# Embracing a new beginning: understanding the teachable window for lifestyle change

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# 6

# General discussion

"Teachable moments" describes periods when individuals suddenly become more open to lifestyle advice and changing lifestyle, often following important events or experiences in life(1, 2). In this dissertation, we empirically investigated life events as potential teachable moments for lifestyle change. A well-known theoretical framework proposed by McBride et al.(1) suggests that the factors 'increased risk perception', 'affective impact', and 'change in self-concept' determine the intention to change lifestyle following critical health-affecting events. Studies have indeed found links between these factors and lifestyle changes, particularly surrounding pregnancy and the diagnosis of lung cancer or type 2 diabetes(3-7). However, it remains unknown until now how these factors interact, and whether there are other psychosocial processes that also play a role in explaining why health-impacting events become teachable moments that lead to sudden health behavioral changes. The studies outlined in this thesis aimed to explore the potential of acute events as teachable moments for improving health behaviors, the underlying psychosocial mechanisms that explain why certain life events become teachable moments, and how these moments can be utilized in healthcare practices by providing targeted lifestyle counseling at the right moment in the care trajectory. In this dissertation, we focused on events related to acute cardiac disease to address these research objectives, with the overarching goal of broadening our understanding of teachable moments in general.

Several approaches were used to investigate the main study objectives, which resulted in an overall broad exploration of acute cardiac evens as potential teachable moments. This final chapter will first address the main research objectives by summarizing and discussing the main findings of the chapters. Second, it will outline the most important implications for practice and future research. Third, it will discuss the methodological and conceptual considerations regarding the design of the thesis and the empirical work.

# MAIN FINDINGS

## Research objective 1: Exploring the potential of acute events as teachable moments

Prior to addressing the first research objective, it is essential to establish a clear definition of a teachable moment. According to McBride et al.(1), it can be defined as "naturally occurring life transitions or health events thought to motivate individuals to spontaneously adopt risk-reducing health behaviors" (p. 156). Furthermore, teachable moments are often described as opportunities for learning(2), suggesting that individuals that experience teachable moments are more open to learning about optimizing their lifestyle and, thus, more receptive to behavioral messages(2, 8). This perspective underscores the significant

role that healthcare providers play in facilitating these opportunities(2, 9, 10). Combining these definitions, teachable moments can be defined as urgent life or health events after which individuals become more open to receiving behavioral advice and more inclined to make positive changes in their lifestyle. Consequently, the chapters of this dissertation explored the potential of acute events to serve as teachable moments by investigating whether they lead individuals to become both more *inclined* to improve their lifestyle and more *open* to receiving behavioral advice following such events.

This dissertation commenced with the cross-sectional study in **Chapter 2**. This chapter employed a quantitative approach to explore whether the onset of the COVID-19 pandemic was perceived as a teachable moment for Dutch cardiovascular disease (CVD) patients, a group at high risk for adverse health outcomes. Our findings confirmed that the COVID-19 crisis triggered a desire to enhance various health behaviors, with the strongest intention to improve concerning 'lifestyle in general', followed by 'physical activity' and 'dietary behavior'. These findings concluded that societal crises impacting people's lives can indeed prompt them to become more willing to improve their lifestyle, thus serving as a teachable moments. Similar conclusions emerged from **Chapter 3** and **Chapter 5**. **Chapter 3** employed an Interpretative Phenomenological Analysis (IPA) approach to qualitatively explore how patients made sense of a myocardial infarction in the context of their lifestyle. The findings revealed that the majority of patients viewed their myocardial infarction as a life-changing experience that motivated them to adopt a healthier lifestyle. In the months following the event, these patients actively contemplated changing their health behaviors, implemented behavioral changes in their lives, and sought ways to improve their lifestyle. As this period of increased willingness and receptiveness took place over an extended window of time following the event, this dissertation concludes that the term "teachable window" better encapsulates the phenomenon than "teachable moment". This gradual process of change, as opposed to change prompted by a single, specific moment, aligns with previous research on events and behavior change(11, 12). The notion of a teachable window, rather than a moment, was further supported in **Chapter 5**, where it was observed that cardiac patients after their CVD diagnosis generally showed receptivity to behavioral advice at multiple phases in the healthcare trajectory (including hospitalization, post-hospital discharge, follow-up appointments in the hospital, and Cardiac Rehabilitation).

Taken together, the findings of this dissertation demonstrated that important life events, exemplified by the COVID-19 crisis and a CVD diagnosis, indeed possess the potential to evoke intentions to improve lifestyle (**Chapter 2** and **Chapter 3**) and enhance individuals'

receptiveness to behavioral messages (**Chapter 3** and **Chapter 5**). Consequently, it can be concluded that certain events during life may be experienced as teachable windows.

## Research objective 2: Exploring the underlying psychosocial mechanism that turn life events into teachable moments

To address the second research objective, we adopted a combination of quantitative and qualitative approaches. Beyond exploring the potential of the COVID-19 crisis as a teachable moment, **Chapter 2** additionally investigated whether increased intentions to change health behaviors were linked to risk perception, affective impact, and changes in self-concept, thereby verifying the theoretical framework proposed by McBride et al.(1). To further explore this matter in a qualitative and bottom-up approach, **Chapter 3** explored sensemaking processes that contributed to intentions and changes in lifestyle following a myocardial infarction. During the research, we encountered a considerable variability in how teachable moments were assessed due to the absence of validated scales for this purpose. Consequently, in **Chapter 4**, we adopted a more fundamental approach and aimed to validate questionnaires designed to facilitate research on teachable moments. Following the methodology outlined by Boateng et al.(13), we successfully validated two newly developed scales: the Cardiac Teachable Moment (CardiacTM) scale, which assesses the characteristics of cardiac events as teachable moments (research objective 2), and the Cardiac Lifestyle Change Intention (CardiacLCI) scale, which measures whether an acute cardiac event triggers patients' intentions to make lifestyle changes (research objective 1). The CardiacTM scale finally consisted of six internally consistent factors (affective impact, risk cardiovascular disease, changed self-concept, cardiovascular disease group identity, risk noncommunicable disease, anticipated regret), and the CardiacLCI scale resulted in two internally consistent factors (event-related lifestyle change and general healthy lifestyle). Both scales demonstrated good internal reliability and sufficient content, construct (factorial), and convergent validity.

The findings of **Chapter 2**, **Chapter 3**, and **Chapter 4** provided valuable insights into psychosocial factors instrumental in transforming acute life events into teachable windows. **Chapter 2** concluded that a desire to make lifestyle changes in response to the COVID-19 crisis was predominantly linked to shifts in patients' self-concept, specifically how they believed that they or their outlook on life had changed due to the pandemic. In **Chapter 3**, a closely related theme emerged as a key concept in explaining teachable windows: the re-evaluation of life goals, self, and social roles. Similarly, in **Chapter 4**, items related to the factor 'changed self-concept' of the CardiacTM scale focused on changes in one's sense of self, meaningfulness, and the importance of certain social roles in life. This factor

demonstrated the highest association with self-reported cardiac event-related lifestyle change. Together, these findings suggest that teachable windows may be elucidated by the extent to which individuals felt that their life goals, selves, and social roles had altered, especially when they realize that a healthy lifestyle is essential for achieving what they value in life, who they are or aspire to be, and fulfilling social roles responsibilities. This finding aligns with Michie et al.(14, 15)'s recognition of identity as an important factor in shaping health behaviors. Additionally, previous literature has also identified the important role of identity and identity shifts in behavior change and maintaining behavioral changes(16-20).

Both **Chapter 2** and **Chapter 4** found that experiencing an affective impact of a life event was associated with intentions for lifestyle change due to the event, although to a lesser degree compared to self-concept. This finding was confirmed in **Chapter 3**, which also identified the important role of experiencing an emotional impact in acute cardiac events, along with a clear recall of the event. Moreover, the chapter that also encountered emotions of loved ones, particularly partners, was important in turning life events into teachable windows, providing evidence that dyadic coping is important in health behavior change of couples(21).



In contrast to the lack of a significant role for risk perception in **Chapter 2**, **Chapter 3** revealed several related concepts important in explaining lifestyle change during teachable windows. These concepts were primarily linked to an increased perception of one's vulnerability and establishing a connection between one's vulnerability and adopting a healthier lifestyle. This suggests while McBride et al.'s(1) forwarded critical factor of increased risk perception is likely to have an influence during teachable windows, it needs to further operationalization. Specifically, heightened risk perception may lead to an intention to change lifestyle only when patients causally attribute their vulnerability to unhealthy behaviors, and when perceived risk is associated with a degree of outcome expectancy (i.e. beliefs about the specific consequences of engaging in healthy or unhealthy behaviors)(22, 23).

These findings suggest that elements of McBride et al.'s theoretical framework(1) may be important in elucidating the underlying mechanisms of teachable windows, yet they should be further operationalized and may not be sufficient without other psychological processes taking place. For instance, both **Chapter 3** and **Chapter 4** found that a desire to avoid anticipated regret regarding the continuation of unhealthy behaviors serves as a motivation for enhancing lifestyle after a life event. Furthermore, **Chapter 3** showed that when patients want to maintain autonomy over their life after a life event, and interpret the narrative of the event in relation to its behavioral causes, this motivates lifestyle

improvement as well. Additionally, a desire to reduce medication intake together with a belief that this can be achieved through improving lifestyle, can trigger motivation in patients. Therefore, when we want to fully understand the underlying mechanisms of teachable windows, integration from other theoretical frameworks such as the self-determination theory(24, 25) and the factors involved in the Sense of Coherence of the Salutogenic model(26) is valuable.

## Research objective 3: Exploring how we should utilize teachable windows in healthcare

In **Chapter 5**, we aimed to address the knowledge gap related to the practical utilization of teachable windows. This mixed-methods study therefore explored the perspective of cardiac patients concerning the timing and manner of delivering lifestyle advice following an acute cardiac event. Our findings indicated that the teachable window after an acute cardiac event offers a unique opportunity to provide tailored and patient-centered lifestyle advice. Cardiac patients, in general, showed receptiveness to behavioral advice throughout the care trajectory, allowing healthcare professionals to initiate lifestyle advice already during hospitalization and continue it through follow-up appointments and cardiac rehabilitation. The findings revealed that cardiac patients preferred advice that was practical, empathetic, and tailored to their individual needs, values, and perceptions of the causes of their cardiovascular disease.

The scales developed and validated in **Chapter 4** can serve as useful tools for facilitating discussions on lifestyle changes following significant life events. While these scales were specifically developed for acute cardiac events, they can be further adapted to foster discussions about lifestyle during other events in life (such as pregnancy, exemplified in our study of Uzan et al. (68)). These scales can serve conversation aids to facilitate brief lifestyle discussions with patients(27). Adapted versions of the CardiacLCI scale can assist healthcare providers in screening the extent to which their patients might be experiencing a potential teachable window and, thereby being receptive to behavioral advice. Providing advice when patients are most open to it ensures greater appreciation and likelihood of compliance(28, 29). Similarly, adapted versions of the CardiacTM scale can initiate discussions about psychosocial themes related to a teachable window, potentially triggering patient motivation during a physician-patient interaction(9). How to capitalize on teachable windows will be further elucidated in the following paragraph.

# IMPLICATIONS FOR PRACTICE

The findings of this dissertation offer valuable implications for healthcare concerning how to respond to a life event with the potential to become a teachable window. This section provides practical implications based on the dissertation's findings.

## Role for healthcare providers and organizations

The findings of **Chapter 5** that patients are receptive to advice following life events, their positive evaluation of received advice, and the link between received advice and their intention to improve lifestyle, emphasize the significant role of healthcare providers and organizations during such critical periods. Healthcare professionals in primary and secondary care can then play an important role in emphasizing the significance of a healthy lifestyle(12), as they frequently interact with patients around these life events. Research indicates that advice from physicians is highly regarded by patients(30) and can facilitate healthy lifestyle changes(12, 31). Maximizing the effectiveness of potential teachable window situations in healthcare therefore requires healthcare professionals to recognize and acknowledge that certain life events can trigger an intention to change lifestyle among patients. To make the most of these opportunities as they arise, they then could proactively offer lifestyle advice(9, 10). According to patient preferences demonstrated in **Chapter 5**, this should preferably be done in an empathetic and genuine manner to respect the patient-provider relationship.



However, relatively passive attitudes towards lifestyle counseling in primary and secondary care settings(32-35) suggest that lifestyle does not receive the emphasis it deserves in healthcare. This may be due to a lack of specific knowledge about lifestyle, limited time during consultations, and having other priorities that hinder care workers from discussing lifestyle in the clinical setting(35, 36). To overcome these barriers, it is crucial for hospital and primary care settings to adapt policies to include lifestyle medicine as part of their treatment protocol. For example, they are well advised to implement a time- and content-specific protocol or roadmap regarding brief lifestyle counseling in hospital settings, to ensure that lifestyle support becomes an integral part of the treatment process. Perceiving the provision of lifestyle advice as a professional responsibility has been linked to better implementation of providing such advice(37), highlighting the importance of healthcare organizations demonstrating their commitment to lifestyle support. Moreover, it is important that skill development regarding how to best support a patient in the process of changing their behavioral habits receives more attention. This can be incorporated into medical and nursing education and reinforced through skill development training

sessions and follow-up education(38). These educational sessions are probably preferably led by trained behavioral experts or health psychologists who are specialized in evidence-based behavioral change conversation techniques(15). Passive attitudes among healthcare providers may also be caused by perceiving that many patients still struggle to effectively implement lifestyle advice into their daily life (33, 39), leading them to doubt the effectiveness of their guidance(33). It would be advantageous to find a way to share positive feedback with healthcare providers, ensuring that their efforts in facilitating behavioral change are acknowledged. Moreover, it is important that educational sessions emphasize to healthcare providers that even minor changes in health-related behaviors can yield significant benefits for patients, and certainly on a population basis. For example if 10% of smokers successfully quit smoking this may seem a small effect in a singular practice, but is a huge effect on a population basis. Encouraging healthcare providers to hold positive beliefs about the consequences of their actions will further enhance their commitment to the provision of lifestyle advice(37).

## Timing matters

The findings of this dissertation further emphasize that in order to fully utilize the opportunity of the teachable window, it is important that lifestyle counseling begins immediately following an acute health event such as a myocardial infarction or a chronic disease diagnosis. This includes the initiation of lifestyle advice for example immediately after hospital admission, during disease screening, or during a primary care consultation. Healthcare providers should be given the opportunity to actively inquire about their patients' lifestyle behaviors at any time during any care trajectory. **Chapter 5** highlights that behavioral advice may have the greatest impact when provided by specialists, such as cardiologists in the context of acute cardiac events. Patients hold a high level of trust in these specialists, considering them experts, including in the field of prevention(30). We therefore expect that when specialists start with "priming" the idea of lifestyle among their patients immediately after a life-changing event, the teachable window will be perceived most strongly. Subsequently, more extensive lifestyle support can be continued by other healthcare providers or paramedics who can invest more time in understanding the patient's unique circumstances. This allows them to adapt their advice to a patient's context and to support patients in acquiring the necessary skills (see also paragraph "manner of advice").

We additionally found that patients generally take longer to make sense of a life event, hence the previously introduced term "teachable window". This indicates that an intention to change lifestyle may evolve over time. It is important for healthcare providers to be

aware of this and to continue to offer lifestyle advice after hospital discharge and during the remainder of the care trajectory, including during follow-up visits in the hospital and beyond. This highlights the potential of strong collaboration between healthcare providers, to ensure that lifestyle support is repeated and continued in a consistent manner. Collaboration between primary and secondary care also appears promising, with general practitioners taking over the role of monitoring patients and providing lifestyle support after a certain period, continually reminding patients of the importance of a healthy lifestyle and subsequently refer to different forms of lifestyle counselling.

Particularly in the case of acute cardiac events, **Chapter 5** highlighted a noteworthy gap in lifestyle support between the moment of hospital discharge and the onset of cardiac rehabilitation programs. In line with the concept of the "fresh start effect", individuals tend to be better at implementing changes at new beginnings(40). As **Chapter 3** showed that many participants saw the time after their acute cardiac event as a new beginning, during which they were actively searching for ways to prevent another future cardiac event to happen, additional lifestyle support should be also organized in between hospital discharge and onset of cardiac rehabilitation. For instance, future studies should investigate how we can develop blended eHealth interventions for this purpose, with particular attention to tailoring them to individual needs of patients. This may also be organized for other illness diagnoses, as similar gaps in between health event and treatment are also expected in follow-up care of other conditions such as in cancer treatment. Special attention may be given to patients with a lower socioeconomic position as they potentially have the greatest substantial health benefits from such interventions(41, 42).



## Manner of advice

The psychosocial processes that emerged as underlying mechanism of teachable windows in **Chapter 2, 3, and 4** also revealed several implications regarding how healthcare providers should capitalize on such situations. For instance, the results show that it is important to prompt patients to engage in reflection about their identity, life goals, and social role responsibilities, after potential teachable window situations. By doing so, healthcare providers can support patients in forming new, healthier, conceptions about themselves, and they can connect lifestyle advice to what a patient considers important in life, who a patient really is or aspires to be, what a patient wants to achieve in their life, and the social roles they wish to fulfill. This way, the healthcare provider can more easily link the urgency of why patients need to optimize their lifestyle in a way that resonates with the patient's values and higher order motivations. For example, a patient may not be directly motivated to improve their health, but their true desire might be to stay active to

enjoy playing with their grandchildren. Motivational interviewing techniques can prove especially valuable in encouraging patients to construct and pursue personal goals(43).

Both **Chapter 3** and **Chapter 5** demonstrate the value of aligning lifestyle advice with a patient's experience of a life event. This dissertation revealed that patients tend to make sense of an event, in which they try to comprehend why it happened. Healthcare providers could encourage this sensemaking process, encouraging patients to construct a personal narrative around a life event and assisting patients in making a connection to their lifestyle as strong determinant of their (future) health. In addition, healthcare providers could investigate the health behaviors to which patients attribute their illnesses or health problems, and consequently aligning their advice with what patients perceive as most impactful on their health. Tailoring advice to align with what patients consider as attributional factor to their illness seems to have a more profound impact on their willingness to comply, according to the findings of **Chapter 5**.

Another implication drawn from this dissertation involves that healthcare providers are well advised to emphasize a patient's sense of personal control and autonomy in managing their health and future through lifestyle changes, as this dissertation showed that this will increase the likelihood of the occurrence of a teachable window. Healthcare providers could for instance make patients aware of their susceptibility and educate them about their own role in lowering their susceptibility by adopting healthier lifestyle behaviors. Moreover, they could use the facilitating role of anticipated regret in teachable windows by encouraging patients to imagine consequences of not engaging in health protective behaviors, as previous literature shows that especially anticipated inaction regret is associated with health behavior(44). In addition, to foster patients' sense of control over their health, it could be worthwhile to show patients the benefits of an improvement in lifestyle through presenting them the effects of lifestyle change on health indicators such as cholesterol and blood pressure, as in Chapter 5 it was encountered that patients preferred such personalized feedback. Chapter 3 further showed that life events sometimes trigger a sudden perception of deteriorating health and a fear of losing independence accordingly. Healthcare professionals could identify if patients experience these concerns and emphasize that maintaining good physical condition can significantly prolong their independence.

**Chapter 2, 3, and 4** determine the importance of incorporating psychosocial consultation into patient care after significant health events, to discuss the emotional impact of such events. By providing an opportunity for patients to reflect on the emotional impact of life-changing events, healthcare professionals can foster the emergence of a teachable

window within patients. As we encountered that witnessing emotional responses of partners and family members, can further trigger a teachable window in patients, there should be created opportunities for patients to discuss the emotional impact of the health event together with their partners and family members. It is beneficial to invite partners to lifestyle support as well, such as participation in cardiac rehabilitation programs. Not only is behavior change more likely to occur in patients when their partners also change their behavior(45), but involving partners can potentially lead to their own teachable window, thus improving the partner's own lifestyle and health(5).

The findings of **Chapter 5** highlight the wish of most patients that healthcare providers deliver clear, practical, and feasible lifestyle advice that includes unambiguous guidance on which behaviors are beneficial or detrimental to a patient's health, for instance regarding the (un)healthiness of certain food products and how one should read food labels. Patients are also likely to highly benefit from personal consultations with healthcare providers during which their behavioral habits can be discussed, minor yet advantageous adaptations that easily integrate into their daily routines and unique circumstances can be explored, and behavioral change goals can be collaboratively determined. Such tailored advice that fit patients' identity and circumstances tends to be more impactful(38, 46, 47). In order to support patients in healthy habit formation, advising patients on how they can change their behaviors may offers the best potential for life-long impact(48, 49).



## METHODOLOGICAL CONSIDERATIONS AND FUTURE RESEARCH

This section describes methodological considerations of the study designs, measures, and findings of the chapters, and proposes recommendations for future research to advance the understanding of teachable windows. The first limitation concerns the study designs employed. In **Chapter 2, 4, and 5**, the quantitative assessments were carried out using cross-sectional survey data. This use of a cross-sectional design limited our ability to establish causal relationships between the variables(50, 51). Consequently, we were limited in establishing the nature of the associations between psychosocial factors and lifestyle change intention, and thus were unable to draw definite conclusions regarding the sequencing of these associations over time(51, 52). Future studies should prioritize the adoption of longitudinal designs to enable a more comprehensive exploration of the temporal order in which the psychosocial factors, lifestyle change intentions, and actual behavioral changes occur, which in turn lead to the possibility of making causal inferences.

To fully explore the underlying mechanism of the teachable window, psychosocial factors should ideally be measured in the months following an acute life event, whilst intention to change lifestyle as well as the actual occurrence of lifestyle change should be assessed over a longer period of time. This longitudinal approach would further allow to test mediation and moderation effects of the psychosocial factors identified in **Chapter 3**, to explore how variables may interact in their role to initiate a teachable windows and whether specific psychosocial factors play a role in specific subgroups of patients.

Another limitation concerns the use of self-reported measurements that may have affected biases and caused measurement errors and validity issues. For instance, self-report measurements are often linked to social desirability bias, wherein respondents may provide socially acceptable responses, especially concerning sensitive topics(53). Considering that lifestyle behaviors could be perceived as a sensitive topic(54), social desirability bias might have influenced the responses of participants involved in this dissertation. Additionally, recall bias could have affected the findings as participants were asked to retrospectively recall details about their life event. Although efforts were made to limit recall bias by including participants soon after an event, there remains a possibility that it influenced the answers. Measurement errors and validity issues could for instance play a role in **Chapter 2**, where the Box-score method was used to assess intention to change lifestyle due to a life event. This method focused on calculating a percentage of participants who, on average, demonstrated at least a slightly increased intention to change health behaviors in response to the COVID-19 crisis (indicated by a arguably arbitrary mean score exceeding 3.5 on a Likert scale ranging from 1 = no intention to 7 = full intention). In an effort to reduce validity issues, **Chapter 4** described the development and validation of scales for the purpose of conducting research about teachable moments, which appeared reliable and valid. This has led to a more valid measurement to assess intention to change. Nonetheless, it is important to recognize that for a more comprehensive understanding, for example ideally a comparison should be made between an individual's lifestyle intentions before and after a significant life event.

The focus on intentions to change lifestyle and short-term lifestyle changes following acute life events presents another limitation. First, the predominant focus on lifestyle change intention as outcome elucidates the essence of a teachable window, but it should be recognized that the connection between intention and actual lifestyle change may be rather limited(55, 56). Future studies should therefore further investigate to what extent an intention, instigated by a teachable window, also translates into actual changes in lifestyle. This exploration could involve the incorporation of additional approaches of data collection such as ecological momentary assessment(57), and the use of more objective

devices such as accelerometers. In a study conducted by Fong et al.(58), improvements in smoking outcomes were found to last at least until one year after participants underwent surgery, suggesting that the teachable moment effect triggered by surgery may indeed hold promise for longer-term behavior change. While there is some evidence for long-lasting effects of behavior change interventions(59-61), it is imperative to emphasize that more research towards sustainable effects of teachable windows is needed. For instance, it would be beneficial to investigate whether patients develop lasting behavioral habits and successfully implement healthier practices in their daily lives(48, 49, 62). Lastly, it would be fruitful to investigate whether behavioral changes observed in the first year after acute events yield lasting beneficial effects for a person's health.

The chapters in this dissertation may have been susceptible to selection bias, a common issue in studies that involve additional data collection beyond routine data gathering(50). This bias was evident in an overrepresentation of participants with higher professional and academic backgrounds, potentially introducing bias as this group often is more able to focus on health(63). However, it is important to note that participants with elementary or vocational backgrounds were still sufficiently represented in the study samples, contributing to diversity. It is also possible that individuals with a stronger interest in lifestyle and health were more inclined to participate the studies of this dissertation. In future research, it would therefore be particularly interesting to investigate how individuals with no interest in healthy lifestyles perceive and respond to acute life events, providing a more comprehensive understanding of the subject matter.



Another limitation is its predominant focus on negative urgent events, such as acute cardiac events and the COVID-19 crisis, while the literature also associates positive or less urgent events with lifestyle changes. Positive "transitions in life" have the potential to shift an individual's perspective and induce changes(64). Pregnancy, as an example of a positive event, also often leads to healthy lifestyle changes, with pregnant women typically being very open to such transitions (65)(Uzak et al. submitted). Future studies could explore the extent to which positive events differ from negative events, examining whether similar psychosocial processes play a role. Furthermore, lifestyle changes following less urgent events, such as being informed of a slightly increased risk of developing cardiovascular disease, may also occur. We expect that similar processes may play a role, however to gain a more comprehensive understanding of teachable windows, future studies should verify if our findings are applicable to these other life events as well. It would for example be valuable to employ narrative interview techniques with elderly patients to retrospectively let them identify potential teachable windows throughout their life course(66, 67). This approach could provide insights into the various life events that influence lifestyle changes,

both positively and negatively, and how care and support may be proactively organized around these events to stimulate behavior change.

A final limitation of this dissertation to consider here, is that the perspective of healthcare providers regarding how we should take advantage of the teachable windows was not assessed. Understanding healthcare providers' needs, as well as their perceptions of best practices, can inform the development of new approaches and interventions to provide lifestyle advice in the most effective manner. Moreover, in order to increase the provision of lifestyle advice in healthcare, it is important to investigate what barriers healthcare providers experience in doing so. To optimally exploit the teachable window, future studies should therefore investigate barriers and facilitators experienced by healthcare providers when providing lifestyle advice to patients, based on a thorough understanding of behavior change by applying frameworks such as the Theoretical Domains Framework (TDF)(37).

In addition to the aforementioned recommendations for future research, several additional questions for further exploration remain. For instance, does a teachable window necessarily occur within the initial months following an acute life event, or can this process also occur later in the aftermath of such an event? Furthermore, regarding the psychosocial factors that underlie the mechanism of a teachable window: is there a minimum threshold of a specific factor required to initiate a teachable window effect?, and is there a minimum amount of psychosocial processes that must take place in order to experience a teachable window effect? Additionally, the reference to teachable moments as health events that "spontaneously" motivates behavior change(1), implies the involvement of automatic processes. However, this dissertation highlights that lifestyle changes are mostly the result from a process of reflection rather than occur automatically. It would be interesting to explore whether lifestyle changes are indeed primarily the result of a reflective process or if automatic processes also come into play following significant life events.

## CONCLUSION

The chapters of this dissertation demonstrated that certain events in life have the ability to make someone become more motivated to change their lifestyle and more receptive to lifestyle advice. Such events can be health occurrences such as acute cardiac events, but also broader societal crises that impact a person's life such as the COVID-19 pandemic. This dissertation revealed that individuals tend to make sense of important life events in the months that follow. Several interrelated processes of sensemaking within these months will

impact motivation for lifestyle change. Therefore, we can conclude that life events have the ability to trigger a "teachable window" towards lifestyle change. The implications of these findings underscore an important window of opportunity to provide continuous lifestyle support during and after life-changing events. This dissertation provides multiple recommendations on how to enhance lifestyle support during this window of opportunity.

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