Making sense of a myocardial infarction in relation to changing lifestyle in the five months following the event: an interpretative phenomenological analysis

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Making sense of a myocardial infarction in relation to changing lifestyle in the five months following the event: An interpretative phenomenological analysis

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ABSTRACT

Objective: Previous research has shown that experiencing an acute cardiac event, such as a myocardial infarction (MI), can lead to lifestyle changes. This study aimed to explore the potential of a MI as a 'teachable moment' (TM) for positive lifestyle changes and to identify psychosocial sensemaking processes that facilitate or hinder the presence of a TM.

Method: We conducted semi-structured interviews with 14 patients who suffered their first MI and were hospitalized in a larger Dutch city. Participants were interviewed twice, respectively one and five months after their hospitalization. They were encouraged to explain how they experienced their MI and how this had affected their lifestyle. We used an Interpretative Phenomenological Analysis approach to the data collection and analysis.

Findings: The participants varied in their willingness to adopt a healthy lifestyle due to their MI. Most participants experienced their event as a TM for changing specific health behaviors, for example facilitated by reflecting on self-concept or social roles and by constructing and comprehending a personal narrative of their MI. Some participants struggled to follow through on their intentions to change their behavior, for example because of a negative attitude towards a healthy behavior or because they perceived it as incongruent to their identity. Only three participants maintained most former health behaviors, for example because they failed to acknowledge their MI as severe or because of earlier life events that elicited more blunted cognitive responses.

Conclusion: Cardiac patients may experience a TM, which is the consequence of interrelated processes of psychosocial sensemaking. As this does not occur at a singular time point, we suggest using the term 'teachable window' rather than 'moment'. Given these findings, there is a window of opportunity to provide continuous psychosocial and lifestyle support during and after hospitalization for acute cardiac events.

1. Introduction

The prevalence of cardiometabolic diseases worldwide is increasing, contributing to considerable health-care costs, mortality, and physical and mental burden (Seidell and Halberstadt, 2015; Whooley and Wong, 2013; Brinks et al., 2017). Modification of unhealthy risk behaviors among cardiovascular disease (CVD) patients not only lowers their risk of developing other comorbidities such as type two diabetes mellitus, obesity, and mortality, but also prevents recurrent cardiac events (Brinks et al., 2017; Santos, 2022). Moreover, favorable lifestyle changes may improve health-related quality of life among patients (De Smedt et al., 2014). In accordance, cardiac patients are strongly advised to adhere to healthy behavioral recommendations (Brinks et al., 2017).

Hospitalization for acute cardiac events may temporally increase patients' motivation to make favorable changes in their lifestyle (Deijle et al., 2017; Abroug et al., 2020). Consequently, cardiac events may

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trigger a potential teachable moment (TM) (Abroug et al., 2020; Tofler et al., 2015), a period when individuals are more receptive to receiving lifestyle advice and motivated to adopt risk-reducing health behaviors (McBride et al., 2003). That a cardiac event can serve as a TM is indeed observed in a study by Jokar et al. (2017) which revealed that cardiac patients demonstrated greater willingness to modify risk factors after their event, and by Coull and Pugh (2021), who observed that the event served as a TM for physical activity (PA) among their participants. Furthermore, evidence for this phenomenon is demonstrated by higher smoking cessation rates (Abroug et al., 2020; Tofler et al., 2015) and increased vegetable intake after a CVD diagnosis compared to the general population (Marques-Vidal et al., 2019).

Significant life events may initiate and sustain positive lifestyle changes by generating a sudden shift in individuals' judgments of their health and circumstances (Kwasnicka et al., 2016; Schlossberg, 2011). By doing so, these events help to overcome common barriers to lifestyle change. For instance, risk events can influence perceptions of perceived risk, such as unrealistic optimism characterized by an underestimation of one's likelihood to be affected by future health events which can be a barrier to engage in protective health behaviors (Hanoch et al., 2019; Ferrer and Klein, 2015). Moreover, acute life events help break habitual behaviors which normally are difficult to modify, allowing room for new, healthier, habits to be formed (Gardner and Rebar, 2019; Nicolai et al., 2018; Fålun et al., 2016). The Health Belief Model (HBM), which emphasizes an important role of cues to action (Becker, 1974), theoretically underlies the concept of TMs. A cardiac event serve as a cueing life event that influences patients' perceived threat of illness (recurrence) and the perceived benefits of lifestyle change, in turn leading to strong motivation for healthier lifestyle choices (McBride et al., 2003; Lawson and Flocke, 2009). Therefore, TMs represent an important window of opportunity for healthcare providers to offer lifestyle advice.

The potential of a life event to trigger a TM for lifestyle change depends on an individual's sensemaking process (McBride et al., 2003). Through a literature search focusing on smoking cessation after a lung cancer diagnosis, McBride et al. (2003) identified three psychosocial factors that play a role in this phenomenon: 1) an increased perception of personal risk for adverse health outcomes, 2) a strong emotional or affective response to the event, and 3) a redefinition of one's self-concept or social role. Previous quantitative studies have provided empirical evidence supporting the role of risk perception (Okely et al., 2019; McBride et al., 2008), affect (McBride et al., 2017; Brust et al., 2021), and change in self-concept (McBride et al., 2017; Brust et al., 2021) in facilitating TMs. Additionally, previous qualitative research has suggested that all factors appear instrumental in the context of pregnancy as a TM (Atkinson et al., 2016), while risk perception and self-concept were associated with experiencing a type 2 diabetes diagnosis as a TM (Dimova et al., 2020). Nonetheless, it remains unclear if these exact same psychosocial factors also apply to acute cardiac events becoming TMs.

A better understanding of the psychosocial sensemaking processes that influence the onset of a TM after acute cardiac events is essential for effectively utilizing such events as opportunities for lifestyle counseling (Locke, 2022). Solely providing lifestyle information often proves inadequate (Jallinoja et al., 2007), e.g. because a large part of behavior is based on routines and automatic processes (Gardner and Rebar, 2019). Even when patients initially demonstrate a willingness to optimize a health behavior, a gap exists between intention and actual action (Sheeran and Webb, 2016; Rhodes et al., 2016), as health behaviors are influenced by a complex interplay of individual, social, and environmental factors (Sallis et al., 2015). Numerous studies have identified psychosocial factors that can enhance patients' adherence to behavioral recommendations following a CVD diagnosis, such as an individual's knowledge, self-efficacy, and attitude and beliefs about lifestyle (change), as well as illness perception and anticipated consequences of engaging in healthy behavior (Coull and Pugh, 2021; Nicolai et al., 2018; Huffman et al., 2016; Kalantzi et al., 2023). Additionally, social factors such as social or professional support facilitate cardiac patients' ability to adopt healthier behaviors (Nicolai et al., 2018; Kalantzi et al., 2023).

It remains unclear how patients make sense of their cardiac event and how this process of sensemaking relates to their motivation to change behaviors, and therefore, how this may instigate a potential TM. The aim of this study was therefore to examine the potential of a myocardial infarction (MI) to serve as a TM, and to in-depth explore processes of sensemaking that may explain differences in lifestyle change intentions among cardiac patients. In this, we sought to identify underlying psychosocial factors that facilitate or hinder the presence of an effective TM. To the best of our knowledge, this is the first study that attempts to examine the underlying mechanisms of acute cardiac events as potential TMs.

2. Methods

2.1. Study design

An Interpretative Phenomenological Analysis (IPA) approach was applied for data collection and analysis. This qualitative research method, often used for building theories or narratives, is ideal to uncover how individuals makes sense of a certain experience (Pietkiewicz and Smith, 2014). It is characterized by a deep examination of - relatively few (Peat et al., 2019) - individual cases rather than producing general statements about the group as a whole (Pietkiewicz and Smith, 2014). The interpretative aspect of IPA allows participants to interpret their experience and explain what meaning it had for them (Pietkiewicz and Smith, 2014; Smith, 2004).

2.2. Sample and procedure

Inclusion criteria included hospitalization for a first MI at one of two general hospitals in a larger Dutch city, living in or near the city, being 18 years or older, being able to speak Dutch, having no other chronic or neurodegenerative disorders, and planning to participate a cardiac rehabilitation (CR) program. Participants were recruited by cardiologists or nurse practitioners who informed patients about the study during hospital discharge. Interested patients received a patient information letter and an informed consent form. Afterwards, the first researcher further contacted them and scheduled the first interview. Participants received a voucher of 25 euros for participation. The Medical Ethical Committee of Zuidwest Holland considered this study not to be subject to the Medical Research Involving Human Subjects Act (WMO) on November 2nd, 2018 (18–112).

Semi-structured interviews were conducted in person by the first author (MB), who is a health psychologist with expertise in qualitative research and who followed courses about IPA and qualitative interviewing prior to the study's initiation. Participants were interviewed twice: approximately one month (T1) and five months (T2) after their MI. This approach facilitated investigation of lifestyle trajectories within individuals over time. T2 was strategically chosen, occurring about one month after participants' completion of CR. As lifestyle support has stopped at this point-in-time and participants had then resumed back to their regular daily life, it marks a clinically significant moment. The interview guide was self-developed by 3 researchers (MB, WAG, JCK). Following IPA guidelines (Pietkiewicz and Smith, 2014), it contained primary open questions asking participants to tell something about their MI and its impact on life and lifestyle, and several prompts to encourage patients to speak in-depth about the topic. Inspiration for the interview guide was drawn from previous studies employing IPA or focusing on lifestyle changes following acute cardiac events (Nicolai et al., 2018; Atkinson et al., 2016). The interview guide (Online Supplementary Material 1) was tested in a pilot interview with an individual diagnosed with CVD. In accordance with the aim of facilitating a natural conversational flow (Pietkiewicz and Smith, 2014), the sequence of interview

questions was not rigidly bound by the guide. While participants remained in control of the parameters of the topic, the interviewer gently redirected the conversation back to the subject matter when participants deviated from themes related to the MI and its impact on life and lifestyle. Interviews lasted on average 67 min (range 43–93 min) at T1 and 53 min (range 29–71 min) at T2.

2.3. Analysis

Interviews were audio-recorded and transcribed verbatim. An IPA approach was administered to the data analysis (Pietkiewicz and Smith, 2014), which was primarily conducted by the first author (MB, health psychologist). First, an audio-recording was listened to and a transcript was read multiple times. Second, initial reflective notes were made based on content (what was said), language use (how it was said), and interpretation (what meaning it has for a participant). A double hermeneutics process was followed in which a participant's interpretation of their experience was in turn interpreted by the researcher (Pietkiewicz and Smith, 2014; Smith, 2004). The third step was to transform these notes into emergent themes. In line with IPA recommendations (Pietkiewicz and Smith, 2014), the analysis was completely inductive without predetermined theories. At the start of the analysis process, the first (MB) and third (SvB, psychologist) author independently performed the first three steps of the analysis on two randomly selected interviews, discussed their similarities and disagreements, and ultimately together explored and developed themes and reached 100% agreement about the emergent themes. Afterwards, the remainder of the analysis was performed by the first author in a similar manner. To recognize her subjective interpretating role and to ensure that interpretations were grounded in the transcripts, emergent themes were further discussed during meetings with the second (WAG, health psychologist) and last author (JCK, dietician and epidemiologist). The fourth step was to find clusters of emergent themes. The final overview of clusters of emergent themes was the result of regular meetings among the first, second, and last author, during which they discussed and produced the overview together. After repeating all steps for the interviews from T2, transitional themes over time were explored to identify changes in the participant's perspective on lifestyle from T1 to T2. Finally, we explored which clusters of psychosocial sensemaking processes were related to differences in lifestyle change intentions considered at T2. We have selected this as our primary focus, as we regarded lifestyle changes at T2 are clinically most relevant.

3. Results

Fourteen cardiac patients were included in the study. Their demographic and pre-event lifestyle characteristics are provided in Table 1. While most participants modified certain health behaviors due to their MI, substantial variations in behavioral decisions were evident among participants and across behaviors. An overview of all themes is provided in Online Supplementary Material 2. Stories of lifestyle change as a result of the cardiac event at T1 and T2 are summarized in Online Supplementary Material 3, hereby indicated per distinct behavior (i.e. diet, PA, smoking, alcohol, stress) whether participants were intended to improve or had already improved the behavior.

3.1. Lifestyle change at T1 and T2

Considering at T1, our analysis revealed three themes related to differences in lifestyle and lifestyle change intentions among participants: 1) *initial influence on lifestyle behaviors*, where participants mentioned to directly have adapted health behaviors due to their heart attack, 2) *influence on lifestyle intentions*, where willingness to change health behaviors was expressed but not yet acted upon, and 3) *no initial influence on intentions and behaviors*, where no such effects were noted. Participants varied in their intentions and behaviors across distinct behaviors; someone may be inclined to alter one behavior and not be as willing to change another. For instance, Amanda improved her diet by reducing snacking (theme 1), was additionally motivated to reduce her stress (theme 2), but did not feel compelled to enhance PA (theme 3). Moreover, most former smokers (James -occasional smoker-, Martin, David, and Emma) abruptly quit smoking yet did not consider improving dietary habits.

Table 1
Demographic and lifestyle characteristics.

Name	Sex	Age	Level of education	Relation status
1. James	Male	60	Middle	Married
2. Martin	Male	81	Lower	Married
3. Amanda	Female	66	Middle	Cohabitation
4. Thomas	Male	–	Lower	Married
5. John	Male	68	Higher	Married
6. Hester	Female	53	Middle	Single
7. Eric	Male	61	Higher	Married
8. Ian	Male	66	Middle	Single
9. Peter	Male	58	Higher	Married
10. Shivani	Female	–	Middle	Married
11. David	Male	65	Higher	Married
12. Emma	Female	59	Middle	Married
13. Harry	Male	57	Lower	Relation
14. Steven	Male	64	Lower	Married

Note. All cardiac patients experienced an MI. Names are replaced with pseudonyms. Level of education was classified according to the International Standard Classification of Education (ISCED, 2011) into lower education (none, elementary or vocational education), middle education (higher general and secondary vocational education), or higher education (higher professional and academic education).

Considering at T2, the analysis also revealed three themes related to differences in lifestyle change intentions among patients. The first theme was 1) *teachable moment for lifestyle intention and change*. With the exception of John, all participants were motivated to change or adopt certain healthier behaviors in the months following their event. Within them, a TM was thus experienced for one or more particular health behaviors. For some, the MI acted as a wake-up call regarding the urgent need to adopt risk-reducing health behaviors. Consequently, Thomas, Eric, Peter, and Steven stated that they took a positive view on their MI. Perceiving the event as a warning, they felt that they had received a second chance in life and were therefore motivated to take action regarding their health behaviors, as illustrated by Steven's comment:

> [Steven, T2: Maybe it was all for the good, otherwise things might have ended badly. If you've reached a certain age and maybe have much poorer general health. It's like I am probably still in the prime of life and then you can cope, isn't it great that you get a second chance?]

The second theme was *discrepancy between contemplating change and actively pursuing change,* indicating that an initial willingness to adopt a healthier behavior at T1 was no longer pursued at T2. James, Amanda, John, Hester, Ian, Shivani, Emma, and Steven were initially thinking about changing certain health behaviors, however, these intentions did not translate into active engagement with these behaviors at T2.

The third theme was *maintaining former (unhealthy) behavioral habits*, in which no impact of the MI on behaviors and behavioral intentions was noted. Most participants had such behaviors which they continued following their diagnosis. This is not necessarily negative, as it could reflect pre-existing healthy habits such as Amanda's active lifestyle prior to her MI. Only a minority of participants implemented only minor or no behavioral changes after being hospitalized at T1; John demonstrated a slightly increased awareness of the importance of exercise, James quit smoking the occasional cigar and contemplated becoming more physically active, and Ian professed an increased awareness of the importance of healthy eating. Nonetheless, they all retained former behavioral routines in all other lifestyle aspects.

3.2. Change trajectories in lifestyle change

Certain favorable lifestyle changes were adopted immediately following hospital discharge, such as Thomas's decision to immediately improve his diet:

> [Thomas, T1: Food, yes, I did adapt that immediately because I have a sweet tooth.]

In contrast, James, Ian, Eric, Ian, and Steven only began to adopt healthier behaviors later in their trajectory. Participants could change in their intention and change of a health behavior along their trajectory from T1 to T2. For instance, despite Ian's disinterest in healthier eating at T1, he had reduced snacking behavior at T2:

> [Ian, T2: Initially, I admit that I thought, "why", but I do believe that, partially, umm … that bowl of peanuts isn't there anymore in the evening, you know, next to the TV.]

This example demonstrates how cardiac patients undergo a change trajectory in lifestyle changes between the two interview moments. Similar trajectories of change were evident across different behaviors. For instance, Amanda initially altered her diet at T1, but by T2, she felt that changing her behavior was not worth the effort as healthier eating made her feel "less like herself". Conversely, Eric and Ian, who had not considered their diet at T1, incorporated dietary changes at T2. Similar regarding stress, the influence of the MI on stress reduction was immediately visible in Eric, Shivani, and Steven. However, Amanda, Hester, and Peter needed longer to implement changes in their stress management. Progress in PA behavior seemed more gradual, with minimal adaptions noted at T1, but most participants had increased their PA at T2. Notably, those uninterested at T1 in improving PA maintained their inaction at T2. In terms of alcohol consumption, apart from John and David, no other participants consumed alcohol around T1. However, at T2, some resumed their alcohol intake albeit in moderation compared to before their MI. Smoking cessation predominantly occurred immediately after hospitalization, as shown by Martin's comment below. Moreover, it remained relatively stable, as most former smokers (James, Martin, David, and Emma) maintained their abstinence from tobacco at T2.

> [Martin, T1: After that I completely stopped with roll-ups, haven't had a single one. Completely stopped.]

3.3. Psychosocial sensemaking processes

In this section, we elaborate on the psychosocial sensemaking processes associated with variations in lifestyle change and lifestyle change intention at T2. As psychosocial themes did not differ substantially at T1 and T2, the processes were prominent on both time points unless otherwise stated.

3.3.1. Teachable moment for lifestyle intention and change

Fig. 1 shows all processes of sensemaking related to experiencing a TM for lifestyle intention and change. In the figure, we depict inter-theme pathways as themes have an interrelated impact on instigating lifestyle change intentions, with evident relationships between themes. An example of a pathway is illustrated by Peter's narrative (below); triggered by looking at his physical appearance, his emotions (affective impact) had initiated a cognitive process in which he no longer considered his current body a reflection of his true identity (re-evaluation of self), a reconsideration that was reinforced by his brother's emotional comments (affective impact).

> [Peter, T1: Yes, it really was a shock, but are you surprised that this is happening to you. And then you see your own body and I think okay, this is not how I want to appear anymore.[…] And he [Peter's brother] had said oh, I hope I don't lose my dear brother who has always been an example to me. Yes, I don't see it that way at all, but he is younger than me and well, then I do have to cry. […] his words have always stuck with me.]

3.3.1.1. Perceived vulnerability and attentive self-care. The figure firstly shows perceived vulnerability and attentive self-care as a process related to experiencing a TM. Martin, Amanda, Thomas, Eric, David, Emma, and Steven experienced feelings of intense vulnerability and an acute perception of themselves as (mortal) human beings, accompanied by feelings of susceptibility to other lifestyle-related illnesses. This realization prompted a heightened sense of urgency for health protective health behavior, as Emma conveyed:

> [Emma, T2: You don't really expect it. Of course you some inkling but then.. you just fail to take it into account. And I know now I really have to think about it more, because it could happen to me anytime, that's been proven]

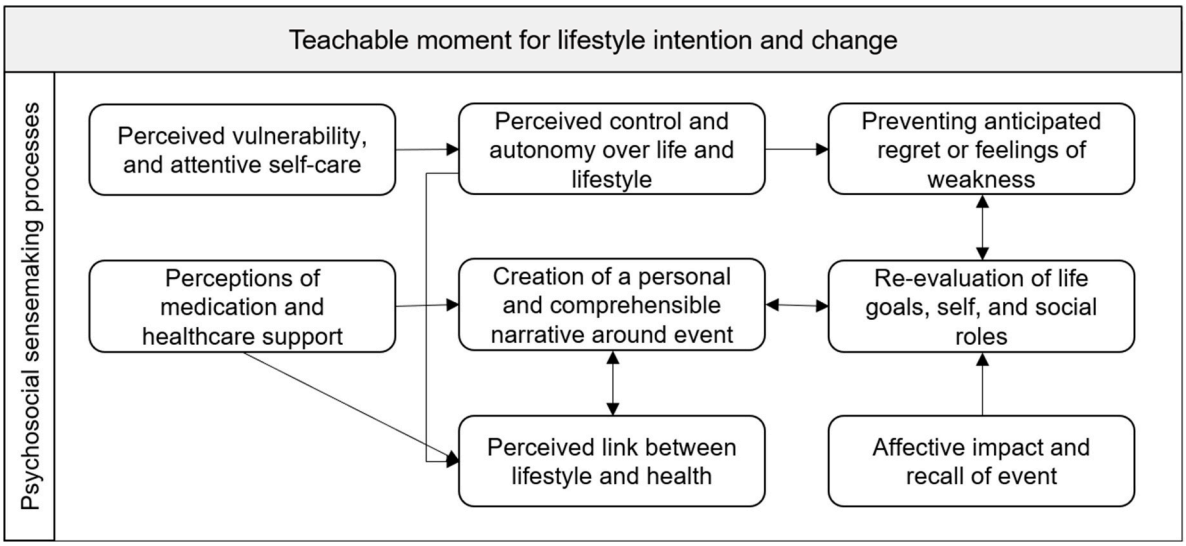

Fig. 1. Themes and inter-theme pathways within a teachable moment for lifestyle intention and change following a myocardial infarction.
Note. This figure presents a schematic overview of the emergent psychosocial sensemaking processes related to the theme 'teachable moments for lifestyle intention and change', as well as how these processes are interrelated. It is important to note that this figure does not indicate the relative importance or sequence of the processes, as the current study does not provide evidence on these aspects.

Thus, perceptions towards the notion that "illnesses could happen to me" shifted amongst most participants, and Martin, Amanda, Hester, Shivani, and Emma were particularly worried about their cardiovascular and general health. For Hester, these worries resulted in an avoidant coping mechanism, in which she tried to avoid thinking about her heart attack and its possible consequences for her life. In others, however, these concerns motivated participants to take better care of their health and fitness, as explained by Shivani:

> [Interviewer, T2: What are you most worried about then? Shivani: About my body, about myself, and yes, I still have so much to enjoy and so much to do, then I think, yes, you to want to keep doing those things at least for a while, etc., so now I do try to be a bit more careful with myself.]

Martin, Amanda, Eric, Peter, Shivani, and Harry additionally described a sudden realization of the finiteness of life. Consequently, this awareness made them willing to take the necessary measures to increase their chances of living a longer, healthier life:

> [Martin, T1: You think, okay just a little bit further really. Interviewer: And how does that relate to smoking? Martin: Well, I hope that this [quitted smoking] will let things carry on a bit longer, of course.]

Post-diagnosis, some participants experienced physical consequences such as fatigue (e.g. James, Amanda, Shivani, David, and Steven). These consequences acted as a constant reminder of their status as cardiac patients and increased awareness of certain necessary precautions. Shivani, Eric, David, and Steven specifically mentioned that they responded to perceived bodily needs by taking better care of themselves when physical symptoms were noticeable. This form of attentive self-care is illustrated by Shivani:

> [Shivani, T1: Well, my body, I've always been used to doing anything and keeping at it, and I can't do that now. I can't manage it, I can do everything but at a certain point I really have to stop because I feel that I can't carry on.]

3.3.1.2. Perceived control and autonomy over life and lifestyle. Realizing their vulnerability, certain patients feared losing autonomy over their health and lives in the future. James, Martin, Ian, and David expressed such concerns about losing control over their lives, body, or selves. Their diagnosis raised worries about a declining physical condition, which were closely connected to concerns about reduced autonomy. Consequently, they were compelled to live healthier to preserve future autonomy, associating good physical condition as crucial:

> [David, T2: Well, to get a good level of fitness, I already said it there [CR], because they asked. At least to get my fitness back so that I can, if I have to, walk to the center of town or whatever.]

David, Harry, and Steven regarded their behavioral changes as relatively effortless, demonstrating a higher self-efficacy:

> [David, T2: The only change I've made and that's to quit smoking and [to take up] exercise; really, I don't think that's such a change.]

This high level of confidence reinforced their perceived ability to adhere to behavioral recommendations. The integration of healthier behaviors into participants' lives during the first months after the hospitalization facilitated a sense of mastery in the case of Eric, Ian, Peter, and Steven. As a result of the experience of being able to live a healthy life, at T2 they felt increasingly confident regarding their ability to continue healthier behaviors:

> [Peter, T2: and I've also now realized that if you just change a few things, you can lose a couple of kilos really fast. That if I can just get above a certain limit, just be super strict for a few weeks, then it'll all be fine again.]

3.3.1.3. Preventing anticipated regret or feelings of weakness. As depictured in the figure, feelings of personal control on behaviors and future autonomy influence the concept of anticipated regret, because such perceptions of control shape how someone may feel after performing an unhealthy behavior. Certain participants were driven to avoid feelings of anticipated regret or weakness due to the continuation of unhealthy behaviors. For example, a wish to avoid personal blame for future health problems motivated John to continue PA, Martin to quit smoking, Peter, Harry, and Ian to follow a healthier diet, and Ian to consume less alcohol and participate in CR so as to become more active, as illustrated below:

> [Ian, T2; I also started drinking my wine a little less. So that they can't tell me later like, you see, I told you so.]

Both Thomas and Harry explicitly regarded failure to adhere to lifestyle recommendations as a character trait of the weak. Accordingly, they were strongly motivated to avoid engaging in unhealthy behaviors:

> [Thomas, T1: I would see that as very weak. That people give up, by smoking or whatever, no, just stop with things like that. I'm not some wimp.]

3.3.1.4. Re-evaluation of life goals, self, and social roles. Experiencing an MI triggered patients to reflect on what they deemed important in life, where their priorities lay and what they essentially valued in life. Consequently, the investment of time or resources underwent substantial adaptation. Eric, Peter, and Steven, for example, became more vigilant concerning their work-life balance when they realized that they had become detached from life and family due to responsibilities at work. A shift in priorities occurred, moving the focus from career to family, as illustrated by Peter:

> [Peter, T2: Well, I think that's what a heart attack is about, that it makes you see the world in a different way, it also forces you to think about what is really precious to you, what is important. And then of course your family and relatives come first more[…]. And work, that becomes something, just a social responsibility, just a way to earn money.]

Peter especially felt that his heart attack had led him to critically reflect on his self-concept prior to the MI, leading to a perceived incongruence between his former self and his real, desired self. This resulted in a strong sense of dissatisfaction regarding his self and appearance prior to the MI, motivating him to optimize his health behaviors in order to make live in more congruence with his real, desired self:

> [Peter, T1: I remember at a certain point I was allowed to take a shower for the first time and I saw myself in the mirror and I thought, no, this isn't you, with a bit of belly and looking very tired. This isn't you, this is not who you want to be. And I just decided then and there that I was going to immediately lose weight.]

Experiencing an MI also changed identities and social roles. For example, Martin, Thomas, and Peter adopted a heart patient identity and accepted the lifestyle restrictions that accompany that role. In addition, the importance of specific social roles was re-evaluated primarily by Thomas, Eric, Peter, and Steven. Eric, Peter, and Steven began to consider their social role as an employee much less important as their social role as a loved one (i.e. partner, parent, or friend), as illustrated below by Eric.

> [Eric, T1: this event makes you make choices as to what really matters. And as much as I like work, in the end life is about that [social] circle, that's where your real foundation is.]

This process of reflection on social roles was an important driver of lifestyle change, as it provided motivation to ensure that certain social roles were fulfilled for as long as possible. Furthermore, it impacted

anticipated regret, as continued unhealthy behaviors evoked anticipated remorse toward the social environment for burden them with preventable health issues and not ensuring maximum time together.

3.3.1.5. Creation of a personal and comprehensible narrative around the event. All participants reflected on the period of time before and after their MI, linking the event to behavioral causes and consequences, in an effort to create a more personal and comprehensible narrative. Martin, Amanda, Thomas, Eric, Peter, David, and Steven created a comprehensible narrative for themselves that helped them to accept the necessity of behavioral adaptations. For example, Peter described below how he felt that it was actually "logical" that he stopped consuming alcohol. When social roles were re-evaluated and new priorities in life are accompanied by behavioral changes required to achieve them, patients seemed more motivated to adhere to these changes.

> [Peter, T1: I don't know if it is an achievement [stopped drinking alcohol], I don't think so, it's perfectly rational and obvious to me actually. And I think that that of course makes you start to think about your past]

3.3.1.6. Perceived link between lifestyle and health. Comprehending the narrative could instigate a TM when a direct link to lifestyle was recognized. Martin, Amanda, Ian, Peter, Shivani, David, and Steven all believed that their cardiac problems were influenced by lifestyle behaviors. The causal attribution of their cardiovascular problems to unhealthy behaviors shaped an informed desire to change the behaviors. For instance, Martin stated that he only maintained smoking abstinence because he directly attributed his MI to tobacco use:

> [Martin, T2: If they say tomorrow that smoking has nothing at all to do with it, I'll start smoking again tomorrow, yes. But of course, I have smoked for 60 years, so there must be something wrong somewhere, with the veins.]

Martin, Amanda, Thomas, Peter, and Harry were generally confident in their internal locus of control concerning regulation of their cardiovascular health. A high level of personal control reinforced participants' motivation to making a link to desired lifestyle behaviors, as illustrated by Thomas:

> [Thomas, T1: Yes, it's up to you. You're the one who has to do it. Try to be smart. And I suppose that most people who get this [CVD] are adults. You can still have it and grow old. Fine. That's how we're going to handle it.]

Interestingly, participants tended to focus on wanting to change the health behavior to which they attributed their cardiovascular problems. This was almost solely tobacco use in the case of former smokers. Hester, the only smoker to attribute her MI to stress rather than smoking, continued to smoke after her diagnosis:

> [Hester, T1: But I'm also convinced that the stress I've had in my life has been worse than all those cigarettes. Because I'm always stressed. Always. My entire life.]

Amanda, Hester, Peter, Shivani, Emma, and Steven attributed their cardiac problems to stress. Consequently, they perceived their cardiac event as a TM to prioritize relaxation and stress reduction. The extent to which participants considered stress management as their responsibility, rather than a result of external factors, influenced their intentions. For example, initially, Amanda attributed her stress to be the outcome of a demanding working situation. However, by T2, after participation in coaching sessions, she had learned that she could take individual action to address her maladaptive response to stressors:

> [Amanda, T2: So just like work, that's the cause of the stress these last 3 years. But no, I know I could have reacted differently myself, I recognize that now, but I didn't. […] So, and that's the lesson I've learned]

While Ian also attributed his cardiac event to stress, he did not believe that reducing his stress levels was feasible, considering it as an unchangeable aspect that he had experienced his entire life. Consequently, he took no action in this direction and did not feel any guilt, as he was not aware of the role he could play in making changes.

> [Ian, T2: okay, but how are you supposed to do that [reduce stress]? Look, if I solve that problem today, tomorrow I'll have found something else, it's just how I am.]

3.3.1.7. Perceptions of medication and healthcare support. Beyond healthcare professionals' roles in emphasizing the importance of behavioral changes by supporting patients to create a personal narrative and by linking health to lifestyle, patient perspectives on medication and healthcare support also shape the occurrence of TMs. Amanda, Thomas, and Harry saw medication use as symptom control rather than using it to battle potential causes of cardiovascular problems. Together with an overall negative attitude towards medication, this belief fostered an urge to adopt dietary changes beneficial in controlling cardiovascular risk factors. For example, Amanda explains below her ambivalence regarding the consumption of unhealthy foods that could increase her cholesterol level while simultaneously using medication to decrease it:

> [Amanda, T1: because I think it's weird to just, you know, high cholesterol? Okay then, I'm going to take those pills, no problem, and meanwhile eat crisps that raise my cholesterol. That's obviously really stupid.]

Most participants were generally positive concerning support received from healthcare professionals. Below, Martin specifically mentions that he maintained his abstinence from smoking because of he felt obligated to do so towards the healthcare professionals who treated him. However, this seemed mostly to be of influence sooner after hospitalization, as no such feelings were expressed at T2.

> [Martin, T1: well, I think I would come across as a bit ungrateful, when you've just had a heart operation and then you just keep puffing away. And then they all try to keep you in line and help you get healthy again[…] Well, then you're definitely obliged to quit, of course. You can't just keep on puffing away regardless. Not me in any case.]

John, on the other hand, repeatedly demonstrated his dissatisfaction with healthcare in general. Recent and earlier occurrences during hospitalization had fostered suspicion towards the advice of healthcare professionals, causing him to become less receptive.

Additional important healthcare-related themes that impacted participant's lifestyle change intentions include a facilitating role of received lifestyle information, a reluctance and selectivity concerning lifestyle advice, and a need for specific anchors related to the impact of behavioral change on health indicators, as illustrated by Amanda below.

> [Amanda, T1: Those pills will definitely lower your cholesterol. As for all that exercise, as I already said, how often have I got to jump around to lower that cholesterol? 100 times? 10 times?]

3.3.1.8. Affective impact and recall of event. Martin, Hester, Shivani, and Emma vividly recalled their event and expressed negative emotions such as sadness and fear in the narrative of their event. Experiencing the event as affectively impactful reminded them to take good care of their cardiovascular health to prevent the occurrence of another event.

> [Emma, T2: also when I feel it [chest pressure] I still find it pretty scary. Yeah, you don't want to end up lying there again, do you? No, so then you know what it's all for, don't you?]

Thomas, Eric, Peter, and Steven felt positively affected by the aftermath of their event and generally described feelings of gratitude concerning the support received from their social network or concerning the opportunity for a second chance in life. These positive emotions motivated health behavior change, as explained by Peter:

> [Peter, T1: in my case gratitude is now the main feeling, that I'm still here and that I'm still there for my family, for my friends […] I also understand, of course, that's also the reason we're sitting here, that I have to take steps to start changing things in my life.]

Martin, Thomas, Eric, Peter, and Shivani were very affected by the notion of worry and fear amongst their loved ones, mostly their spouses. Martin and Thomas even described the experience of their partners' emotions as the most salient image relating to their cardiac event. They were consequently determined to live healthier lives in order to prevent their partner witnessing another cardiac event, as illustrated by Thomas:

> [Thomas, T1: I think I was most affected by my wife's emotions. Because she was, though now a bit less, really terrified. To lose me […]. Then you're standing at a counter selling all kinds of delicious things, and then I tell myself, get a grip, don't give in! […] Why would you take the risk, you just don't want to do that to your partner.]

Nonetheless, an event did not necessarily have to be experienced as emotionally impactful in order to trigger a TM. David and Ian regarded their event as neither emotional nor impactful, yet both made substantial changes to their health behaviors. This is additional evidence that multiple processes of sensemaking can instigate a TM. For example, below Ian explains his intention to nevertheless pursue a healthier diet in order to prevent a subsequent MI that might be more serious:

> [Ian, T2: But I actually look back positively on that heart attack. Didn't cause any real problems at all, yes except for those 2 hours then. You know, then you think okay, it most likely had nothing to do with food, but [knock on wood], the second time it's over.]

3.3.2. *Discrepancy between contemplating change and actively pursuing change*

This section will elaborate on the processes important in shifting from contemplating change at T1 to no longer actively pursuing change at T2.

3.3.2.1. Belief: full recovery of health after surgery. By T2, Thomas, John, Ian and Harry all believed that they had fully recovered their cardiovascular health. While John refused all lifestyle changes, and Thomas maintained his adherence to self-imposed behavioral changes at T2, Ian and Harry struggled to remain motivated to live a healthy life at T2 compared to T1. Their belief in personal recovery seemed to lower their perceived need to continue living a healthy life. Below Ian describes how this belief was further strengthened by physical assessments at the hospital:

> [Interviewer, T2: And then what happened? And now? Ian, T2: 100% in physical shape. I did that bike test and I was on it and they are like "Sir, that's really great".]

3.3.2.2. Positive attitude towards unhealthy behavior or negative attitude towards healthy behavior. Differences in attitudes towards certain unhealthy and healthy behaviors seemed to affect the participants' perceived ability and willingness to perform or omit them. Eric and Peter, for example, found pleasure in PA during CR, which fostered their decision to continue exercising afterwards. Conversely, Martin, Amanda, and John expressed an aversion to healthy eating, as evident in Martin's referral to it as "nonsense". Although they all seemed motivated at T1 concerning healthier eating, they were not able to keep this motivation and had almost completely returned to their usual dietary habits at T2.

> [Martin, T2: I've never liked eating a lot of vegetables. I: Because you don't like the taste, or? P: I really don't need it actually, all that nonsense. I'll eat it, but isn't that I [like it].]

A similar phenomenon was evident among participants with positive attitudes towards unhealthy, undesirable behavior, often involving alcohol and unhealthy foods. Ian, David, Harry, and Steven enjoyed alcohol intake, considering it as valuable in their social life. In addition, Amanda, Ian, Emma, and David realized that they preferred unhealthy foods, such as sweets and snacks, to the extent that omitting these behaviors was not worth the benefit. This is illustrated by Amanda:

> [Amanda, T2: yes, now I am a bit different when I see all those sweets. In the beginning you are really strict and then comes that moment again of "I don't want to be 100" and that also makes sense, you know. Rather 85 and a nice life.]

3.3.2.3. Identity mismatch in relation to healthy behaviors. Beyond merely holding a negative attitude towards healthier behaviors, Amanda, Hester, Ian, Shivani, and David even experienced a mismatch between those healthier behaviors and their personal identities and values in life. They realized at T2 that they considered certain unhealthier behaviors (i.e. most often smoking, eating snacks or drinking alcohol) particularly valuable for their identity and social life. This process of sensemaking contributed to discrepancies in lifestyle intentions between T1 and T2, as changing behaviors closely tied to one's identity seemed to be challenging to adhere to. For instance, David's motivation to lose weight was evident at T1, yet by T2, he realized that freely drinking alcohol and eating was fundamental to his social activities:

> [David, T1: No, I just feel that, it's [the weight] all wrong, it's not supposed to be here, I just notice that it bothers me and it just needs to come off now.]

> [David, T2: Yes, we can spend evenings, hours at the table, but eating normally, not eating mountains of food. […] Then I just do as everybody else does, yet, but do I have to change my life that much then that I'm not allowed to drink a single beer?]

Similarly, Amanda initially expressed a wish to control her snacking behavior. However, by T2, she stated that her personal and social identity depended on "social eating" and she strongly associated the consumption of snacks and sweet foods with socializing.

> [Amanda, T2: sweet has something cozy and delicious. So yes that fits me, I am [a] cozy [person].]

Consequently, she eased her self-imposed restrictions, gravitating towards behaviors more congruent with her identity. However, she was still trying to find a new balance by implementing minor changes to her dietary behavior concordant with her identity, for instance illustrated below:

> [Amanda, T2: Yesterday you're playing a board game and then there is all this cheese and fig bread placed in front of you. And as happened for example yesterday, it was a conscious decision to eat most of the strawberries.]

3.3.2.4. Cognitive dissonance. John, Amanda, and Peter faced conflicting thoughts about balancing a return to normal life and protecting their health. At T1, they believed in the role of a specific risk behavior in their cardiovascular condition and were motivated to change it. However, by T2, they had often resumed former activities that interfered with their behavioral goals, leading for them to change the perceptions of the risks of the specific behaviors. A process of cognitive dissonance aimed at

reducing tension between health goals and life activities seemed to have occurred in these participants, as illustrated by Peter:

> [Interviewer, T2: The last time you already mentioned stress in your life as the most important cause, wasn't it? Peter, T2: Well, maybe I did mention that last time. Could be. I've changed my mind a bit since, because although I do think that the stress is really important, but I was very focused on it at the time, […] I mean, when I'm working now everyone says "Take it easy", and then I say okay, but hard work really isn't a problem for me.]

3.3.3. Maintaining former (unhealthy) behavioral habits

The following section elaborates on processes of sensemaking related to the immediate continuation of former healthy or unhealthy behavioral habits.

3.3.3.1. Perceiving lifestyle or behaviors as fine as is; no necessity to change. Some participants were convinced that they already lived a healthy lifestyle prior to their hospitalization. James, John, and Ian considered their overall lifestyles to be relatively healthy, Hester and Shivani regarded their eating behavior as already healthy, and Amanda, Ian, and Harry perceived their exercise behavior sufficient. Consequently, these participants did not perceive a need or feel any urgency to optimize behaviors that they already considered healthy, as illustrated by Ian:

> [Ian, T1: because I cycle a lot and I walk for hours, I'll walk for 2 hours, I'll go to [town] and then go via [town] to [town] and then I'll come all the way back again. Almost every morning when the weather is a bit like today and there's no wind, then I'll go on my racing bike. Okay, I do have a bit of a belly, but I actually have very good physical fitness, perfect in fact.]

There were some indications of misconceptions in this matter. For example, when Hester described her diet, she included some evidently unhealthy food habits. In addition, the quote below shows that John was unaware of the unhealthiness of take-away meals:

> [John, T1: if you just eat normally, it's healthy, right? You know, a nice Chinese or Greek? But hey, that's not really unhealthy. It's a grilled chicken or it's that grilled stuff. No, I don't think that's bad for you.]

3.3.3.2. Compensatory health beliefs. A tendency to form compensatory health beliefs, indicating self-justification of certain unhealthy behavioral habits by emphasizing healthier ones, was evident in some participants who maintained unhealthy behaviors. Smoking cessation offered a striking example of this phenomenon. Martin, John, and Emma successfully quit smoking, and they used this achievement to justify not adopting healthier alcohol or dietary behaviors for themselves. Additionally, John, Ian, Harry, and Emma did not experience feelings of guilt during unhealthy behaviors, presumably due to simultaneous engagement in healthier actions, as illustrated by Ian:

> [Ian, T1: Look, I eat unhealthily you know, but I also eat very healthy food. Look, sometimes I don't feel like cooking, then I'll get some fries at that Turk's [place]. But then I'll also get a bowl of salad, and then eat that too.]

3.3.3.3. Downplaying the life event. John, Ian, David, and Harry failed to acknowledge the severity of their MI and experienced little affective impact in the aftermath of hospitalization. Although they were aware that an MI had occurred, they felt that the event itself lay in the past and would not affect their future. This downplaying of the impact of a cardiac event, as exemplified below, seemed to hinder the process of sensemaking, which is important in inducing a TM.

> [Ian,T1: well you, your daughters are crying and I'm saying there's nothing wrong, because I'm already laughing in that bed. Yes, I'm saying nothing at all is wrong here, it's done]

3.3.3.4. Previous significant life events. Some participants regarded other early life events as more salient than their cardiac event. Specifically, James, John, Hester, and Ian previously experienced multiple important life events, such as earlier diagnoses of illness (all), illnesses of family members (John, Hester, and Ian), or a history of abuse (Hester). Experiencing multiple earlier life events seemed to elicit more blunted emotional and cognitive responses towards the cardiac event itself. The experience of multiple significant life events therefore seemed to hinder the process of sensemaking and lowered the TM effect of the cardiac event, as illustrated by John:

> [John, T1: I can imagine that someone who has never had any problems will have a hard time dealing with it, or when it's the first time you've had anything like this. But I've had back surgery, and twice for my neck hernia, so those are also things that cause some panic of course]

3.3.3.5. Reduced interoceptive awareness. Comments by John and Ian appeared to signal reduced interoceptive awareness, suggesting that they responded poorly to otherwise alarming physical signals, as illustrated by Ian's quote below. This in turn affected their cognitive-affective sensemaking, because a poorer perception of physical signals seemed to relate to a lower perceived severity of their illness.

> [Ian, T2: And then a nurse comes rushing in who says "Haven't you noticed, your heart is racing"; then I say "I don't feel a thing".]

4. Discussion

A significant life event such as an MI may have a major impact on a person's life and lifestyle, although each patient generally experiences an event in a unique way (Bremer et al., 2019; Andersson and Stanich, 1996). The aim of this study was to explore whether an MI could act as a TM, and to in-depth explore which sensemaking processes played a role on lifestyle change. We conducted the study using IPA, which is characterized by an interpretative exploration of a case-by-case process of sensemaking of an experience (Pietkiewicz and Smith, 2014). We found that experiencing an MI often elicited a need within patients to make sense of what had happened. As a consequence, most participants developed more positive attitudes towards a healthy lifestyle and even implemented positive lifestyle changes. The impact of the MI on lifestyle seemed to be an ongoing process, consisting of multiple situations causing processes of reflection and sensemaking within patients. Therefore, we consider 'teachable window' (TW) as a more appropriate term than 'teachable moment'. While patients varied in how they made sense of their MI, several common processes of sensemaking that seemed important for experiencing a TW were observed in multiple patients. These included perceiving a connection between lifestyle and health, consciousness of one's own vulnerability should unhealthy behaviors continue, a wish to regain autonomy and control over one's own life, one's own or loved one's emotional experiences, and reflecting on one's identity in relation to health behaviors.

4.1. Comparison with previous studies and explanation of findings

Understanding potential TWs is important as previous studies have shown that life events can motivate people to change ingrained lifestyle habits (Kwasnicka et al., 2016; Kenter et al., 2015). Moreover, lifestyle modifications that are triggered by life events are known to induce particularly sustainable behavioral changes (Kwasnicka et al., 2016). Individuals that experience important life events are more likely to

engage in self-reflection, which may in turn trigger a desire to further develop oneself in a positive way (Nicolai et al., 2018; Biasin and Evans, 2019). Our findings complement a growing body of literature that considers a cardiac event as a turning point towards healthier lifestyle behaviors (Coull and Pugh, 2021; Nicolai et al., 2018; Ketilsdottir et al., 2014; Bremer et al., 2009). We found that lifestyle changes may be not directly instigated by the MI, but are rather the consequence of a continuous process of sensemaking over a longer period of time after hospital discharge. This has also been established in previous studies and reflects a more universal view of a turning point as a gradual process rather than a single moment (Nicolai et al., 2018; Bidart, 2019).

For some patients, the experience of an MI induced a clear TW towards adopting healthier behaviors, whilst others showed more avoidant coping behaviors. That psychosocial sensemaking plays an important role in this divergence was also evident in other studies of cardiac events, where relatable psychosocial themes were identified. These themes may therefore be important in TW mechanisms. For example, previous studies emphasized the importance of causal beliefs linking lifestyle and cardiac health, as well as outcome expectations (Nicolai et al., 2018; Blanchard et al., 2015; Astin et al., 2014). In addition, Bremer et al. (2019) reported that feelings of security changed after experiencing a cardiac arrest, often accompanied by emotional distress. Similar themes also emerged in our study regarding an increased perception of vulnerability, health worries, and the perceived finiteness of life. A confrontation with the finiteness of life can cause people to change their approach on life and adopt different attitudes and motivation related to certain life activities (Bremer et al., 2009). Also, in line with previous research (Coull and Pugh, 2021; Nicolai et al., 2018), our findings underscored that experiencing physiological benefits of lifestyle changes seemed to enhance patient commitment to maintain to the changes. This is likely tied to interoception mechanism or the ability to process afferent bodily signals (Craig, 2002). A higher interoceptive sensitivity has been linked to engaging in beneficial health behaviors such as PA(Machado et al., 2019), whereas lower interoceptive sensitivity has been associated with unfavorable behaviors, like smoking (Hina and Aspell, 2019). Our finding that attitude towards medication was important was also similar to the findings of previous research, for instance demonstrated by a clear preference for lifestyle change over medication use (Jarbøl et al., 2017). Moreover, Lönnberg et al. (2020) found that a wish to avoid medication encouraged taking the health behavior necessary to control cardiovascular health. Earlier studies also emphasized the influential roles of family, friends, and healthcare professionals in cardiac patients' lifestyle changes, offering direct support, enabling behavior change, or providing motivation (Nicolai et al., 2018; Astin et al., 2014; Dilla et al., 2020), a theme recurrent in the present study.

Reflecting on one's self-concept, identity, and social roles was found to be an important sensemaking process within experiencing a TW. These concepts have previously considered as important mechanisms of behavioral change. As they cause individuals to reflect on their priorities, significant life events such as acute cardiac events may often be accompanied by a re-evaluation of social roles (Slotter et al., 2017). In our sample, this was driven by a confrontation with the emotions of patients' loved ones after their MI, which increased their awareness of the social roles they wished to fulfill. Life events can additionally trigger a reappraisal of aspects of identity and self-concept (Kwasnicka et al., 2016; Kenter et al., 2015; Kearney and O'Sullivan, 2003), the latter referring to the belief that someone has about oneself or one's position in a wider social context (Gecas, 1982). We found that an MI can cause patients to look at themselves differently and reconsider their sense of vulnerability. This transition often entailed a shift towards greater perceived accountability for personal health. This transformation was closely tied with gratitude and anticipated regret, as patients did not want to take their "second chance" for granted. Another important factor is identity, as we found that health behaviors that did not correspond with a patient's self-identity seemed to be more difficult to pursuit. A higher likelihood of pursue of behavior that is consistent with one's identity was also emphasized by Jin et al. (Jin and Roumell, 2021) and Rhodes et al. (2016).

Next to perceiving an inconsistency between a health behavior and someone's identity, we also encountered other adverse processes that seemed to hinder the experience of a TW after a cardiac event. Our findings align with those of Nicolai et al. (2018), who also found that a perceived lack of necessity for behavioral change hindered cardiac patients' adherence to recommendations. In our study, some participants believed that they have completely recovered in health, which further reduced their perceived necessity of a healthy lifestyle. Nonetheless, it is also possible that these participants only claimed full recovery as a coping mechanism to avoid anticipated regret over not changing behaviors or to mask fear of losing control over their illness. Falun et al. (Fålun et al., 2016) encountered satisfaction with former behavioral habits as a barrier to lifestyle change after an MI. A similar theme emerged in our study. Other adverse processes that we encountered, such as cognitive dissonance regarding the discrepancy between lifestyle beliefs and current behaviors, highlight the importance of providing structural lifestyle support in cardiac healthcare, as health promotion interventions that attempt to lower cognitive dissonance are known to be effective in establishing sustainable behavior change (Freijy and Kothe, 2013).

4.2. Theoretical interpretations

Several themes encountered in our study align with the heuristic framework proposed by McBride et al. (2003). McBride's changed self-concept is similar to our theme "reflections about priorities, self, and social roles". We both recognize "affective impact" as a key determinant of a TM, and our themes "perceived link between lifestyle and health" and "perceived susceptibility, vulnerability, and health-related worry" are equivalent to McBride's concept of risk perception. However, these themes were far from exclusive and did not operate independently. For instance, our findings suggest that perceiving an affective impact of the MI may interrelate with reflections on one's priorities, self, and social roles, which is also previously established in literature (Flores Kanter et al., 2015; Zhang et al., 2022). The self-determination theory (SDT), often been applied to explain intrinsic motivation (Ryan and Deci, 2000; Nissen et al., 2018), is also consistent with some important themes we encountered. For example, the need for competence part of the SDT aligns with our theme "self-efficacy and perceived behavioral control", while the need for relatedness show similarities to our finding that a changed outlook on social roles was important for behavior change. Moreover, similar to the SDT, we found that feelings of autonomy in regaining control over one's life and health played an important role in making beneficial changes. We therefore believe that an extension of McBride's TM framework (Ferrer and Klein, 2015) would bring it a step closer to reality. Consequently, we have proposed a heuristic framework with themes and inter-theme pathways that may explain an MI-related TW. This framework will need to be further validated in future studies.

When we consider the time after a health event as a TW rather than a TM, McBride's heuristic framework (McBride et al., 2003) can also be integrated with principles of the Salutogenic model and, in particular, factors involved in Sense of Coherence (SOC) (Antonovsky, 1996). According to this model, having a strong SOC is a coping mechanism that supports maintenance of good health, aided by perceiving stressors in life as comprehensible, manageable, and meaningful (Antonovsky, 1996; Eriksson et al., 2007). Certain themes encountered in our study, such as "comprehending the narrative concerning the MI" and "re-evaluating one's priorities or self', show similarities to SOC. When patients are able to attribute a positive meaning to their MI, they can potentially achieve a SOC and have healthier coping mechanisms. Achieving a SOC may therefore be an important underlying explanation of how acute life events become TWs (Bremer et al., 2009). Our finding that earlier significant life events may impede a TW may be related to

the findings of Wolff et al. (Wolff and Ratner, 1999), who reported that recent traumatic life events negatively impact SOC.

4.3. Practical implications

Cardiac healthcare professionals can play an important role in supporting cardiac patients' lifestyle changes (Nicolai et al., 2018), especially during a TW. To make the most of this opportunity, it is important for healthcare professionals to be attuned to the processes of sensemaking described in this study, while also taking patient differences into account. One way to capitalize on a TW, based on our themes, is to encourage patients to reflect on their identity and goals in life, while supporting them in making connections to healthy behaviors that align with their values. Motivational interviewing techniques, with its principles closely related to the factors of the SDT(Markland and Ryan, 2005), can be particularly useful in encouraging patient autonomy regarding their personal goals (Rollnick et al., 2010). Moreover, it is essential to allow room for psychosocial consultation, where healthcare providers can discuss the impact of the MI on the patient's life and encourage the patient to construct a narrative around their MI, as the latter has been shown to support a process of greater self-awareness (Biasin and Evans, 2019). Physical training sessions can also provide an opportunity to form new cognitions about one's self and their one's identity as an exerciser or physically active person.

Importantly, as we observed that patients may experience a change trajectory regarding their motivation to live a healthy life, lifestyle counseling should not be confined to the hospital but should also continue and be targeted towards helping patients integrate healthy habits to their daily lives. As the transfer from hospital to home is frequently perceived as insecure by cardiac patients (Bremer et al., 2019; Ketilsdottir et al., 2014), there is a need to provide continuity of lifestyle support during the TW(Hanssen et al., 2005). Personalized eHealth application seem promising for this (Robinson et al., 2020). Finally, involving partners or family members throughout the rehabilitation phase may be a promising approach for promoting long-term success.

4.3.1. Methodological considerations and future perspectives

To the best of our knowledge, this is the first study using an IPA approach to explore a cardiac event as a potential TW. Our sample of 13 participants exceeded recommendations for IPA research (Noon, 2018). The ideographic focus of IPA((Pietkiewicz and Smith, 2014)) allowed us to obtain in-depth insights into the processes of sensemaking that were important for experiencing a TW in our sample. It should be noted that the interpretative nature of IPA((Smith, 2004)) means that the analysis of patients' interpretations may be shaped by the authors' prior knowledge of TMs. To reduce this influence we used inductive analysis as much as possible, as well as a second coder without such prior knowledge. The utilization of a convenience sample of interested patients and the lack of information of patients who declined to participate limit the generalizability of our findings. While generalizability is not a primary objective in IPA studies, we encourage scholars to explore the applicability of our findings to a broader range of cardiac patients, including those from diverse cultural backgrounds. Moreover, we encourage scholars to further explore cardiac events as TMs using IPA and longitudinal survey studies to empirically evaluate the predictive properties of our proposed heuristic framework on objective behavioral outcomes. Additionally, while our use of two interview points provided insights concerning lifestyle trajectories after hospital discharge, it is still not known whether patients achieved sustainable lifestyle changes that will persist for the remainder of their lives. Future research is needed to determine whether an MI-related TW can actually induce sustained behavioral habit formation and automatic behaviors in cardiac patients. Finally, we encourage other scholars to conduct fundamental and applied research on utilizing TWs, including the timing, context and practical implementation of personalized lifestyle support, taking into account the perspectives of the cardiac patient as well as the healthcare professional.

5. Conclusion

The findings of this study demonstrate that experiencing a TW after an important life event such as an MI is influenced by psychosocial contexts, thoughts, and cognitions, that interact and influence a person's intention to change their health behaviors. We encountered certain processes of sensemaking that may be important in explaining behavioral change after important life events. Given these findings, one may conclude that there is an important window of opportunity for providing lifestyle counseling after acute cardiac events or comparable chronic disease diagnoses. To maximize impact on behavioral change, it is important for cardiac healthcare providers to incorporate lifestyle consultations that connect to a patient's psychosocial sensemaking, over a longer period of time following an event.

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Michelle Brust: Conceptualization, Methodology, Formal analysis, Investigation, Writing – original draft, Visualization. **Winifred A. Gebhardt:** Conceptualization, Methodology, Formal analysis, Writing – review & editing, Supervision. **Sytske van Bruggen:** Formal analysis, Writing – review & editing. **Veronica Janssen:** Writing – review & editing. **Mattijs E. Numans:** Writing – review & editing, Supervision. **Jessica C. Kiefte-de Jong:** Conceptualization, Methodology, Formal analysis, Writing – review & editing, Supervision, Project administration, Funding acquisition.

Declaration of competing interest

None.

Data availability

Anonymized parts of data can be made available upon reasonable request.

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Appendix A. Supplementary data

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References

Abroug, H., El Hraiech, A., Mehrez, O., Ben Fredj, M., Zemni, I., Ben Salah, A., et al., 2020. Acute coronary syndrome: factors predicting smoking cessation. East. Mediterr. Health J. 26 (3), 315–322.

Andersson, L., Stanich, J., 1996. Life events and their impact on health attitudes and health behavior. Arch. Gerontol. Geriatr. 23 (2), 163–177.

Antonovsky, A., 1996. The salutogenic model as a theory to guide health promotion. Health Promot. Int. 11 (1), 11–18.

Astin, F., Horrocks, J., Closs, S.J., 2014. Managing lifestyle change to reduce coronary risk: a synthesis of qualitative research on peoples' experiences. BMC Cardiovasc. Disord. 14, 96.
Atkinson, L., Shaw, R.L., French, D.P., 2016. Is pregnancy a teachable moment for diet and physical activity behaviour change? An interpretative phenomenological analysis of the experiences of women during their first pregnancy. Br. J. Health Psychol. 21 (4), 842–858.
Becker, M.H., 1974. The health belief model and sick role behavior. Health Educ. Monogr. 2 (4), 409–419.
Biasin, C., Evans, K., 2019. Agency, identity and learning at turning points in women's lives. A comparative UK-Italian analysis. Eur. J. Res. Educ. Learn. Adult. 10 (1), 47–63.
Bidart, C., 2019. How plans change: anticipation, interferences and unpredictabilities. Adv. Life Course Res. 41, 100254.
Blanchard, C., Arthur, H., Gunn, E., 2015. Self-efficacy and outcome expectations in cardiac rehabilitation: associations with women's physical activity. Rehabil. Psychol. 60.
Bremer, A., Dahlberg, K., Sandman, L., 2009. To survive out-of-hospital cardiac arrest: a search for meaning and coherence. Qual. Health Res. 19 (3), 323–338.
Bremer, A., Dahné, T., Stureson, L., Årestedt, K., Thylén, I., 2019. Lived experiences of surviving in-hospital cardiac arrest. Scand. J. Caring Sci. 33 (1), 156–164.
Brinks, J., Fowler, A., Franklin, B.A., Dulai, J., 2017. Lifestyle modification in secondary prevention: beyond pharmacotherapy. Am. J. Lifestyle Med. 11 (2), 137–152.
Brust, M., Gebhardt, W.A., Numans, M.E., Kiefte-de Jong, J.C., 2021. The COVID-19 crisis as a teachable moment for lifestyle change in Dutch cardiovascular disease patients. Front. Psychol. 12, 678513.
Coull, A., Pugh, G., 2021. Maintaining physical activity following myocardial infarction: a qualitative study. BMC Cardiovasc. Disord. 21 (1), 105.
Craig, A.D., 2002. How do you feel? Interoception: the sense of the physiological condition of the body. Nat. Rev. Neurosci. 3 (8), 655–666.
De Smedt, D., Clays, E., Annemans, L., Boudrez, H., De Sutter, J., Doyle, F., et al., 2014. The association between self-reported lifestyle changes and health-related quality of life in coronary patients: the EUROASPIRE III survey. Eur. J. Prev. Cardiol. 21 (7), 796–805.
Deijle, I.A., Van Schaik, S.M., Van Wegen, E.E.H., Weinstein, H.C., Kwakkel, G., Van den Berg-Vos, R.M., 2017. Lifestyle interventions to prevent cardiovascular events after stroke and transient ischemic attack systematic review and meta-analysis. Stroke 48 (1), 174–+.
Dilla, D., Ian, J., Martin, J., Michelle, H., Felicity, A., 2020. "I don't do it for myself, I do it for them": a grounded theory study of South Asians' experiences of making lifestyle change after myocardial infarction. J. Clin. Nurs. 29 (19–20), 3687–3700.
Dimova, E.D., Swanson, V., Evans, J.M.M., 2020. Is diagnosis of type 2 diabetes a "teachable moment"? A qualitative study. Diabetes Res. Clin. Pract. 164, 108170.
Eriksson, M., Lindström, B., Lilja, J., 2007. A sense of coherence and health. Salutogenesis in a societal context: aland, a special case? J. Epidemiol. Community Health 61 (8), 684–688.
Fålun, N., Fridlund, B., Schaufel, M.A., Schei, E., Norekvål, T.M., 2016. Patients' goals, resources, and barriers to future change: a qualitative study of patient reflections at hospital discharge after myocardial infarction. Eur. J. Cardiovasc. Nurs. 15 (7), 495–503.
Ferrer, R., Klein, W.M., 2015. Risk perceptions and health behavior. Curr. Opin. Psychol. 5, 85–89.
Flores Kanter, P.E., Medrano, L., Conn, H., 2015. Emotion and Self-Concept.
Freijy, T., Kothe, E.J., 2013. Dissonance-based interventions for health behaviour change: a systematic review. Br. J. Health Psychol. 18 (2), 310–337.
Gardner, B., Rebar, A.L., 2019. Habit Formation and Behavior Change. Oxford University Press.
Gecas, V., 1982. The self-concept. Annu. Rev. Sociol. 1–33.
Hanoch, Y., Rolison, J., Freund, A.M., 2019. Reaping the benefits and avoiding the risks: unrealistic optimism in the health domain. Risk Anal. 39 (4), 792–804.
Hanssen, T.A., Nordrehaug, J.E., Hanestad, B.R., 2005. A qualitative study of the information needs of acute myocardial infarction patients, and their preferences for follow-up contact after discharge. Eur. J. Cardiovasc. Nurs. 4 (1), 37–44.
Hina, F., Aspell, J.E., 2019. Altered interoceptive processing in smokers: evidence from the heartbeat tracking task. Int. J. Psychophysiol. 142, 10–16.
Huffman, J.C., DuBois, C.M., Mastromauro, C.A., Moore, S.V., Suarez, L., Park, E.R., 2016. Positive psychological states and health behaviors in acute coronary syndrome patients: a qualitative study. J. Health Psychol. 21 (6), 1026–1036.
Jallinoja, P., Absetz, P., Kuronen, R., Nissinen, A., Talja, M., Uutela, A., et al., 2007. The dilemma of patient responsibility for lifestyle change: perceptions among primary care physicians and nurses. Scand. J. Prim. Health Care 25 (4), 244–249.
Jarbøl, D.E., Larsen, P.V., Gyrd-Hansen, D., Søndergaard, J., Brandt, C., Leppin, A., et al., 2017. Determinants of preferences for lifestyle changes versus medication and beliefs in ability to maintain lifestyle changes. A population-based survey. Prev. Med. Rep. 6, 66–73.
Jin, B., Roumell, E.A., 2021. "Getting used to it, but still unwelcome": a grounded theory study of physical identity development in later life. Int. J. Environ. Res. Publ. Health 18 (18), 9557.
Jokar, F., Yousefi, H., Yousefy, A., Sadeghi, M., 2017. Begin again and continue with life: a qualitative study on the experiences of cardiac rehabilitation patients. J. Nurs. Res. 25 (5), 344–352.
Kalantzi, V., Kalafati, I.P., Belitsi, V., Tsiampalis, T., Koutsonasios, I., Androutsos, O., et al., 2023. Cardiometabolic patient-related factors influencing the adherence to lifestyle changes and overall treatment: a review of the recent literature. Life 13 (5), 1153.
Kearney, M.H., O'Sullivan, J., 2003. Identity shifts as turning points in health behavior change. West. J. Nurs. Res. 25 (2), 134–152.
Kenter, E.J., Gebhardt, W.A., Lottman, I., van Rossum, M., Bekedam, M., Crone, M.R., 2015. The influence of life events on physical activity patterns of Dutch older adults: a life history method. Psychol. Health 30 (6), 627–651.
Ketilsdottir, A., Albertsdottir, H.R., Akadottir, S.H., Gunnarsdottir, T.J., Jonsdottir, H., 2014. The experience of sudden cardiac arrest: becoming reawakened to life. Eur. J. Cardiovasc. Nurs. 13 (5), 429–435.
Kwasnicka, D., Dombrowski, S.U., White, M., Sniehotta, F., 2016. Theoretical explanations for maintenance of behaviour change: a systematic review of behaviour theories. Health Psychol. Rev. 10 (3), 277–296.
Lawson, P.J., Flocke, S.A., 2009. Teachable moments for health behavior change: a concept analysis. Patient Educ. Counsel. 76 (1), 25–30.
Locke, A., 2022. Putting the 'teachable moment' in context: a view from critical health psychology. J. Health Psychol. 13591053221101750.
Lönnberg, L., Damberg, M., Revenäs, Å., 2020. "It's up to me": the experience of patients at high risk of cardiovascular disease of lifestyle change. Scand. J. Prim. Health Care 38 (3), 340–351.
Machado, D., Farias Junior, L.F., Nascimento, P., Tavares, M.P.M., Anselmo da Silva, S. K., Agrícola, P.M.D., et al., 2019. Can interoceptive accuracy influence maximal performance, physiological and perceptual responses to exercise? Physiol. Behav. 204, 234–240.
Markland, David, Ryan, Richard M., Jayne Tobin, Vannessa, Rollnick, S., 2005. Motivational interviewing and self–determination theory. J. Soc. Clin. Psychol. 24 (6), 811–831.
Marques-Vidal, P., Quinteiros Fidalgo, A.S., Schneid Schuh, D., Voortman, T., Guessous, I., Franco, O.H., 2019. Lessons learned? Changes in dietary behavior after a coronary event. Clin. Nutr. ESPEN 29, 112–118.
McBride, C.M., Emmons, K.M., Lipkus, I.M., 2003. Understanding the potential of teachable moments: the case of smoking cessation. Health Educ. Res. 18 (2), 156–170.
McBride, C.M., Puleo, E., Pollak, K.I., Clipp, E.C., Woolford, S., Emmons, K.M., 2008. Understanding the role of cancer worry in creating a "teachable moment" for multiple risk factor reduction. Soc. Sci. Med. 66 (3), 790–800.
McBride, C.M., Blocklin, M., Lipkus, I.M., Klein, W.M.P., Brandon, T.H., 2017. Patient's lung cancer diagnosis as a cue for relatives' smoking cessation: evaluating the constructs of the teachable moment. Psycho Oncol. 26 (1), 88–95.
Nicolai, J., Müller, N., Noest, S., Wilke, S., Schultz, J.H., Gleißner, C.A., et al., 2018. To change or not to change - that is the question: a qualitative study of lifestyle changes following acute myocardial infarction. Chron. Illness 14 (1), 25–41.
Nissen, N.K., Jónsdóttir, M., Spindler, H., Zwisler, A.-D.O., 2018. Resistance to change: role of relationship and communal coping for coronary heart disease patients and their partners in making lifestyle changes. Scand. J. Publ. Health 46 (6), 659–666.
Noon, E.J., 2018. Interpretive phenomenological analysis: an appropriate methodology for educational research. J. Perspect. Appl. Acad.Pract. 6 (1).
Okely, J., Mason, C., Collier, A., Dunnachie, N., Swanson, V., 2019. Diagnosis of gestational diabetes: a 'teachable moment'. Diabet. Med. : J. Br. Diabet. Assoc. 36 (2), 184–194.
Peat, G., Rodriguez, A., Smith, J., 2019. Interpretive phenomenological analysis applied to healthcare research. Evid. Base Nurs. 22 (1), 7–9.
Pietkiewicz, I., Smith, J., 2014. A practical guide to using Interpretative Phenomenological Analysis in qualitative research psychology. CPPJ 20, 7–14.
Rhodes, R., Kaushal, N., Quinlan, A., 2016. Is physical activity a part of who I Am? A review and meta-analysis of identity, schema and physical activity. Health Psychol. Rev. 10, 1–75.
Robinson, A., Slight, R., Husband, A., Slight, S., 2020. The value of teachable moments in surgical patient care and the supportive role of digital technologies. Perioperat. Med. 9 (1), 2.
Rollnick, S., Butler, C.C., Kinnersley, P., Gregory, J., Mash, B., 2010. Motivational interviewing. BMJ (Clinic. Res. Ed) 340.
Ryan, R.M., Deci, E.L., 2000. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. Am. Psychol. 55 (1), 68–78.
Sallis, J.F., Owen, N., Fisher, E., 2015. Ecological models of health behavior. Health Behav.: Theor. Res. Pract. 5 (43–64).
Santos, L., 2022. The impact of nutrition and lifestyle modification on health. Eur. J. Intern. Med. 97, 18–25.
Schlossberg, N.K., 2011. The challenge of change: the transition model and its applications. J. Employ. Counsel. 48 (4), 159–162.
Seidell, J.C., Halberstadt, J., 2015. The global burden of obesity and the challenges of prevention. Ann. Nutr. Metab. 66 (Suppl. 2), 7–12.
Sheeran, P., Webb, T.L., 2016. The intention–behavior gap. Soc. Personal. Psychol. Compass 10 (9), 503–518.
Slotter, E.B., Emery, L.F., 2017. Self-concept clarity and social role transitions. In: Lodi-Smith, J., DeMarree, K.G. (Eds.), Self-Concept Clarity: Perspectives on Assessment, Research, and Applications. Springer International Publishing, Cham, pp. 85–106.
Smith, J.A., 2004. Reflecting on the development of interpretative phenomenological analysis and its contribution to qualitative research in psychology. Qual. Res. Psychol. 1 (1), 39–54.
Tofler, G.H., May, R., Bartrop, R., Kirkness, A., Glinatsis, H., de Burgh, S., 2015. Acute coronary syndrome as a teachable moment for smoking cessation. J. Smok. Cessat. 10 (1), 5–11.

Whooley, M.A., Wong, J.M., 2013. Depression and cardiovascular disorders. Annu. Rev. Clin. Psychol. 9, 327–354.
Wolff, A.C., Ratner, P.A., 1999. Stress, social support, and sense of coherence. West. J. Nurs. Res. 21 (2), 182–197.
Zhang, Q., Miao, L., He, L., Wang, H., 2022. The relationship between self-concept and negative emotion: a moderated mediation model. Int. J. Environ. Res. Publ. Health 19 (16), 10377.