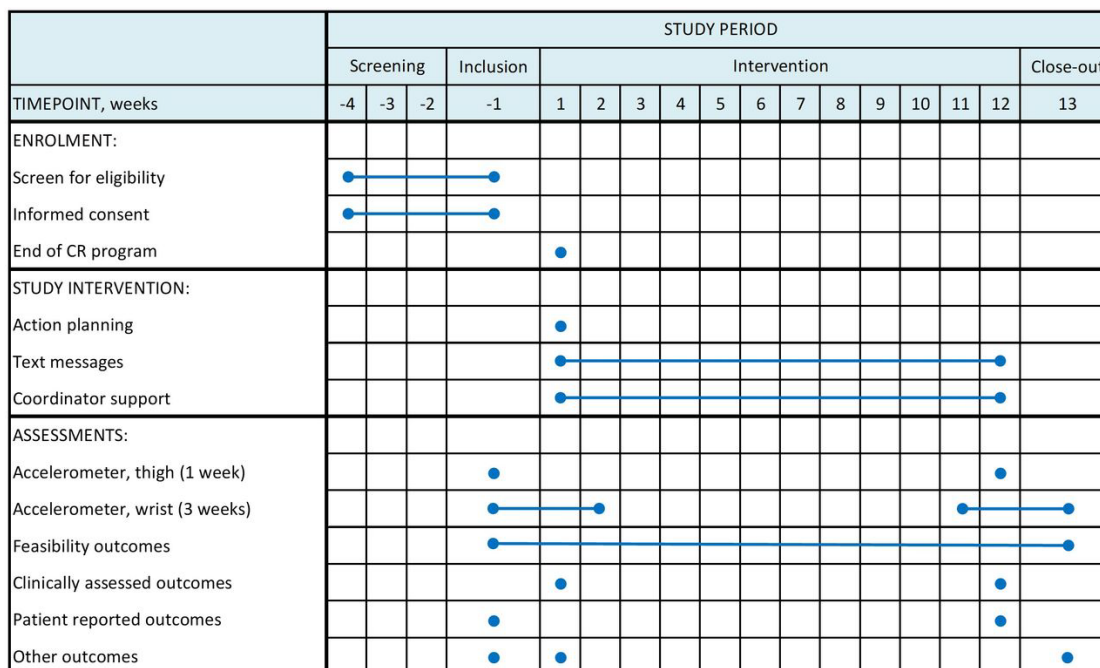
Method

Design

This qualitative study was conducted as part of the feasibility trial, FAIR, investigating feasibility, intervention delivery and acceptability of an mHealth intervention utilising text messages and behaviour change theory after completion of supervised cardiac rehabilitation (21). mHealth involves the use of mobile phones or other wireless technologies in healthcare (25). Phase II cardiac rehabilitation at the clinical sites in FAIR consisted of a supervised exercise-based programme varying from 6-8 weeks following clinical guidelines (3). They provided group-based aerobic and resistance training twice a week, education, and physical activity counselling, i.e., on exercise intensity and frequency, as well as psychosocial support. Forty participants were enrolled in the FAIR trial. The intervention started immediately after completing the supervised cardiac rehabilitation and lasted for 12 weeks. The participant timeline is shown in Figure 1. After enrollment, each participant sat down and created an individual written action plan for weekly physical activity of moderate intensity with the assistance of a physiotherapist. The action plan used a template and consisted of the

following: What types of physical activities are planned, when, where, and with whom? For 12 weeks, the participants received text messages two times a week and had the possibility of support from a health professional coordinator. Per the paper describing the intervention (21), the first message prompted physical activity, and the second questioned if physical activity goals in action plans were reached. Participants received an automatic response with encouraging reinforcement if they replied "yes." Participants were asked whether they wanted to be contacted by a health professional coordinator if they replied "no." Further, if a participant did not respond to text messages for two weeks in a row, the coordinator would contact them. The text messages served multiple purposes to facilitate behaviour change by prompting physical activity and ensuring general encouragement. Further, they extended the contact to health professionals involved in supervised cardiac rehabilitation and identified potential difficulties in complying with action plans. At baseline and follow-up the participants were wearing accelerometers. The FAIR protocol is published elsewhere (21) and the feasibility results are currently being prepared for publication. In this qualitative study, a phenomenological-hermeneutic approach inspired by French philosopher Paul Ricoeur was chosen to elucidate the patients with CVD's experiences with participation in the FAIR intervention and maintenance of physical activity. Repeated individual semi-structured interviews were conducted with participants in the FAIR trial. The consolidated criteria for reporting qualitative research checklist (COREQ) (26) (Appendix 1) for designing and reporting guided the study.

Figure 1. Participant timeline in the FAIR intervention



Made by Andersen RM, Skou ST, Clausen MB, Jäger M, Zangger G, Grøntved A, et al. Maintenance of physical activity after cardiac rehabilitation (FAIR): study protocol for a feasibility trial. *BMJ Open*. 2022;12(4):e060157.

Participants

Participants from the FAIR trial were recruited for individual interviews based on convenience sampling, eligible to participate if being part of the trial and giving acceptance of being interviewed. Eligibility to the FAIR trial required: Age ≥ 18 years, participation in a supervised exercise-based cardiac rehabilitation programme in either hospital or municipality setting, access to a personal mobile phone with a Danish number, and ability to walk 3 meters without assistance. Excluded if having insufficient Danish language skills to read and understand text messages and questionnaires, being cognitively or mentally unable to participate, or terminal with a life expectancy of fewer than three months (21). Contact was established through the cardiac rehabilitation physiotherapists or FAIR trial personnel based on an online questionnaire to begin the trial. Participants were invited from two clinical sites, which were ongoing in the trial when this study started recruiting. All participants invited to be interviewed accepted, and no participants dropped out.

Data collection

The study used individual semi-structured interviews. These were conducted to obtain detailed and personal descriptions of what the individual participants felt, thought,

experienced, and perceived as meaningful (27). Interviews were carried out in Danish by TGH, (a female physiotherapist and master's student) from September 2021 to February 2022. The interviews were conducted face-to-face to ensure a close relationship with the participants, gaining their trust to generate rich data. Before each interview, TGH briefly introduced herself, explained the purpose of the research, and provided participants with a description of the study in layman's terms. Two topic guides were developed and pilot-tested. Following the topic guides (Appendix 2 and 3), each participant was interviewed twice: during and after the FAIR intervention. The participants were encouraged to talk about *how they perceived integrating and maintaining physical activity in everyday life and what it meant to participate in the FAIR intervention*. The interviews lasted 26-54 minutes. As preferred by the patients, the interviews were conducted undisturbed in either the participants' homes (n = 4) or at Slagelse Hospital (n = 4). A spouse accompanied one participant. All interviews were audio-recorded, transcribed verbatim by TGH, and included all non-verbal communication. Hence, extended field notes were not made. The transcribed material consisted of 175 pages in total.

Data analysis

The analysis was based on a phenomenological-hermeneutic analysis, inspired by Paul Ricoeur's philosophy on narrative and interpretation (28,29). This approach enabled an in-depth interpretation of the participants' experiences with the FAIR intervention. A sophisticated understanding of the participants' experiences was gained by a dialectical movement between the following three levels:

- (1) The naïve reading: the text was approached from a phenomenological view and was read several times to grasp an initial understanding of what was at stake during the intervention.
- (2) The structural analysis: the text was divided into meaning units, condensation, sub-themes, and themes. In this part, the analysis moved from what was being said to what was being talked about (28). Meaning units were identified and reflected on with the naïve understanding in mind and then transferred into condensed meaning units. Then sub-themes and themes were identified (see table 1).
- (3) The comprehensive understanding and discussion: A deeper understanding of the phenomenon was gained through reflection on the naïve reading, the findings from the structural analysis, preunderstandings, and the theoretical model of behaviour change; the Health Action Process Approach (HAPA) (30).

HAPA is usable to assist health care professionals to understand the process of behaviour, and guide designing inventions to best fit the certain behaviour and target group (31). It consists of two phases: a motivational phase ending with an intention and a volitional phase ending with successful performance in the form of changed behaviour. Action planning is a key element in the model linking the intentions to the behaviour change (30). TGH primarily generated the analysis and discussed this regularly with CS. To handle data in the analysis, the qualitative analysis software QRS NVivo12 was used (32).

Table 1. Example of structural analysis

Meaning unit	Condensation	Sub-theme	Theme
"It has been good, and I honestly think that I am going to miss it. Yeah, as it has become a habit, that this message pops up. I think I am going to miss that."	The transition from cardiac rehabilitation to physical activity individually is perceived to be troublesome. The participants express a need for support and a gratitude for being guided in a vulnerable situation.	A kind and helpful hand in a vulnerable situation	The FAIR intervention as a bridge builder in the transition to be physically active in everyday life
"The transition (from cardiac rehabilitation) is difficult. I think that it is needed that someone has your back - that is for sure."			
"Even though it annoys me that I know I have to answer this (message) every Saturday or Sunday, it sharpens my attention and helps me get it done."	The text messages are experienced to keep the physical activity top of mind, helping to achieve the weekly goals. Also generating feelings of being somewhat supervised. However, lacking personal interaction, which is considered needed to some.	Action planning and text messages as loving pushes though with limitations	
"I kind of miss a little that..., there was someone who was on the phone a little bit more, who talked to people instead of this, you decide for yourself. Have you achieved your goals this week? No. Do you want to be contacted? Yes or no. I thought, it would be nice if you did not have those choices. Instead, you would get a call every other week and have somebody ask you how things are going."			

Ethics

The study complies with the Declaration of Helsinki (33). Study information was presented orally, and subsequently, written information was sent by email. The participants were allowed a minimum of 24 hours to consider. Written informed consent was obtained upon acceptance of participation. Participants were assured anonymity and sensitive data were securely stored and treated confidentially in accordance with General Data Protection

Regulation legislation (34). Study approval for the current study was obtained from the Danish Data Agency through Region Zealand (j.no. REG-125-2021) and the Regional (local) Research Ethics Committee (j.no. EMN-2021-07880).

Results

Interviews were conducted with eight participants with a median age of 57 years, ranging from 37-74 years, three were female, three were living alone, seven were working, and four had a medium-cycle higher education level. Two types of heart conditions were present, where four had a myocardial infarction and four had heart valve surgery, either sternotomy or TAVI (see table 2). For all participants, the cardiovascular event was the first they had experienced. Seven participants had a history of being physically active prior to the cardiovascular event. All participants had at least one comorbidity.

Table 2. Participant characteristics

Participant	Gender	Age	Type of heart condition	Marital Status	Working status	Educational level	Clinical site
P1	Male	35-40	Myocardial infarction	Single	Working	Medium-cycle higher education	A
P2	Male	70-75	Heart valve surgery	Married	Retired	Medium-cycle higher education	A
P3	Female	65-70	Heart valve surgery	Cohabitation	Working	Vocational	A
P4	Male	60-65	Myocardial infarction	Married	Working	Vocational	B
P5	Male	55-60	Heart valve surgery	Married	Working	Medium-cycle higher education	B
P6	Female	60-65	Heart valve surgery	Single	Working	Vocational	A
P7	Female	45-50	Myocardial infarction	Single	Working	Short-cycle higher education	A
P8	Male	55-60	Myocardial infarction	Married	Working	Vocational	A

The overall impression from the naïve reading revealed that the participants found the situation overwhelming, the cardiovascular event being the first they experienced. It caused a sudden change in their life affecting their relation to physical activity, as it had a significant impact on both physical and mental health. The participants were aware that physical activity was a significant element in achieving good health with CVD. Yet the CVD was perceived as

a game changer with an increased vulnerability and a shaken self-image. The participants were generally reluctant to perform vigorous-intensity training and expressed a need for support in the transition to implement and maintain regular physical activity in everyday life. In this transition, the FAIR intervention was experienced as a helping hand, giving reasonable support and reassurance of still being under supervision, though with limitations.

From the structural analysis, two themes with two sub-themes each were derived (see table 3): *The FAIR intervention as a bridge builder in the transition to being physically active in everyday life*, and *Meaningful conditions for maintaining physical activity*.

Table 3. Themes and sub-themes

Themes	Sub-themes
The FAIR intervention as a bridge builder in the transition to being physically active in everyday life	<ul style="list-style-type: none"> • A kind and helpful hand in a vulnerable situation • Action planning and text messages as loving pushes though with limitations
Meaningful conditions for maintaining physical activity	<ul style="list-style-type: none"> • Incentives valuable for physical activity • The reassurance of being part of a group

The FAIR intervention as a bridge builder in the transition to being physically active in everyday life

A kind and helpful hand in a vulnerable situation

The participants felt insecure and had a lack of self-efficacy in the transition from physical activity in supervised cardiac rehabilitation to physical activity in everyday life, which fostered the need for an authority to set the frames and support them. The participants welcomed the FAIR intervention, as it was experienced as someone holding their hand in this transition. Meaning that the intervention was seen as a bridge builder from an exercise community to an individual life with physical activity. FAIR was experienced as easily accessible, useful, and thereby manageable to integrate into everyday life. There were no inconveniences in everyday life related to being part of the intervention. On the contrary, the participants mentioned that the text messages would be missed, which was described like this:

"It has been good, and I honestly think that I am going to miss it. Yeah, as it has become a habit, that this message pops up. I think I am going to miss that." (P3)

The intervention was assessed as a relevant approach as many patients with CVD may find it difficult to move on after a supervised cardiac rehabilitation programme and find courage and motivation themselves. FAIR facilitated the start of good habits with physical activity by supporting in the form of text message reminders. Several participants perceived it in two ways, both as an obligation that poked the guilty conscience and as an aid to increased self-discipline, being described as small loving pushes to act independently. However, this was experienced as needed, as this kind of support was appreciated in the transition to performing physical activity individually, as described by one:

"The transition (from cardiac rehabilitation to everyday life maintenance) is difficult. I think that it is needed that someone has your back - that is for sure." (P8)

Action planning and text messages as loving pushes though with limitations

The action plan was drawn individually based on the idea of generating motivation and ownership to be implemented. Some participants experienced this, as very motivating as it led to *will do* things instead of *must do* things, and thus greater ownership. It was thereby perceived as a loving push in terms of guiding and structuring physical activity in everyday life. Others found it motivating but also a bit hectic to have to choose the activities themselves in a relatively short time and hence a wish for a little more supervision in planning and getting it implemented. The participants experienced the text messages as a means to achieve the goals in the action plan, moreover, physical activity was top of mind. It facilitated to keep holding on, which in general was experienced positively. The frequency meant a persistent focus on the physical activity, as one described:

"Because otherwise, you might take it a little bit easy if you would only get a message every two weeks instead of twice a week." (P6)

The participants experienced the FAIR intervention to provide useful room for individual planning, when to do physical activity according to being most convenient to them in everyday life. Further, the participants experienced that the text messages ensured attention to physical activity, though they might not fit everyone's needs equally. As some patients would benefit more from them than others, according to i.e., physical functioning and motivation. To some, the text messages did generate ambivalent feelings, but in total, text messages were perceived as valuable, as participants expressed:

"Even though it annoys me that I know I have to answer this (message) every Saturday or Sunday or whatever it is, it sharpens my attention and helps me get it done." (P5)

"It has been really nice to be reminded of being physically active through the text messages. It also makes you happy when you are reminded and are actually able to think: Yes, I am in control, as I have accomplished the planned activities." (P7)

Some participants wished for a higher degree of personal interaction, feeling somewhat alone with their thoughts during the intervention. Instead of having a choice to ask for personal support, just simply be offered it as part of the intervention. This expresses a need for interaction to reflect on their experiences to generate new perceptions of living with CVD and strengthen their self-efficacy toward physical activity. One participant expressed it this way:

"I kind of miss a little that..., there was someone who was on the phone a little bit more, who talked to people instead of this, you decide for yourself. Have you achieved your goals this week? No. Do you want to be contacted? Yes or no. I thought it would be nice if you did not have those choices. Instead, you would get a call every other week and have somebody ask you how things are going." (P1)

Meaningful conditions for maintaining physical activity

Incentives valuable for physical activity

The cardiovascular event animated the participants to take responsibility for their own health in a new way and added a focus on physical activity. One participant explained it like this:

"So, in the past, you did not exercise too much because you did not think of it as a necessity of life. But it is now. You hold yourself to it, right? Well, it is darn necessary now. So now we have to do something." (P2)

Physical activity was already a part of most participants' lives. Hence, they were familiar with using their body physically and had always been able to find the motivation to be active. They hereby had a frame of reference. Physical activity was of great importance to the participants, associated with feelings of well-being and self-satisfaction. Feelings that were still present despite the changes and challenges they met in life with CVD. It was an incentive to keep going as a degree of normality and contributed with energy and well-being both physically and mentally to everyday life, as one participant described it:

"It means quite a LOT because I feel good. I might be tired when I walk, but I feel good afterward. I really feel like I have done something good, and you also get a little more energy." (P3)

The family was valuable to most participants, supporting them in being active and enabling physical activity in everyday life. The participants wanted to be a part of life with the family onwards, which motivated them for physical activity. In addition, the fact that family members expressed being afraid of losing them obliged the participants to a sense of responsibility to hold on to life, which again was an incentive for physical activity. As one participant put it:

"My wife said: I can tell you one thing when you get home, you have to sign up for something. Which is okay, and I did. I have signed up over there (gym) and ... Well, we have to, and we have to go for walks too, and I want to go walking too." (P2)

Lastly, it had been an incentive for physical activity with a positive impact on the participants' self-efficacy to be monitored, having to report, and getting feedback in the FAIR intervention. Higher self-efficacy led to belief of being more in control of life. The FAIR intervention thereby strengthened the patients' perception of being in control, encouraging them during a chaotic period. This empowered the participants with wishes to continue the physical activity habits in everyday life, which they started during the intervention.

The reassurance of being part of a group

Of great importance to the participants was having a sense of belonging and being part of something with somebody with a mutual frame of reference. The group exercise in the supervised cardiac rehabilitation programme provided the participants with a feeling of belonging. It was an opportunity to encourage and spar with each other, which felt needed being in a vulnerable situation. One participant expressed the need for belonging like this:

"Now that you have tried being part of an exercise group and you know that this thing with exercising in a group setting, it is simply more effective because there is this drive and togetherness. Humans are herd animals, and we need to be together with others." (P1)

As the participants felt the supervised exercise-based cardiac rehabilitation programme ended too soon, the FAIR intervention provided them with some security in handling physical

activity in the transition to everyday life. Still, the participants suggested extending the FAIR intervention with an establishment of a group for patients with CVD to facilitate sparring and motivation for physical activity. This with a reference to the feeling of vulnerability in the transition. Belonging was perceived useful, as it provided energy and feelings of being secure and understood.

Discussion

Our qualitative study demonstrated that patients with CVD experienced the digital health intervention FAIR to support them well in implementing and maintaining physical activity in everyday life, following completion of a supervised cardiac rehabilitation programme. An individual action plan secured attention to physical activity and guidance to achieve the goals. At the same time, text messages facilitated the actions and left an impression of being under supervision in a supportive way. Further, the participants experienced having a frame of reference with physical activity, family, and being monitored, having to report, and getting feedback in the intervention as incentives for being physically active in everyday life. Lastly, a feeling of belonging was significant to the participants in the maintenance of physical activity.

This study revealed that the participants experience going through a behavioural transition, leaving them with a feeling of being vulnerable. Such issues are also addressed in previous studies (7,35,36), stating that having CVD changes the individual from having a status of being a healthy person to being chronically ill. The CVD diagnosis acts as a game changer with a need for a redefinition of oneself and an acknowledgment of changed conditions for physical activity. Hence, a need and opportunity for addressing health behaviour change occur in these situations, in which digital technology interventions can be key elements. According to Schwarzer, perceived self-efficacy is essential in changing behaviour, and it interacts with positive outcome expectancies, contributing substantially to forming an intention (37). Our findings showed that attending a supervised cardiac rehabilitation programme provided the participants with increased perceived self-efficacy and security in being under supervision. However, in the transition to being physically active in everyday life, they lost this, leaving them vulnerable and lacking confidence. A loss of confidence stresses the extended need for support to increase self-efficacy to succeed in long-term maintenance of physical activity, which text messages can provide. Moreover, the gains from text message support are important as other studies highlight how lack of support and guidance made maintaining positive physical activity behaviours more challenging (7,38).

The FAIR intervention was seen as a useful assistive technology to guide the participants' intentions further, engaging them to implement and maintain physical activity in everyday life, facilitating health behaviour in real-time. Thus, the intervention served as a bridge builder in a vulnerable situation, holding the participants' hands in the transition from supervised exercise-based cardiac rehabilitation to individual physical activity. In addition, support from family was encouraging and a significant factor in looking forward. The theoretical model of behaviour change HAPA presents support in general and from family and friends, as a resource in the implementation of the maintenance of behaviour and thereby valuable for long-term success (31).

The study found that the participants in the FAIR intervention perceived the action plan as motivating. Individual planning generated significant ownership. It served as a fixed point of reference and a structure of physical activity leading to the intended action. Thus a key element that bridges intentions with behaviour (31). Action planning addresses the when, where, and how, and intentions are remembered, being specified and visualised like this (37). The study reflected the text messages likewise functioned as a support in achieving the weekly goals for physical activity in the action plan. It facilitated the physical activity being top of mind, providing general encouragement and prompting physical activity. Hence, a crucial behaviour change technique, by which assistive technology provides most participants with a positive feeling, being motivated to keep holding on and with a sense of someone having their back. This supporting character of the messages is in line with a study by Carrillo et al. (6), revealing that 86% of their participants, patients with coronary artery disease, reported that text messages were helpful and had a direct impact leading to action.

In this study, participants addressed a need for belonging. While losing a former role and needing to redefine themselves, they highlighted a wish to be part of a supportive community. In a study by Wagner et al. (39), participants perceived such a community as liberating, as it evoked feelings of being understood and raised hope for the future. This study supported this, as the participants shared similar experiences. According to Frank, people who experience life-changing illnesses must learn to think differently about life as they become a new person (40). By telling their stories, the participants got a chance to reflect and shape new paths. Participants in this study experienced that this guided them to discover new aspects of living with CVD. Since this study reflects that dialogues with peers and healthcare professionals strengthened patients' self-efficacy in their trajectory of change, providing room for dialogues is therefore important to consider in future interventions.

Limitations

The study included eight participants being interviewed twice, which was considered to provide good insight into the research field. As a limitation, the sample only included participants who had completed a supervised exercise-based cardiac rehabilitation programme, and participated in the FAIR intervention, which may have influenced the general representativeness of patients with CVD. Commonly, it is a problem to retain patients with CVD throughout supervised cardiac rehabilitation (41,42). Hence it must be expected that the ones not attending or dropping out will have further challenges facing individual maintenance of physical activity. Further, results obtained from a convenience sample may not be representative for the entire population.

To ensure that the participants felt comfortable, they were allowed to choose the location for the interview. This influenced the balance of power between the interviewer and interviewee, empowering the participants to speak freely (27). Being part of the FAIR intervention could influence the participants' stories, as they might feel obliged to speak highly about it. Being informed that the interviews aimed to gain the patients' perspective and the importance of this for future interventions hopefully made them share what they truly experienced. Transcripts were not shown to participants, nor were they invited to reflect on the findings, which can be seen as a limitation. Yet, according to Ricoeur's thinking, interpreting a text does not include having to go back to the interviewee to validate correctness since the text represents a narrative voice of how something is experienced (43) – in this case, what it was like to receive the FAIR intervention. Using a phenomenological hermeneutic analysis strengthened the structure through the analysis, making it transparent how text became meanings and themes (28). As a limitation TGH primarily conducted the analysis, discussing the findings regularly with CS. A further discussion with other researchers is performed to validate the findings and ensure creditability.

Implications

The findings of this phenomenological-hermeneutic study may help health professionals and researchers deepen their understanding of how maintaining physical activity is perceived among patients with CVD. Hence, the findings can inspire the optimisation and test of future interventions aiming for health behaviour changes in patients with CVD and other patient groups with similar needs for long-term maintenance of physical activity. There is clearly a role for digital health interventions like FAIR addressing physical activity beliefs and

perceived ability to be physically active in combination with personal text message support. In addition, there is a need for further research in the area.

Conclusion

The study showed that patients with CVD find the text message intervention in the feasibility trial FAIR valuable to support the maintenance of physical activity in the transition from a supervised exercise-based cardiac rehabilitation programme to everyday life. Patients experience the intervention to hold their hands in the process of changing behaviour and redefining themselves. Nevertheless, in addition, there is a need for personal interactions, and to better support patients with CVD in transition, the possibility of telling one's story to healthcare professionals and peers is recommended in future technology interventions. Text message solutions are also anticipated to have the potential to support the maintenance of physical activity in people with other chronic diseases.

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Author contributions

All authors designed the study, TGH and CS designed the interview guide, TGH conducted the interviews, RMA assisted with practicalities and facilitated contact with site and study personnel, TGH and CS performed data analysis, TGH drafted the manuscript, and all authors performed manuscript revision, reviewed and approved the final manuscript.

Declaration of conflicting interests

The authors declare no conflicts of interest with respect to the research, authorship, and publication of this article.

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Appendix 1 – COREQ

COREQ (COnsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
<i>Personal characteristics</i>			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	4
Credentials	2	What were the researcher's credentials? E.g., PhD, MD	1 + 4
Occupation	3	What was their occupation at the time of the study?	4
Gender	4	Was the researcher male or female?	4
Experience and training	5	What experience or training did the researcher have?	4
<i>Relationship with participants</i>			
Relationship established	6	Was a relationship established prior to study commencement?	4
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g., personal goals, reasons for doing the research	4 + 13
Interviewer characteristics	8	What characteristics were reported about the interviewer/facilitator? e.g., Bias, assumptions, reasons, and interests in the research topic	4 + Appendix 2
Domain 2: Study design			
<i>Theoretical framework</i>			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g., grounded theory, discourse analysis, ethnography, phenomenology, content analysis	3 - 5
<i>Participant selection</i>			
Sampling	10	How were participants selected? e.g., purposive, convenience, consecutive, snowball	3
Method of approach	11	How were participants approached? e.g., face-to-face, telephone, mail, email	4 + 6
Sample size	12	How many participants were in the study?	6
Non-participation	13	How many people refused to participate or dropped out? Reasons?	4
<i>Setting</i>			

Setting of data collection	14	Where was the data collected? e.g., home, clinic, workplace	4
Presence of nonparticipants	15	Was anyone else present besides the participants and researchers?	4
Description of sample	16	What are the important characteristics of the sample? e.g., demographic data, date	6
<i>Data collection</i>			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	4
Repeat interviews	18	Were repeat interviews carried out? If yes, how many?	3 + 4
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	4
Field notes	20	Were field notes made during and/or after the interview or focus group?	4
Duration	21	What was the duration of the inter views or focus group?	4
Data saturation	22	Was data saturation discussed?	13
Transcripts returned	23	Were transcripts returned to participants for comment and/or correction?	13
Domain 3: Analysis and findings			
<i>Data analysis</i>			
Number of data coders	24	How many data coders coded the data?	5
Description of the coding tree	25	Did authors provide a description of the coding tree?	5-6
Derivation of themes	26	Were themes identified in advance or derived from the data?	4-5
Software	27	What software, if applicable, was used to manage the data?	5
Participant checking	28	Did participants provide feedback on the findings?	13
<i>Reporting</i>			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g., participant number	7-11
Data and findings consistent	30	Was there consistency between the data presented and the findings?	7-11
Clarity of major themes	31	Were major themes clearly presented in the findings?	7-11
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	7-11

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

Appendix 2

Topic guide 1

After 6-7 weeks of participation in the FAIR intervention

Introductory:

- We are going to talk about your life, your experiences with physical activity and the FAIR project, which you are participating in right now.
- The interview will be audio-recorded, and it will last between 30-60 minutes. If you need a break, then please say so.
- I would kindly ask you to sign an informed consent form, regarding your participation in the project. Remember that you always have the right to withdraw your consent, and it will not affect the treatment or future treatment that you receive.
- Throughout the project, you will be anonymized. All data will be stored and treated confidentially according to General Data Protection Regulation legislation. Interviews will be recorded, and audio files will be deleted at the end of the project.
- There is no right or wrong answers, as it is your experiences, which are of interest.
- Who am I: Female physiotherapist and now a Master of Science in physiotherapy thesis student. I have among others worked with cardiovascular disease patients in municipality rehabilitation and am very concerned with patients' experiences with various phenomena, i.e., physical activity.
- Purpose with the study: Brief outline of the written information.

Research questions	Interview questions	Prompts
	<ul style="list-style-type: none"> • Please tell me a little bit about yourself and your life 	<ul style="list-style-type: none"> • Relations • Education and work life • Cardiovascular disease
How do the participants experience life with cardiovascular disease?	<ul style="list-style-type: none"> • Can you tell me a little bit about everyday life? • Which kind of influence does the disease have on you and your family? • Do you experience any kind of changes in everyday life due to the disease? 	<ul style="list-style-type: none"> • Routines • Activities • Person type: i.e., outdoor, cosy stay at home, indoor. • Quality of life/energy • Pain/sleep/social life • What is the most significant change in everyday life after your diagnosis?
How do the participants experience participation in the FAIR intervention?	<ul style="list-style-type: none"> • What are your experiences with participation in the FAIR intervention? 	<ul style="list-style-type: none"> • Barriers? Enablers?

<p>How do the participants experience the different elements in the FAIR intervention?</p>	<ul style="list-style-type: none"> • What impact does the FAIR project have on your everyday life? • How do you experience the different parts of the FAIR project? • Has anything surprised you? 	<ul style="list-style-type: none"> • How do you feel about using technology? • If so, why has it?
<p>How is physical activity handled and experienced?</p>	<ul style="list-style-type: none"> • Can you tell a little bit about what kind of physical activity you are currently doing? • What does physical activity mean to you? • How do you experience being able to handle physical activity on your own? 	<ul style="list-style-type: none"> • Is there a change from before? • More/Less • Cause • Resources • What motivates you? • Can you elaborate on that?
<p>Wrapping up</p>	<ul style="list-style-type: none"> • Do you have any questions? Is there anything you have not said - something you want to tell? • May I contact you if I need clarification of individual parts of the interview? • You can contact me at any time if you want something deleted or changed. • Thank you for your participation 	

Appendix 3

Topic guide 2

After completing the FAIR intervention (12 weeks).

Introductory:

- You have now completed your participation in the FAIR project, and we are going to talk a little bit about the whole process and follow up on what we talked about last time.
- As last time, the interview will be audio-recorded, and it will last between 30-60 minutes. If you need a break, then please say so.
- Throughout the project, you will be anonymized. All data will be stored and treated confidentially according to GDPR legislation. Interviews will be recorded, and audio files will be deleted at the end of the project.
- There is no right or wrong answers, as it is your experiences, which are of interest.

Research questions	Interview questions	Prompts
	<ul style="list-style-type: none"> • Is there anything you would like to share with me before I start asking questions? 	<ul style="list-style-type: none"> • Experiences • Successes • Barriers
<p>What has it meant for the participants' everyday lives to participate in the FAIR project?</p> <p>How do the participants experience the different elements of the FAIR project?</p>	<ul style="list-style-type: none"> • How have you experienced participating in the FAIR project? • Please tell me a little bit about your process and how it has worked out for you? • What has made the most impression on you? • Has anything surprised you during the intervention? • How have you experienced the different elements of the FAIR project? • Do you have any suggestions for changes to improve the FAIR project? • Is there anything you think we as health professionals should know about your 	<ul style="list-style-type: none"> • In what way? • Can you tell me more about that? • Can you give an ex. on that? • Has participation changed anything in your everyday life? • What have you gained from participating in the FAIR project? • Are there any elements of the project that you experienced challenges with? • What does it mean that you had to design the action plan yourself? • What would the intervention look like if it were to best meet your needs?

	<p>experience with the FAIR project?</p>	<ul style="list-style-type: none"> • How have you experienced the text messages lately? • Has the fact that you have had accelerometers on had any impact?
<p>How is physical activity handled and experienced after participation in the FAIR project?</p>	<ul style="list-style-type: none"> • Can you tell me a little bit about your everyday life as it is now with a focus on physical activity? • Is being physically active meaningful to you? • What are your thoughts on the future living with cardiovascular disease and physical activity? 	<ul style="list-style-type: none"> • Have your habits of physical activity changed throughout the process? • What kinds of physical activity do you do now? • Can you elaborate on that? What place does physical activity have in your everyday life? • How do you feel about being able to handle physical activity on your own now?
<p>Wrapping up</p>	<ul style="list-style-type: none"> • Is there anything else you would like to add regarding your experience with the FAIR project? • Is there anything you have not said - something you want to tell? • Do you have any questions? • Thank you for your contribution 	