International Journal of Behavioral Medicine (2019) 26:474–485
https://doi.org/10.1007/s12529-019-09798-z

Motivation, Challenges and Self-Regulation in Heart Failure Self-Care: a Theory-Driven Qualitative Study

Han Shi Jocelyn Chew[1] · Kheng Leng David Sim[2] · Xi Cao[1] · Sek Ying Chair[1]

Published online: 9 July 2019
© International Society of Behavioral Medicine 2019

Abstract

Background Self-care behaviours are crucial in reducing chronic heart failure (HF) morbidity and mortality but performance remains poor worldwide. This study draws on Temporal Self-regulation Theory (TST) to explore participants' motivations, challenges and personalised self-regulation strategies to enhance self-care.

Method Seventeen HF patients were purposively sampled and recruited from outpatient and inpatient settings at a Singaporean tertiary hospital from December 2017 to March 2018. Unstructured face-to-face interviews were conducted. Data were analysed using thematic analysis with constant comparison.

Results Five themes emerged. Self-care motivations were (1) consideration of family's future and (2) consideration of own past, while demotivation was (3) fatalistic consideration of own future. Barriers of behaviour change were (4) difficulty adopting physical activity and (5) difficulty deviating from personal dietary habits and sociocultural dietary norms. Personalised strategies to overcome these challenges were described in the 12 subthemes that emerged. Themes were well-fitted into the TST—(1–3) corresponded to time perspective, (4–5) corresponds to behaviour prepotency and the subthemes corresponded to self-regulatory capacity. Motivation could be enhanced by stimulating considerations of one's past regrets, family's future well-being and real-life success stories to instil hope. Clinicians and case managers could enhance self-regulation by empowering patients with tactical and situational skills to develop personalised plans to improve lifestyle habits and strategies to resist temptations.

Conclusion Future person-centred self-care interventions could be tailored according to the study findings. Better self-care could improve patient outcomes, reduce rehospitalisation and alleviate global healthcare burden. Findings could be generalised to healthy populations as primary prevention.

Keywords Heart failure · Self-care · Self-regulation · Motivation · Time perspective · Behaviour change

Introduction

Heart failure (HF) affects approximately 26 million people worldwide and cost about US$108 billion a year [1]. It is characterised by an uncertain illness trajectory of acute decompensations and remissions that last for months to years, resulting in frequent hospitalisations, distressing physiological and psychological symptoms (e.g. shortness of breath, fatigue, oedema and depression) and lower quality of life (QoL) [2, 3]. HF patients are at a six- to nine-times higher risk of sudden deaths than the general population and have a worse survival rate as compared to cancer patients [4]. Together with an ageing population, the increasing prevalence of HF and rising healthcare demands highlight the need for a sustainable coping strategy [5]. One such strategy is self-care, where patients are required to proactively take ownership of their health while healthcare providers shift towards an empowering and supportive role [6]. In many countries, patient education on HF self-care is reinforced during discharge and/or outpatient follow-ups but studies have shown that the performance remains inadequate [7].

HF self-care refers to a set of behaviours for (1) physiological maintenance, (2) symptom monitoring and (3) symptom management [6]. While the latter is only required during symptom exacerbations, the former two requires consistent performance akin to habits and will be collectively referred to as *HF self-care behaviours* throughout this paper [8]. *Maintenance* behaviours include medication adherence,

✉ Han Shi Jocelyn Chew
jocelyn.chew.hs@link.cuhk.edu.hk

[1] Nethersole School of Nursing, Faculty of Medicine, The Chinese University of Hong Kong, Esther Lee Building, Shatin, NT, Hong Kong

[2] National Heart Centre Singapore, 5 Hospital Dr, Singapore, Singapore

physical activity, sodium restriction, attending regular medical follow-ups, and avoiding getting sick (e.g. vaccination) and *monitoring* behaviours include checking for ankle swelling and daily weighing [9]. Habits are well-known to be difficult to change and the sustainability of behaviour change is even more challenging in the real world full of temptations [10]. Many HF self-care interventions have been shown to improve knowledge and performance for up to 3 months post-intervention, but the sustainability of such interventions beyond this time frame remains unknown [11]. While knowledge deficit is well-established as the main barrier of self-care, a systematic review found that there are other determinants such as the ability to integrate self-care into daily living (i.e. incorporate self-care as a lifestyle habit), timely symptom detection and management, caregiver support and empowerment [12]. Others identified influencing factors such as duration since diagnosis, perceive valence beliefs, type D personality [13], gender, age, cognition, QoL, self-efficacy comorbidity and social support [14–16]. To address these factors, self-care interventions have evolved from purely educational to multicomponent. Effective components include counselling through motivational interviewing (MI) [17], skills-based training [18] and engaging family support [19]. Various means of delivery were also tested to improve self-care including telephone monitoring [20], face-to-face and web-based [21]. However, there remain more than 50% non-adherence rates in HF patients across 15 countries worldwide especially in developed countries, highlighting a dearth in understanding the underlying mechanism of self-care behaviour change [7].

Most behavioural change theories such as the theory of planned behaviour are based on the intention-behaviour link, where behaviours are posited to be influenced by factors (e.g. attitude, perceived control and social norms) that influence intention [22]. However, a meta-analysis of 47 trials found that a medium-to-large increase in intention only induces a small-to-medium change in actual behaviour performance (e.g. exercise and diet) [23]. This could be due to the effect of other influencing factors on the translation of intention to behaviour, which can be addressed using the temporal self-regulation theory (TST) [24]. TST posits that the intention-behaviour link is influenced by time perspective (TP), behaviour prepotency and self-regulation capacity.

TP refers to the degree to which one considers the perceived value and influence of current behaviour on short- and long-term goals/outcomes [25]. In a study on people with newly diagnosed type 2 diabetes, having a more future-oriented TP (FTP) was shown to result in less frequent fatty food choices and a higher level of physical exercise [26]. This was mediated by intention strength, which suggested a motivational effect of TP on health-promoting behaviour. A meta-analysis of 32 trials showed that a higher FTP exerted a small-to-medium effect on health behaviours possibly due to its association with self-control [27]. These health behaviours include adopting a healthy diet [28], increasing physical activity [29], increasing cancer screening uptake [30] and smoking cessation [31]. As HF patients require dietary control not only to reduce sodium intake but also fat and sugar, this is a worthy factor to consider. Popular techniques used to increase FTP include temporal framing, episodic future thinking and self-regulation in patients with obesity [32], diabetes [33] and cancer [34]. However, we could not find such studies conducted in a HF population, TP studies were mostly quantitative and conducted among younger populations who may experience a different time perspective than older adults with chronic diseases [35].

Translation of intention to behaviour performance is influenced by behaviour prepotency (i.e. automatic cue response such as habits) and self-regulation capacity (i.e. executive function) [24]. Behaviour prepotency is often illustrated as habits, which are conditioned responses to internal or situational cues such as the behaviour of eating snacks when one feels bored even when one is not hungry. This requires executive function (cognitive processes including working memory, inhibition and mental flexibility) to exert 'top-down' self-regulation/control over thoughts, emotions and behaviours to overcome challenges that may steer one off-track from a long-term goal [36]. Intention has been well-established as the key predictor of health behaviour changes but emerging research showed that habit strength may be more predictive of certain routine behaviours strengthened through repetition [37]. One study found that future-oriented individuals had higher tendencies to follow *intentions* to control snacking, while present-oriented individuals had a higher tendency to follow unhealthy snacking *habits* [38]. This is supported by a study on 538 undergraduate students, where their intention and behaviour to increase physical exercise were reportedly almost three times stronger at lower than higher habit strength, where stronger exercise habit decreased exercise intention (de Bruijn & Rhodes, 2011). However, we could not find studies that explored habits and self-regulation strategies in patients with HF. As healthcare shifts towards tailored and personalised care, it is essential for healthcare professionals to listen to subjective voices of patients and understand their experiences and needs before testing out interventions. Existing literature has studied HF self-care motivations and barriers but were mostly quantitative and in western cultures, limiting the scope in understanding how self-care intention-behaviour link materialises especially in a Southeast-Asian culture [39].

Aim

This study aimed to adopt the TST as a guiding framework to explore the underlying mechanism by which HF self-care behaviour improves. Findings would inform the personalisation of psychoeducational services to better integrate self-care behaviours into patients' lifestyle. Only when self-care

behaviours become a habit would it be sustained. The research questions were as follows:

- What are the motivators for patients' intention to perform HF self-care?
- What are the behavioural prepotency barriers of performing self-care in patients with HF?
- What are the self-regulation techniques to overcome the barriers of self-care in patients with HF?

Methods

Design

A descriptive qualitative study guided by the TST was conducted to obtain an in-depth understanding of HF patients' experiences in HF self-care [40]. Adopting a qualitative study design allowed the authors to "put flesh on the bones of quantitative results, bringing results to life through in-depth case elaboration" [41]. Ethical approval was obtained from the Survey and Behavioural Research Ethics Committee (SBRE) (Reference number: NTEC-2018-0265) (Hong Kong) and SingHealth Centralised Institutional Review Board (CIRB) (Reference number: CIRB 2017/2925) (Singapore). Participants were recruited from a larger study where potential participants were informed of the possibility of being invited for a face-to-face interview session alongside a full explanation of the study's aims, procedures, risks and benefits. Written informed consent was obtained from agreeable participants.

Participants

Participants were purposefully sampled from an inpatient and outpatient setting in one tertiary hospital in Singapore from December 2017 to March 2018. Purposeful sampling was used to select participants of various ages including some of the youngest and oldest of a larger sample with low, middle and high self-care scores measured using the Self-care of Heart Failure Index (SCHFI). Twenty participants were invited to participate in the study for their potential to provide rich and insightful data on their self-care experiences but three denied due to unavailability [42]. Recruitment ceased upon data saturation at the 17th participant, where no new information emerged [43]. The participants' sociodemographic and clinical characteristics are reported in Tables 1 and 2. Overall level of self-care was poor as indicated by a mean score of 44.5, which is below the cut-off score of 70 that represents adequate self-care.

Data Collection

Sociodemographic data were collected during the larger study that included participants who were (1) clinically diagnosed with HF, (2) above 21 years old and (3) able to comprehend English or Mandarin. The first author (HSJC) conducted unstructured face-to-face interviews while making sure to answer all three research questions on motivators for intention to self-care, behaviour prepotency and self-regulation strategies. Given the bilingualism of Singaporeans in a multiracial society, interviews were conducted in English, Mandarin or both according to the participants' preferences. Unstructured rather than structured interview method was chosen to allow for the evocation of new ideas and themes beyond current knowledge. This allows for a deeper exploration into the complexities of human behaviour in the real world without being too intrusive [44]. To prevent conversations from progressing off-tangent, the interviewer (HSJC) used the research questions to guide the development of follow-up questions, making sure that the research questions were addressed. HSJC has undergone training on qualitative interview techniques and is experienced with conducting unstructured interviews especially in the context of HF. Interviews started with an opening question, "Why do you want to perform heart failure self-care?" followed by "How have you been doing so?" When research questions were not addressed by the participants' narratives, follow-up questions were asked to evoke real-life and in-depth information on the participants' experiences. For example, if a participant only mentioned about how he/she performed self-care like exercising without mentioning about barriers, follow-up questions such as "so what are the challenges faced?" were asked. Observational notes such as non-verbal body language and facial expressions were taken alongside audiotape recordings of the interviews to enrich the data with deeper insights into participants' thoughts and feelings. Participants were reminded that their written consent included consent to the audiotaping of the interview and the recording of observational notes. It was reinforced that that has the right to withdraw from the study at any point in time. Interviews lasted for 15 to 42 min each.

Data Analysis

After every interview, audiotaped recordings were immediately transcribed verbatim, translated when necessary and analysed systematically using the 6-phase thematic analysis by Braun and Clark (2006) [45]. In the first phase, HSJC read the transcripts repeatedly to familiarise herself with the data and searched for meanings and patterns by highlighting relevant data—a process known as immersion. In phase 2, initial codes were generated by highlighting data extracts while giving as much attention to every data item. Then, codes with similar meanings were colour-coded and collated into

Table 1 Sociodemographic, clinical, self-care, motivation and time perspective profile of the participants

Characteristics	Mean (standard deviation)/percentage (%)
Age	56.1 (13.5)
Male	76.5%
Race	
Chinese	82.4%
Indian	11.8%
Malay	5.9%
Marital status	
Single	11.8%
Married	82.4%
Divorced	5.9%
Family income (SGD)	
< 1000	35.3%
1000–3000	35.3%
3001–5000	11.8%
5001–10,000	11.8%
> 10,000	5.9%
Highest education level	
No formal education	11.8%
Primary school	17.6%
Secondary school	47.1%
Post-secondary school	23.5%
Employment	
Part-time	17.6%
Full-time	41.2%
Retired	23.5%
Unemployed	17.6%
Caregiver	
Self	76.5%
Spouse	17.6%
Children	5.9%
Religion	
Buddhism	35.3%
Christianity	17.6%
Hinduism	5.9%
Islam	11.8%
Free-thinker	23.5%
Catholic	5.9%
NYHA	
I	39.4%
II	70.6%
LVEF	31.31 (14.4)
SCHFI maintenance subscale	44.5 (19.2)

Note: *SGD*, Singaporean dollars; cut-off score for SCHFI ≥ 70

categories. Constant comparison with other transcripts was concurrently performed with data collection to identify areas that require more data to be collected. In phase 3, codes were categorised into themes and subthemes using the TST, making this data analysis a more theory-driven one. Phase 4 was an iterative process where all codes in each theme were reviewed for coherent with other codes within the theme, all themes were reviewed for coherence across themes, and all codes and themes were reviewed for overall coherence with the TST. When there were discrepancies, codes were removed or fitted into other themes that were more suitable. In phase 5, the essence of each theme and subtheme was identified and renamed accordingly. In the final phase, the data will be succinctly and coherently presented in a narrative form.

Rigour

Credibility was enhanced by having in-depth and prolonged interviews accompanied by observational notes with each participant. Key ideas were summarised and confirmed with participants as a form of member-checking for correct interpretation of their responses [46]. Transferability was enhanced by providing a thick description of the participants' characteristics and context of the study for readers to evaluate whether findings are applicable to their context of interest. Dependability was enhanced by providing a comprehensive description of the study process from an audit trial including the interviewer's (HSJC) reflexivity journal for repeatability of the study. Confirmability was enhanced by having a professor and post-doctoral fellow analyse the list of codes and themes separately where discrepancies were discussed and resolved among the three researchers (HSJC, SYC, XC).

Findings

Five themes and twelve subthemes emerged to answer the three research questions (Tables 3 and 4). Motivators were (1) consideration of the family's future and (2) consideration of own past. On the contrary, (3) fatalistic consideration of own future served as a demotivator. Prepotent behavioural barriers were (4) difficulty adopting physical activity and (5) difficulty deviating from personal dietary habits and sociocultural dietary norms. Personalised strategies to overcome these challenges were described in the subthemes that emerged. Each theme is supplemented with participants' verbatim quotes followed by their pseudonym and age.

Motivators of Intention to Perform HF Self-Care

Consideration of Family's Future

Participants were motivated to perform self-care to look healthy so that their family would not experience worry for their health or grief for their death. Participants also self-cared to maintain independence and delay the disease progression so that they could continue working and supporting their

Table 2 Questionnaire scores for each participant

Pseudonym, age	SCHFI maintenance subscale	Years since index HF hospitalisation	Number of HF-related hospitalisations
Mary, 69	30.00	16	4
Alice, 58	53.33	< 1	4
Peter, 51	30.00	< 1	2
Ahmad, 66	40.00	7	1
Rahmalia, 32	73.33	5	6
Elon, 62	43.33	< 1	1
Sam, 35	43.33	8	2
Matt, 41	56.66	4	8
Paul, 70	36.66	15	10
Ben, 80	73.33	8	4
Ashiqa, 61	46.66	7	1
Mark, 62	10.00	7	6
William, 41	79.99	2	2
Logan, 46	56.66	4	0
Tom, 50	26.66	3	2
Sulaimi, 62	23.33	10	12
Rick, 67	33.33	2	5

Note: SCHFI measures the frequency of self-care maintenance behaviours of which sum of scores are rescaled to a range of 0–100 with a cut-off score of 70 that indicates acceptable level of HF self-care

families. This was especially for men with dependents like their wife or children.

To Prevent the Family from Worry and Grief Participants identified different family members as their main motivator for self-care. Younger participants without children were motivated to reciprocate kinship, like one participant who talked about realising how much his family had cared for him and wanted to reciprocate that affection:

> Kinship. My brother and sister. Last time I was more selfish. But now because after I got this sickness, I realized that actually my brother and sister are quite concerned for me. And maybe my mom, try not to let her worry too much about me. (Logan, 46)

Participants with young children often expressed guilt for making their children worry for them because they felt that it was their responsibility as a parent to let their children grow up carefree. This sense of guilt served as a motivation for them to stay healthy through self-care. One participant described an inexplicable bond with his daughter and said this with gradually teary eyes:

> Having a daughter is like my lover from the previous life. It's a special feeling. So, I reflected. Whatever I say, she listens. Why can't I listen to what she says? Sometimes I feel that it is unfair to her. So, I told her. Next time whatever you say, I will listen. Whatever you don't want me to eat, I don't eat. I can feel that my daughter feels heart wrench. Because she had ever asked me before. Why other people's father so healthy, but my father so ill? (Matt, 41)

Another expressed a sense of responsibility as a mother to avoid making her children suffer: "If you fall sick, you don't take care of your health, then they will suffer you see. I didn't bring them into this world for them to suffer. I have to do my part" (Ashiqa, 61).

Participants with adult children were motivated to stay healthy for their partners. One participant said: "My worry is that if I were to go, my missus will be very sad. That's the only thing that bugs me. Whatever keeps her happy I will try. So, she's my main motivation" (Tom, 50).

To Support the Family Some participants saw self-care as a bargaining chip for more time to support their dependents, or at least train them to be independent enough to live without them (participant). One participant said: "At this moment, keeping me going is my wife and my girl. My girl is still young, she is only 5 years old. Then my wife is not independent at all. So slowly I have to train them." (Peter, 51). Another participant mentioned: "Because I want to look after my wife. My wife not so well also. I got to keep myself fit. In order to look after her. No other motivation" (Ben, 80).

Table 3 Themes and subthemes that emerged for motivation/demotivation

Motivation/Demotivation	
Themes	Subthemes
Consideration of family's future	To prevent worry and grief
	To support the family
Consideration of own past	To right the wrongs
	To regain feeling of normalcy
Fatalistic consideration of own future	Perceived short residual lifespan
	Helplessness

Consideration of One's Past

Participants expressed that being diagnosed with HF was like stopping at a checkpoint and being given a second chance to live. It made them evaluate how they have led their lives in the past and how they would like to lead their lives in the future.

To Right the Wrongs Upon reflection, participants expressed regret for neglecting their health. One said this with a smile tinged with disappointment: "That time I should have come back for regular follow-ups. I didn't. I was very headstrong. Regret already. Now can save then save (prevent the condition from worsening)" (William, 41).

To Regain a Sense of Normalcy In participants with more disruptive symptoms, self-care was seen as a way to regain normalcy. In those with less severe symptoms, self-care was seen as a way to prevent the loss of normalcy. One participant expressed the desire to be able to walk normally again. "I feel like I have no freedom. Very limiting. Restrict this and that. I hope that after I recover, I will have the physical energy to walk." (Alice, 58).

Another was motivated by the fear of losing normalcy in the form of suffering from repeated admissions. He said: "If this happens again, cannot save. If you don't look after yourself, you eat already at most 2 to 3 months you come back and lie on the hospital bed. Very suffering" (Elon, 62).

Fatalistic Consideration of Own Future

Some participants maintained a fatalistic outlook on their future living with HF upon experiencing the futility of their efforts in the past and/or accepting the fact that may pass away any time and are ready for it.

Perceived Short Residual Lifespan Older participants expressed that since they may die anytime from HF or comorbidities, they might as well enjoy the present moment and indulge in feeling good rather than giving that up for an uncertain future. They expressed having fewer attachments in life with nothing much to look forward to especially when their children are independent. One participant said:

> My child is 45 years old already. No need to hold on too much already. If it is tasty, I want to drink, I will just drink. If die, then die. Because at my advanced age, I don't care so much. Happy can already. Battery, there is time. If it wants to stop, it stops. Don't think. You think also no use. Nothing much to change. (Mary, 69)

Helplessness Younger participants mentioned a sense of helplessness when their condition continued to worsen despite putting in an effort to manage it. This caused them to lose the motivation to self-care. One participant said: "Actually, I think I've already done everything I can. Like take medication and limit water and salt. But still, your condition can deteriorate. So sometimes there's nothing you can do about it" (Rahmalia, 32). Another said: "The doctor told me I cannot be cured. My whole life. So I realised that whatever it is, I have to take the consequences" (Sulaimi, 62).

Table 4 Themes and subthemes that emerged for barriers and techniques to overcome them.

Barriers and techniques to overcome them	
Themes	Subthemes
Difficulty adopting physical activity	Time consuming and boring-integrating physical exercise into daily living and enjoyable activities
	Fear of overexertion-self-monitoring
Difficulty deviating from personal dietary habits and sociocultural dietary norms	Convenience of eating out or takeaway-food adaptations
	Premade food and hostility faced when making dietary requests-home-cook for family and meal preparation for self
	Respecting the cook and other diners-damage control
	Unhealthy food habits- ignoring, distracting, substituting & cognitive reframing

To cope with this, participants mentioned trying to think positively by appreciating life and letting go. One participant said:

> I think positive thinking is very important. You cannot just because of one-time heart attack then you totally put yourself so low and then no motivation at all. You have to be more aggressive to think positively and build up yourself. (Peter, 51)

Another participant said: "Just let the things go. Whatever you can prevent you from prevent. But if you cannot, if things happen, then you just manage" (Tom, 50).

Behaviour Prepotency and Corresponding Self-Regulation Strategies

All participants described initial efforts to make healthier food choices and increase physical activities but were distracted by various situational demands. Participants shared techniques to overcome self-care challenges.

Difficulty Adopting Physical Activity

Time-Consuming and Boring—Integrating Physical Exercise into Daily Living and Enjoyable Activities One participant verbalised difficulties in finding time to exercise and that he only exercised on day-offs. Even so, it was boring and difficult to sustain: "Only if off day then 10 plus (am) just go down for a few walks. If you walk with your friend and talk a bit, maybe can walk more than a bus stop. But if you walk by yourself, quite boring" (Logan, 46).

To overcome these challenges, some participants found ways to save time and make exercising meaningful. One participant mentioned integrating exercises into their daily living (e.g. doing housework): "Mop the floor all, your whole body sweats. That's why I seldom do exercise outside" (Alice, 58). Others mentioned integrating exercising into doing something enjoyable like family bonding and shopping: "Like sometimes when my daughter goes out for a walk, I will accompany her" (Matt, 41). "Walk at the mall. Like every 2 or 3 days. Half an hour" (Ramalia, 32).

Fear of Overexertion—Self-Monitoring Participants especially those who had experienced symptom exacerbations due to overexertion avoided physical exercise because they were unsure of the types of physical activities that their bodies could tolerate. One participant who got a shock from his implantable cardioverter device while walking up a slope said this: "Up till now I am still a bit wary. I am in a situation where I don't really know what triggers an attack. But I try and keep it safe by not doing too much physically" (Sam, 35).

Therefore, some participants employ techniques such as trial-and-error to adjust the frequency and intensity of their exercises. One participant mentioned: "So now I just do a little bit. Just go cycle a bit. Under the block, the cycling machine. When you feel comfortable, ok, a little bit more" (Ashiqa, 61).

Difficulty Deviating from Personal Dietary Habits and Sociocultural Dietary Norms

The Convenience of Eating Out or Takeaway—Food Adaptations Participants verbalised that despite knowing the health benefits of home-cooked meals, they preferred eating out or having takeaway meals out of convenience and time constraint: "I mean to be realistic, sometimes you want to be fast or you have work to do, then you naturally end up eating things that are not so healthy" (Sam, 35). "Because come back already very late. More tiring (if have to cook at home)" (William, 41).

To overcome this temptation of convenience, participants described making adaptations such as portion control and food modification as a compromise. One participant described sharing packed food with her family as a form of portion control: "I don't eat too much because one packet a few people eat so each person don't (doesn't) eat a lot" (Mary, 69). Others mentioned making healthier choices by removing the skin of meat and eating more steamed food: "The chicken skin take out" (Ahmad, 66). "Try not to take fried things, take steamed things" (Sam, 35).

Premade Food and Hostility Faced when Making Dietary Requests—Home-Cook for Family and Meal Preparation for Self Participants expressed difficulties in asking for less salt added especially for food that are premade. Some also mentioned being chastised when asking for less salt as it was seen as pretentious and disrespectful to the food vendor.

> That one very hard. They say you want to geng (hokkien: fake). Cai peng is standard (premade). You cut already the put in already. Zi char (ala carte dishes) you say put less salt, the person who takes your order cares? Write what? Less oil less salt? They will scold you. Want to eat or not? Don't want, get lost! (Mark, 62)

To overcome this challenge, participants described cooking more for dinner and bringing leftovers to work. To make cooking worthwhile, some expressed cooking only when it is for the whole family and used this opportunity to promote healthy eating with the family: "Sometimes I pack home-cooked food to work if I work at night and cooked (leftover from the night before)" (Mary, 69). Another participant mentioned: "One family eat together. She will normally cook blander. Like steamed fish, fry a vegetable. Recently she puts less (salt)" (Matt, 41).

Respecting the Cook and Other Diners—Damage Control Participants expressed reluctance to request for healthier options such as low-salt especially when it is cooked by a respected elder for a big group of diners as it may seem like a form of disrespect or killjoy: "Christmas, Chinese New Year all these I will eat more. It's the mood and you just want everybody to be happy. It shows by eating" (Tom, 50). Another participant said:

> Sometimes when I go to my mom's place, she will cook very delicious food but once I see it, I don't want to eat already. She thought that I was angry but it's because I don't have the appetite to eat. (Matt, 41)

Therefore, when encountered with a situation where participants cannot avoid eating unhealthy food, they mentioned tracking the food they eat and doing damage control afterwards:

> "I frequently ask for less salt but if the restaurant cannot, then at home I will omit my water or increase the water tablet" (Rahmalia, 32).

Unhealthy Food Habits—Ignoring, Distracting, Substituting and Cognitive Reframing Participants expressed the intention to resist food temptations but often fail to do so due to the visual enticement especially when the food item is on discount. One participant said: "Sometimes like when promotion for potato chips, like two packets $8 only or $7.95, I just buy and go." (Peter, 51).

Some expressed the inability to keep to their fluid restriction due to the habitual behaviour of having water with meals. One participant said: "When I eat, even before eating I drink a cup. Eat but haven't finished eating, drink another cup. I don't know. Maybe it's a habit" (Matt, 41). Others attributed the lack of dietary control to the habit of snacking due to boredom: "Sometimes it's just a matter of you are just busy or bored then you will snack a little bit just to de-stress or kill a little bit of time that's all." (Sam, 35).

To tackle this problem, participants mentioned using personalised self-regulation techniques. Some participants said that they tried to reduce visual stimuli by refraining from buying the stimuli in the first place: "I try not to buy them in the first place. I suppose eating is hard to stop, I just try stopping at the source." (Sam, 35). Some mentioned that they tried to distract themselves from temptations such as unhealthy snacking by not thinking about it or doing something else: "You just don't think about it. You think of doing some work. Talk to friends" (Rick, 67). Others mentioned substituting unhealthy habits such as snacking with healthier options like filling themselves up with water: "Just make yourself drink more water or find other things to replace, instead of you must really go and eat the snack" (Peter, 51). Another mentioned reframing their thoughts and reassuring that they do not need to give into temptations: "You know that one is not good for the body, say no need no need, it's not necessary. You know you won't feel hungry, you don't need to worry. Psycho yourself" (Mark, 62). "You don't think about it nothing will happen" (Paul, 70).

Discussion

To our best knowledge, this is the first study that explored self-care motivation, challenges and self-regulation in a Southeast-Asian population living with HF. It is also the first to use TST as a guiding framework to understand the underlying mechanism of HF self-care behaviour change. The five themes and twelve subthemes that emerged showed a good fit with TST in explaining the HF self-care intention-behaviour relationship (Fig. 1). Self-care motivations were found to be influenced by time perspective, exemplified by considerations of the past and future pivoted by the present. Behaviour change barriers were related to behaviour prepotency, exemplified by existing habits and social practices. Personalised strategies to overcome these barriers were relevant to self-regulation capacity, exemplified by effortful cognitive control over existing practices.

Main motivations for participants to perform self-care were to prevent their family from feeling worried or grief, to stay independent enough to continue providing for their families, to atone for neglecting their health in the past and to feel normal again. This coincides with a study on Iranian HF patients who were motivated by the fear of death, "desire to remain independent", "desire to regain prior physical health status", need to "support their family members" and to "prevent them from feeling irritated" [47]. However, our findings extend current knowledge that these motivations were augmented by TP, which could be used in future self-care interventions such as including temporal framing of health promotion messages to motivate HF self-care.

Changing lifestyle behaviours is difficult and requires motivation and self-regulation to stay on track. Motivation is essentially a future-oriented construct that requires one to integrate future desires and past experiences to shape present behaviours. In terms of reflecting on the past, participants mentioned feeling a sense of regret for neglecting their health and being thankful to be given a second chance at life. These participants were motivated to repay the gift of life and started to become more mindful and appreciative of the present. Others mentioned being motivated by their emotional attachment and sense of responsibility to look after their families in the future. This was especially common for men who were sole breadwinners. Contrary to common sentiments, their fear

of death was not due to self-centred reasons but due to the fear that their families may suffer from negative emotions and inability to cope alone in the future. A study found that having a higher family functioning was associated with higher voluntary motivation (as opposed to external pressure) for medicine compliance and adopting a healthy diet [39]. Participants in the intervention group underwent four sessions of family partnership educational intervention that included education on how to decrease negative criticism within the family during patient care. However, it was unclear whether the increase in family functioning and self-care was due to an improvement in emotional or tangible support. According to our findings, it seems that just the attachment to one's family alone, regardless of whether family support is provided, could improve motivation to self-care as long as they found it meaningful (i.e. providing for the family). This is congruent with the socioemotional selectivity theory that people tend to be more motivated towards emotionally meaningful behaviours and goals as perceived residual lifespan decreases with age and illnesses [48]. However, more studies are needed to explore this phenomenon.

In contrast, advanced age and repeated symptom exacerbations could de-motivate patients from self-care due to fatalism and perceived futility. Passive fatalism is a common phenomenon in the Chinese culture (Singapore is made up of 74.2% Chinese) and is rooted in the Taoist belief of "letting nature take its course" [49, 50]. Death is seen as an imminent part of life and one should not attempt to control it. However, this mentality could lead to worse outcomes as shown in a study of 669 patients post-stroke over 5 years [51]. Greater fatalism was associated with an increased risk of recurrence and all-cause mortality, possibly due to a lack of empowerment [52]. More studies on empowerment and interventions for family-patient dyad focusing on family functioning could be useful.

Common challenges in performing HF self-care were the difficulties in adopting physical activity into participants' daily lifestyle and difficulties in deviating from personal dietary habit and sociocultural dietary norms. Working participants commonly mentioned time constraint as a major challenge in performing physical exercise as they were already exhausted after work and some even had family commitments such as looking after their children. Others mentioned refraining from physical exercise due to the fear of overexertion as it may trigger a medical emergency. Similarly, studies have shown that barriers to performing self-care include fear of or existing symptom exacerbations (e.g. fatigue and breathlessness), limiting comorbidities (e.g. diabetes and gout), circumstantial constraints (e.g. time constraint), lack of access to exercise facilities and lack of motivation [53]. However, simple exercise facilities are mostly available near each residential area in Singapore and this could be the reason why it was not identified as a challenge in this study. Suggestively, interventions could focus on empowering HF patients with skills to integrate self-care into their unique lifestyles. This requires the imparting of tactical skills to strategically plan a behaviour change while considering factors such as cost, environment and time and contingencies to satisfy situational demands without jeopardising the plan (Dickson & Riegel, 2009). Situational skills help to maintain self-care amidst situational demands such as adjusting diet restrictions and medication regimes during a vacation. This may require a certain level of health literacy (i.e. understanding how self-care promotes clinical stability), economic access to resources (i.e. weighing machine and medications) and sociocultural sensitivity (i.e. how to reject unhealthy food without seeming culturally disrespectful and discriminatory) for proactive self-care [54].

Changing personal dietary habits (i.e. involuntary response to situational, internal or environmental cues) is well-known to be challenging because it is a subconscious bio-behavioural

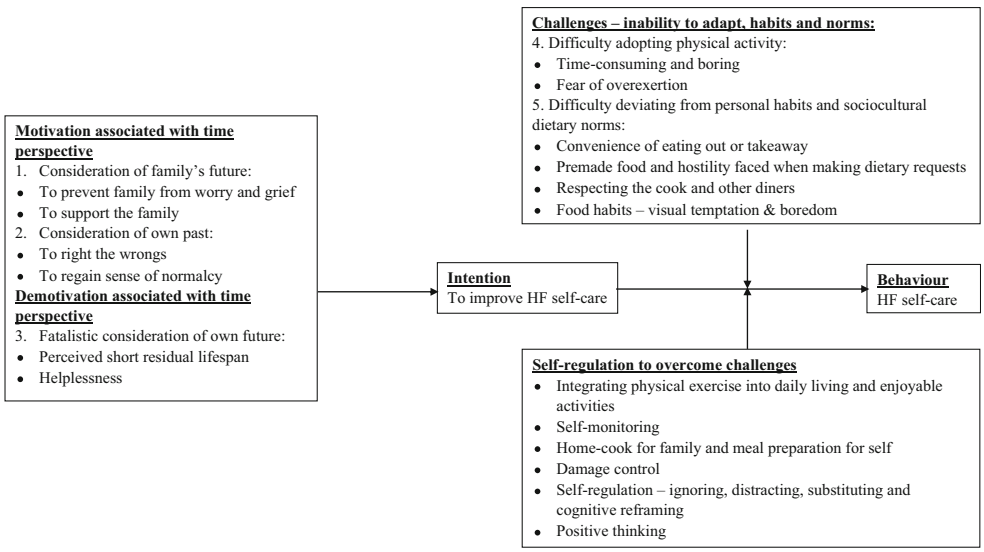

Fig. 1 Temporal self-regulatory theory adapted for HF self-care. Numbers represent the corresponding themes mentioned in the full-text

pattern operationalised from neural associations that are strengthened by repetition [55]. Studies have shown that habit is a strong predictor of health behaviours especially those subjected to situational temptations but self-regulation techniques employed by individuals to kick the habits are rarely reported. One study found that habit strength, past behaviour and perceived cues were strong predictors of healthy eating behaviours (i.e. fruits and vegetable consumption and unhealthy snacking) alongside self-control and intention to change [25]. Concurrently, our study participants expressed difficulties in resisting responses to cues such as snacking in responses to feeling stressed. To overcome this challenge to resist temptations, participants developed personalised self-regulation techniques such as ignoring, distracting, substituting and cognitive reframing to control such urges. Self-care interventions could use these techniques as a guide to facilitate the development of contingent responses to cues. Studies have shown that such planning moderates the intention-behaviour link to increase physical activity and dietary behaviours [56].

Similar to a previous study that identified cultural food preference as a barrier to the adoption of a low-salt diet [57], our findings showed that participants encountered difficulties in deviating from sociocultural dietary norms. This is because more affordable meals in Singapore are mostly premade and leaves little room for one to opt for a low-salt option. Participants also expressed difficulties in requesting for less salt added even when eating at home because it may upset others sharing the dish, who may not want a low-salt option. Moreover, the cook may perceive the request as a sign that one dislikes the dish because it is distasteful. This is reflective of Asian culture, where eating a lot of food in its original way of preparation (without adding many condiments) signifies that the cook has good culinary skills, has prepared a delicious spread and that one is satisfied (Xu, 2008). If one makes special dietary requests or avoids certain foods, it may signify that either the food is not delicious or that one is unwell, of which both displeases the cook. Singapore has a strong food culture transpired through the ubiquitous hawker centres, food courts and coffee shops that house food stalls selling a variety of affordable ethnic food items. Food is readily available, affordable and effortless to obtain as compared to cooking at home, compelling Singaporean especially the working adults to eat or takeaway food from outside. Additionally, food is a mean for social bonding especially in a multiethnic society like Singapore, where the Singaporean cuisine bonds Singaporeans with a single identity. However, these traditional foods are usually unhealthy: traditional Indian (e.g. Indian curry), Malay (e.g. Nasi Lemak or coconut fat rice) and Chinese food (e.g. char kway teow or noodles fried with dark sauce) which are high in salt, fat and sugar. The health promotion board have addressed this issue by encouraging store vendors to publish nutritional facts on their food items and incentivised sales of healthier options by issuing the healthier options symbol of recognition. Further efforts could include sales of premade healthier options at supermarkets run by unions which are more likely to support such movements; raise awareness of healthy eating through advertisements focusing on the mentioned motivations, behaviour prepotency and self-regulation techniques and placing possible salt substitutions near the sales of salt.

Limitations

This study was limited by the sampled participants being mostly Chinese although consistent with the Singaporean demographic profile, which may reduce the transferability of findings to populations of other cultural backgrounds. Moreover, the majority of the participants were male, who may have different perceptions from females as they are mostly the sole breadwinner of the family who may experience more barriers such as time constraints. The use of only one coder (HSJC) may have reduced the accuracy of the codes. This was addressed by having two other researchers evaluate the appropriateness of the codes and themes of which discrepancies were discussed and resolved [58]. Furthermore, findings may have limited transferability to relatively stable participants at NYHA class I or II. Future studies could explore the transferability of these study findings to other populations such as those with other chronic diseases such as diabetes that require similar self-care. Other studies could explore using the study findings to develop culturally tailored interventions targeted at motivating and sustaining self-care. Study findings could also be disseminated to education and training facilities to enhance healthcare professionals' cultural appropriate facilitation of self-care while providing bedside or outpatient care.

Conclusion

Our study is the first to explore HF patients' motivation and challenges to perform self-care behaviours in a Southeast-Asian population and reported unique self-regulation techniques developed and used by patients themselves. Moreover, it is the first to the TST to explore the underlying mechanism by which HF self-care intention-behaviour link operationalises. Future research could attempt to use the TST to guide the development of self-care interventions. Such interventions could incorporate components on empowerment (e.g. teaching tactical and situational skills to integrate self-care into lifestyle), planning strategies to for new habits using the identified self-regulation techniques and tracking systems to enhance the sustainability of the new lifestyle.

Acknowledgements We thank the doctors and nurses who have assisted us during the data collection for this study. This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Author Contributions HSJC, KLDS, XC, SYC: Made substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data;

HSJC, XC, SYC: Involved in drafting the manuscript or revising it critically for important intellectual content;

HSJC, KLDS, XC, SYC: Given final approval of the version to be published. Each author should have participated sufficiently in the work to take public responsibility for appropriate portions of the content;

HSJC, KLDS, XC, SYC: Agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

References

1. Cook C, Cole G, Asaria P, Jabbour R, Francis DP. The annual global economic burden of heart failure. Int J Cardiol. 2014;171(3):368–76.
2. Sahebi A, Mohammad-Aliha J, Ansari-Ramandi M, Naderi N. Investigation the relationship between self-care and readmission in patients with chronic heart failure. Res Cardiovasc Med 2015;4(1): 1–6.
3. Hupcey JE, Penrod J, Fenstermacher K. A model of palliative care for heart failure. Am J Hosp Palliat Med. 2009;26(5):399–404.
4. Braunwald E. The war against heart failure: the Lancet lecture. Lancet. 2015;385(9970):812–24.
5. Savarese G, Lund LH. Global public health burden of heart failure. Card Fail Rev. 2017;3(1):7.
6. Ponikowski P, Anker SD, AlHabib KF, Cowie MR, Force TL, Hu S, et al. Heart failure: preventing disease and death worldwide. ESC Heart Fail. 2014;1(1):4–25.
7. Jaarsma T, Strömberg A, Gal TB, Cameron J, Driscoll A, Duengen H-D, et al. Comparison of self-care behaviors of heart failure patients in 15 countries worldwide. Patient Educ Couns. 2013;92(1): 114–20.
8. Riegel B, Lee CS, Dickson VV, Carlson B. An update on the self-care of heart failure index. J Cardiovasc Nurs. 2009;24(6):485–97.
9. Hunt SA, Abraham WT, Chin MH, Feldman AM, Francis GS, Ganiats TG, et al. 2009 focused update incorporated into the ACC/AHA 2005 guidelines for the diagnosis and management of heart failure in adults: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines developed in collaboration with the International Society for Heart and Lung Transplantation. J Am Coll Cardiol. 2009;53(15):e1–e90.
10. Kwasnicka D, Dombrowski SU, White M, Sniehotta F. Theoretical explanations for maintenance of behaviour change: a systematic review of behaviour theories. Health Psychol Rev. 2016;10(3): 277–96.
11. Chew HSJ, Cheng HY, Chair SY. The suitability of motivational interviewing versus cognitive behavioural interventions on improving self-care in patients with heart failure: a literature review and discussion paper. Appl Nurs Res. 2019;45:17–22.
12. Clark AM, Spaling M, Harkness K, Spiers J, Strachan PH, Thompson DR, et al. Determinants of effective heart failure self-care: a systematic review of patients' and caregivers' perceptions. Heart. 2014;100(9):716–21.
13. Oosterom-Calo R, Van Ballegooijen A, Terwee C, Te Velde S, Brouwer I, Jaarsma T, et al. Determinants of heart failure self-care: a systematic literature review. Heart Fail Rev. 2012;17(3):367–85.
14. Bidwell JT, Vellone E, Lyons KS, D'agostino F, Riegel B, Juárez-Vela R, et al. Determinants of heart failure self-care maintenance and management in patients and caregivers: a dyadic analysis. Res Nurs Health. 2015;38(5):392–402.
15. Peters-Klimm F, Freund T, Kunz CU, Laux G, Frankenstein L, Müller-Tasch T, et al. Determinants of heart failure self-care behaviour in community-based patients: a cross-sectional study. Eur J Cardiovasc Nurs. 2013;12(2):167–76.
16. Cocchieri A, Riegel B, D'Agostino F, Rocco G, Fida R, Alvaro R, et al. Describing self-care in Italian adults with heart failure and identifying determinants of poor self-care. Eur J Cardiovasc Nurs. 2015;14(2):126–36.
17. Riegel B, Dickson VV, Garcia LE, Creber RM, Streur MJPe, counseling. Mechanisms of change in self-care in adults with heart failure receiving a tailored, motivational interviewing intervention. Patient Educ Coun. 2017;100(2):283–8.
18. Dickson VV, Riegel B. Are we teaching what patients need to know? Building skills in heart failure self-care. Heart Lung. 2009;38(3):253–61.
19. Deek H, Noureddine S, Newton PJ, Inglis SC, MacDonald PS, Davidson PM. A family-focused intervention for heart failure self-care: conceptual underpinnings of a culturally appropriate intervention. J Adv Nurs. 2016;72(2):434–50.
20. Hanlon P, Daines L, Campbell C, McKinstry B, Weller D, Pinnock H. Telehealth interventions to support self-management of long-term conditions: a systematic metareview of diabetes, heart failure, asthma, chronic obstructive pulmonary disease, and cancer. J Med Internet Res. 2017;19(5):e172.
21. Athilingam P, Jenkins B, Johansson M, Labrador M. A mobile health intervention to improve self-care in patients with heart failure: pilot randomized control trial. JMIR Cardio. 2017;1(2):e3.
22. Ajzen I. The theory of planned behavior. Organ Behav Hum Decis Process. 1991;50(2):179–211.
23. Webb TL, Sheeran P. Does changing behavioral intentions engender behavior change? A meta-analysis of the experimental evidence. Psychol Bull. 2006;132(2):249–68.
24. Hall PA, Fong GTJHPR. Temporal self-regulation theory: a model for individual health behavior. 2007;1(1):6–52.
25. Evans R, Norman P, Webb TL. Using temporal self-regulation theory to understand healthy and unhealthy eating intentions and behaviour. Appetite. 2017;116:357–64.
26. Hall PA, Fong GT, Cheng AY. Time perspective and weight management behaviors in newly diagnosed type 2 diabetes: a mediational analysis. J Behav Med. 2012;35(6):569–80.
27. Andre L, van Vianen AE, Peetsma TT, Oort FJ. Motivational power of future time perspective: meta-analyses in education, work, and health. PLoS One. 2018;13(1):e0190492.
28. Dassen FC, Houben K, Jansen AJA. Time orientation and eating behavior: unhealthy eaters consider immediate consequences, while healthy eaters focus on future health. Appetite. 2015;91:13–9.
29. Rhodes R, de Bruijn GJ, Matheson DH. Habit in the physical activity domain: Integration with intention temporal stability and action control. J Appl Sport Psychol. 2010;32(1):84–98.
30. Whitaker KL, Good A, Miles A, Robb K, Wardle J, von Wagner C. Socioeconomic inequalities in colorectal cancer screening uptake: does time perspective play a role? Health Psychology. 2011;30(6): 702.
31. Adams J, Nettle D. Time perspective, personality and smoking, body mass, and physical activity: an empirical study. Br J Health Psychol. 2009;14(1):83–105.
32. Stein JS, Sze YY, Athamneh L, Koffarnus MN, Epstein LH, Bickel WK. Think fast: rapid assessment of the effects of episodic future

thinking on delay discounting in overweight/obese participants. J Behav Med. 2017;40(5):832–8.
33. Baird HM, Webb TL, Martin J, Sirois FM. The relationship between a balanced time perspective and self-monitoring of blood glucose among people with type 1 diabetes. Ann Behav Med. 2018;53(2):196–209.
34. Sen CK, Kumkale GT. Who does not get screened? A simple model of the complex relationships in mammogram non-attendance. J Health Psychol. 2016;21(12):2838–50.
35. Cate RA, John OP. Testing models of the structure and development of future time perspective: maintaining a focus on opportunities in middle age. Psychol Aging. 2007;22(1):186–201.
36. Schwarzer R, Luszczynska A. Self-beliefs and self-regulation in health behavior change. Self-concept, motivation and identity: underpinning success with research and practice. Information Age Publishing Inc: Charlotte; 2015. p. 201–24.
37. Verhoeven AA, Adriaanse MA, Evers C, de Ridder DT. The power of habits: Unhealthy snacking behaviour is primarily predicted by habit strength. Br J Health Psychol. 2012;17(4):758–70.
38. Onwezen MC, Van't Riet J, Dagevos H, Sijtsema SJ, Snoek HM. Snacking now or later? Individual differences in following intentions or habits explained by time perspective. Appetite. 2016;107:144–51.
39. Stamp KD, Dunbar SB, Clark PC, Reilly CM, Gary RA, Higgins M, et al. Family partner intervention influences self-care confidence and treatment self-regulation in patients with heart failure. Eur J Cardiovasc Nurs. 2016;15(5):317–27.
40. Hammarberg K, Kirkman M, De Lacey S. Qualitative research methods: when to use them and how to judge them. Hum Reprod. 2016;31(3):498–501.
41. Zheng M. Conceptualization of cross-sectional mixed methods studies in health science: a methodological review. Int J Qual Methods. 2015;3(2):66–87.
42. Patton, M. Q. Qualitative evaluation and research methods (2nd ed.). Thousand Oaks, CA, US: Sage Publications, Inc; 1990.
43. Etikan I, Musa SA, Alkassim RS. Comparison of convenience sampling and purposive sampling. Am J Theor Appl Stat. 2016;5(1):1–4.
44. Rowley J. Conducting research interviews. Manag Res Rev. 2012;35(3/4):260–71.
45. Braun V, Clarke V. Using thematic analysis in psychology. Qual Res Psychol. 2006;3(2):77–101.
46. Anney VN. Ensuring the quality of the findings of qualitative research: looking at trustworthiness criteria. J Emerg Trends Educ Res Pol Stud. 2014;5(2):272–81.
47. Abotalebidariasari G, Memarian R, Vanaki Z, Kazemnejad A, Naderi N. Self-care motivation among patients with heart failure: a qualitative study based on Orem's theory. Res Theory Nurs Pract. 2016;30(4):320–32.
48. Carstensen LL, Fung HH, Charles ST. Socioemotional selectivity theory and the regulation of emotion in the second half of life. Motiv Emot. 2003;27(2):103–23.
49. Department of Statistics Singapore. Population Trends 2018; 2018. Retrieved from: https://www.singstat.gov.sg/-/media/files/publications/population/population2018.pdf. Accessed 04 Feb 2019.
50. Zhang H, Shan W, Jiang A. The meaning of life and health experience for the Chinese elderly with chronic illness: a qualitative study from positive health philosophy. Int J Nurs Pract. 2014;20(5):530–9.
51. Morgenstern LB, Sánchez BN, Skolarus LE, Garcia N, Risser JM, Wing JJ, et al. Fatalism, optimism, spirituality, depressive symptoms, and stroke outcome: a population-based analysis. Stroke. 2011;42(12):3518–23.
52. Chew HSJ, Lopez V. Empowered to self-care: a photovoice study in patients with heart failure. J Transcult Nurs. 2017;29(5):410–9.
53. Klompstra L, Jaarsma T, Strömberg A. Self-efficacy mediates the relationship between motivation and physical activity in patients with heart failure. J Cardiovasc Nurs. 2018;33(3):211–6.
54. Baumann LC, Dang TTN. Helping patients with chronic conditions overcome barriers to self-care. Nurse Pract. 2012;37(3):32–8.
55. Wood W, Labrecque JS, Lin P-Y, Rünger D. Habits in dual process models. Dual process theories of the social mind. N.Y., US: The Guilford Press; 2014:371–85.
56. Gellert P, Ziegelmann JP, Lippke S, Schwarzer R. Future time perspective and health behaviors: temporal framing of self-regulatory processes in physical exercise and dietary behaviors. Ann Behav Med. 2011;43(2):208–18.
57. Dickson VV, McCarthy MM, Howe A, Schipper J, Katz SM. Sociocultural influences on heart failure self-care among an ethnic minority black population. J Cardiovasc Nurs. 2013;28(2):111–8.
58. Berends L, Johnston J. Using multiple coders to enhance qualitative analysis: the case of interviews with consumers of drug treatment. Addict Res Theory. 2005;13(4):373–81.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.