Master Thesis Organization Studies

From Safety-I (a focus on errors) to Safety-II (a focus on successes)?

A qualitative study on the effect of a new perspective on safety management in the healthcare industry.

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Title of the thesis: From Safety-I (a focus on errors) to Safety-II (a focus on successes)? A qualitative study on the effect of a new perspective on safety management in the healthcare industry.

II. Preface

Hereby I present to you my master thesis, which marks the end of my career as a student at Tilburg University. In five and a half years I have had the pleasure to meet inspiring people, gain new eye-opening knowledge, discover what my interests are, and develop myself both as a person and as a professional. Especially during the last year of my Extended Master Organization Studies in which I got the opportunity to be a junior trainee at the ETZ Hospital.

I would like to take this opportunity to express my gratitude to the people who have helped me to write this thesis. First, I would like to thank my academic supervisor, Hans van Dijk. Through his constructive feedback, support and confidence in me as a researcher he stimulated me to take this thesis to a higher level. Also I would like to thank Sander Smit, for the genuine interest he showed in my thesis during the defense and his valuable feedback.

Furthermore I would like to thank my professional supervisors from the ETZ hospital, Ellen Reijnders and Fleur Mutsaerts. From the beginning on, Ellen has challenged me both on personal and professional level which motivated me to get the most out of my traineeship. I would like to thank her for the opportunities she gave me during my traineeship, and for her motivating words and good advice during the writing of this thesis. I would like to thank Fleur Mutsaerts for sharing her knowledge and experience with me, and the inspiring talks we had about my future career.

Also, I would like to thank the participants who participated in this research. The subject of this thesis was new and unfamiliar to them, but still they allowed me to observe their learning process and become part of their group. Furthermore, I would like to thank the group of enthusiastic physicians and nurses within the hospital who are working on creating a more positive safety culture, for opening their doors to me and sharing their ideas and knowledge with me. The conversations I had with them have made me aware of the relevance and importance of this topic.

Finally, a big thank you to my family and friends who have supported me while writing this thesis. Your endless support, interest in my research and exchange of critical thoughts have helped me to analyse my findings and stimulated me to keep looking at my research with an open mind.

Enjoy!

Liselotte van Heugten
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III. Abstract

The current safety management system in the healthcare sector is characterized by a focus on learning from errors, termed a Safety-I perspective. As the healthcare sector is facing an increasing complexity in the demand of care, questions are raised whether the Safety-I perspective is still applicable. Furthermore, it is argued that this focus on errors and mistakes negatively influences the culture within the healthcare organizations. Recently, a new perspective on safety thinking has arisen termed Safety-II. This contrasting perspective focuses on which processes go right within the organization. Safety-II is characterized by focusing on resilient healthcare, best practices and a proactive safety management system. This research aimed to show what the implications are for both safety perspectives on the performance of the employees, thereby asking the following question:

How do the Safety-I and Safety-II perspective differ regarding their influence on individual employees' self-efficacy, support, learning experience, causal attribution and psychological safety?

In order to answer this question qualitative research has been conducted, in a hospital based in the Netherlands, divided in two phases. Within the first phase patient cases were reflected on using the replay method, a method to evaluate cases and learn from them. In total three replays have been conducted, one with a Safety-I perspective, one with a Safety-II perspective and one with a combination of both. Data was collected through observations and interviews with the replay supervisors. During the second phase additional interviews have been conducted with physicians, nurses and policy advisors in order to get insight in whether the results from the first phase were representative for the effects on the daily work performance of the healthcare professionals.

The replay results showed that Safety-I does not lead to a lower level on self-efficacy, support and climate of psychological safety compared to a Safety-II perspective. Contradictory, the interview respondents indicated that they perceive that a Safety-II perspective would lead to a higher level of self-efficacy, support and climate of psychological safety. Both interview and replay results agree that a Safety-I perspective leads to a higher learning experience and more external attribution compared to a Safety-II perspective which triggers a lower learning experience and more internal attribution.

The main insight that can be distracted from this research would be the indication that one safety perspective does not have to exclude the other, and that Safety-I and Safety-II could be seen as complementary. Given the insights that were gained from this research it was concluded that an implementation of a combination of both perspectives is the most realistic and desirable outcome.

Keywords: *Safety culture, Safety-I, Safety-II, Replay, Self-efficacy, Support, Learning experience, Causal attribution, Climate of psychological safety*

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1. Introduction

The publication of the Institute of Medicine report *To Err is Human* (1999) served as an urgent call for attention and a growing interest in improving the safety of healthcare. The main message of the report being the need to reduce error rates within healthcare, as they lead to many fatal incidents each year (Kohn, Corrigan & Donaldson, 1999). As a result the developments in the healthcare industry have been an increasing topic of interest in safety research for the past years (Colla, Bracken, Kinney & Weeks, 2005; Flin, Burns, Mearns, Yule & Robertson, 2006; Manser, 2009; Stelfox, Pamisani, Scurlock, Orav & Bates, 2006). Despite this attention, fifteen years after the publication of this report, patient safety remains a serious public health issue with increasing adverse events each year (National Patient Safety Foundation, 2015; Hollnagel, Wears & Braithwaite, 2015). Over the years the healthcare environment has changed due to the increasing complexity and competitive environment within which it operates (Nembhard & Tucker, 2011). Work is to be done to foster a culture of safety in order to move towards a safer health system for patient care (National Patient Safety Foundation, 2015).

Safety can be defined as "the absence of accidents and incidents" (Hollnagel et al., 2015, p. 3). According to this definition, it is the state where as few things as possible go wrong. This perspective of safety is termed Safety-I and became widespread in safety critical industries (such as aviation and nuclear) between the 1960s and 1980s (Hollnagel et al., 2015). The systems designed to manage safety respond to events that endanger safety or are categorised as an unacceptable high level of risk, usually by eliminating the cause or improving the barriers (Hollnagel et al., 2015). The main goal of this safety perspective is to reduce the error rate in healthcare performance. Safety-I is the generally dominant paradigm in healthcare (Ball & Frerk, 2015).

Only recently another perspective on safety thinking has arisen; namely one that considers why human performance practically always goes right in spite of uncertainties and complex work situations (Hollnagel et al., 2015). Safety-I has been focusing on incidents, neglecting that the vast majority of practices in healthcare lead to successful outcomes (de Bont, Jerak, de Mul & Zwart, 2009). As healthcare systems continue to develop and become increasingly complex, the adjustments that employees make to their work to match the conditions become increasingly important to maintain an acceptable level of performance. As a reaction to these developments the new perspective on safety management arose, called Safety-II, where safety management is focused on ensuring that "as many things as possible go right". This perspective relates to the system's ability to succeed under varying conditions, which is termed resilient healthcare (Hollnagel, Braithwaite & Wears, 2013), and emphasizes that humans are a resource rather than a burden. Learning from, and increasing the number of, successes is the main goal of this safety perspective.

This study focuses on the impact of both organizational safety perspectives on the employees in a healthcare organization. The organizational safety culture has a significant effect on safety behaviour of employees and teams, and their attitude towards safety (Neal, Griffin & Hart, 2000). Using a combination of literature research and interviews with internal safety experts, five factors were identified that are considered to be important for the enhancement of safety performance and development of employees. These factors are self-efficacy, perceived support, learning experience, causal attribution and climate of psychological safety. In this research I aim to answer what the influence is of a particular safety perspective (Safety-I or Safety-II) on these five factors. Insight in the link between safety perspective and these concepts is important as it can either enhance or decrease the performance of the employees, which affects the quality of care for the patient. This research will be distinctive in that it is one of the first to examine how employees react to a new type of safety perspective in healthcare. The main question that will be addressed in this research is the following:

How do the Safety-I and Safety-II perspective differ regarding their influence on individual employees' self-efficacy, support, learning experience, causal attribution and psychological safety?

This research aims to show the implications that a new safety perspective has on employees, and therefore answers the question whether moving towards a new safety culture could be advantageous. An important remark that has to be made here is that, since the "I" and "II" notation could be perceived as denoting "worse than/better than", it rather should be interpreted as alternative ways of seeing, understanding and acting.

1.1 Relevance

The healthcare industry is under pressure to increase both patient safety and quality of care with less means than before. Hospitals are increasingly pressured by federal state, regulatory and customer groups to demonstrate an organizational safety culture in which it is assured that patients are safe from medical harm (Sammer, Lykens, Singh, Mains & Lackan, 2009). As a result, individual healthcare professionals are asked to accomplish objectives (e.g. improving safety, stimulating patient participation and increasing employee well-being) while at the same time doing this as efficiently as possible (Ford & Savage, 2008). Along with this goes the stimulation of, and extensive attention to, incident reporting in healthcare (Mitchell, Schuster, Smith, Pronovost & Wu, 2015). Accordingly, the vast majority on current safety research focuses on incidents in which the concept of success is mainly defined in means of a reduction of these incidents (Nilsen, Hudson, Kullberg, Timpka, Ekman & Lindqvist, 2004).

This research aims to break out of the trend where the focus lies only on incidents when it is about safety. By doing so it will be making both a scientific as well as a practical contribution to the existing body of safety research following the recommendation that was given by Hollnagel (2014) stating that scientific studies of safety should also focus on situations where nothing goes wrong - i.e. where there is safety - instead of only focusing on situations where something does go wrong- where there is no safety. This research takes a critical look at the assumption that the current safety vision perhaps lost its connection with today's society and environment and how a new emerging safety perspective relates to this. In doing so this research is in line with the recommendation of the National Patient Safety Foundation (2015) to consider new perspectives and methods to foster a safety culture in order to move towards a safer health system. This is recommended since current methods do not lead to the desired decrease of adverse events (National Patient Safety Foundation, 2015). This research builds upon the recent developments of a new safety perspective in healthcare, after which until now little to no empirical research has been executed. A scientific contribution to the further development and layout of this safety-perspective is made by applying this concept in the empirical experiments within this thesis.

Furthermore, Nilsen et al. (2004) indicate that safety is rarely operationalized in a non-objective manner. The World Health Organization (1996) defined the objective safety dimension as "behavioral and environmental factors measured against external criteria" (Nilsen, Hudson, Kullberg, Timka, Ekmand & Lindqvist, 2004, p. 71). This research deviates from this by focusing on the subjective dimension, defined as "the individuals internal feelings or perceptions of being and acting safe" (Nilsen et al., 2004, p. 71). This is important as for the past years the focus has been on the development of methods and policies to learn from errors, but the question remains if these policies are also beneficial to physicians and other healthcare workers (Wu & Steckelberg, 2012).

In a practical point of view this research will assist managers in taking a critical look at the organizational safety culture they are working in, and the impact that it has on the employees. A practical contribution is made by testing Safety-II during a group reflection to determine how this safety-perspective can be applied in daily practices. In addition, this research meets the demand of the examined organization, the ETZ hospital, in giving advice on how to incorporate this new safety-perspective into their current practices.

2. Theoretical background

2.1 Introduction on safety thinking

The main topics of this research, Safety-I and Safety-II, are forms of safety thinking. Different perspectives on safety thinking have developed throughout the years. In the first age of safety thinking, and scientific safety studies, the dominant threats to safety came from technology, which introduced new risks and new understanding of risks (Hale & Hovden, 1998). Realizations that technical risk assessment and prevention measures could not solve all problems led to the second age of safety thinking, where "the exclusive dominance of the technical view of safety in risk analysis and prevention was broken and the study of human error and human recovery or prevention came into its own" (Hale & Hovden, p. 130). The focus during this period was on human reliability assessment techniques and safety training (Kirwan, 1994; ReVelle, 1980). The following period, during the 1980's, was characterized by the increasing doubt that health and safety could be captured simply by matching the individual to technology, leading us to the third age of safety thinking where safety management systems are the focus of development and research. In this third age of safety thinking organizational culture first came into consideration as an influence on safety within an organization. Organizational safety culture can be defined as "the product of individual and group values, attitudes, perceptions, competencies, and patterns of behaviour that determine the commitment to, and the style and proficiency of, an organization's health and safety management" (Health and Safety commission Advisory Committee on the Safety of Nuclear Installations, 1993). Because of the impact of organizational culture on the possibilities for organizational safety and learning, the assumption arose that limitations to safety might come from political processes as much as from technology and human factors (Hollnagel, 2014). In summary, these three ages of safety thinking differ in terms of the predominant causes that people would consider and accept (technological failure, human error, or organizational factors). However, they did not differ in their notion of safety which was always defined by the absence of accidents and risks, and finding the cause of that (Hollnagel, 2014). Defining safety in terms of absence of incidents is a key part of the Safety-I culture, which is the generally dominant paradigm in today's healthcare industry (Ball & Frerk, 2015).

2.1.1. Safety-I perspective

The common way on how we look at safety today has a great impact on the functioning of our society and is reflected in how we measure and assess safety. When you say to someone "be safe" you hope that things will go right, and that the activities and actions they undertake are successful. However, we are not used to count the number of tasks where people succeed and everything went well (Hollnagel, 2014). In many cases we aren't even aware of the numbers of flights without incidents or the amount

of holidays without car accidents. What we do have a good idea about is how many times something went wrong, how many flight delays there were or the number of medical incidents. An explanation for this is given by psychological studies where it is recognized that humans have an innate negativity bias (Rozin & Royzman, 2001). This means that humans are more attentive to and influenced by negative emotions, events and interpersonal interactions than by the positive (Kelly, 2016; Rozin & Royzman, 2001). The effect of this innate negativity bias on our perception of safe healthcare is clearly shown by the study of Behr, Grit, Bal and Robben (2015), who indicate that in healthcare systems in high-income countries not the well-delivered care, but the critical incidents are increasingly seen as an important indicator of the quality of care.

This way of looking at safety is termed as a *Safety-I* perspective, where safety is defined as "a state where as few things as possible go wrong" (Hollnagel et al., 2015, p. 3), meaning that the number of adverse events (a.k.a. accidents, incidents, near misses) is as low as possible (Hollnagel, 2014). An adverse event can be defined as "an injury caused by medical management rather than the underlying condition of the patient" (Institute of Medicine, 2000, p. 28). An error is defined as "the failure of a planned action to be completed as intended (i.e., error of execution) or the use of a wrong plan to achieve an aim (i.e. error of planning)" (Institute of Medicine, 2000, p.28). These failures account for about 10% of the total amount of events, compared to 90% of non-failures (Gravio & Patriarca, 2016; Hollnagel, 2014; Hollnagel et al., 2015). The safety management system that goes with this perspective focuses on diminishing the amount of errors that can occur within the healthcare system by improving barriers, eliminating contributory factors and standardize processes to prevent errors from (re)occurring (Patterson & Deutsch, 2015). In relation to human activity this focus makes good sense as these errors threaten the ability to carrying out the work as planned and from achieving the intended objectives, leading to unintended and unwanted harm (Hollnagel, 2014). In this process humans are frequently viewed as hazards as they are not always carrying out the work as planned, thereby allowing errors to take place (Patterson & Deutsch, 2015).

Various methods are used to asses' risks and analyse accidents, for example root cause analysis and risk assessment. These methods are based on identifying, understanding and eliminating the causes that contributed to the accident assuming that adverse outcomes can be explained by linear cause-effect chains (Braithwaite, Wears & Hollnagel., 2015; Gravio & Patriarca, 2016). These classical safety analysis methods, related to the Safety-I perspective, assume that systems are tractable, decomposable and well-understood (Gravio & Patriarca, 2016). Also in line with the Safety-I perspective, in the past years, there has been a focus on incident reporting which "is widely recognised as an important method for improving safety in healthcare" through learning from- and preventing future adverse events (Leistikow, Mulder, Vesseur & Robben, 2016. p. 1.). As can be derived from the

used instruments, Safety-I is characterized by having a reactive view. This means that measures are often used as a response to a certain (near) incident. Important to take into account when investigating medical errors from a reactive perspective is the possible influence of a hindsight bias (Henriksen & Kaplan, 2003). Being aware of the hindsight bias means that you understand how knowledge of the outcomes of adverse events influences the way of thinking and assessment of the event (Henriksen & Kaplan, 2003).

A side effect of this safety perspective is that it has the potential to cause a blame culture within an organization (Waring, 2005). Culture of blame means that "there is an assumption that openness and transparency, including forms of incident reporting, make possible the allocation of individual responsibility and therefore serve to distribute blame and possibly secure some form of retribution" (p. 6). A blame culture leads to an unwillingness to take risk or accept responsibility for mistakes out of fear for criticism (Argyris, 1990; Khatri, Brown & Hicks, 2009). A Safety-I management system, which is focused on- and learning from errors could therefore be counterproductive as it has been suggested that a prevailing blame culture in healthcare can be a major source of high numbers of medical errors (Khatri et al., 2009).

2.1.2. Safety-II perspective

The Safety-II perspective is created as a response to the changing and increasingly complex work environments (healthcare) organizations are operating in (Hollnagel, 2014). Different scholars argue that the assumptions of the Safety-I perspective no longer fit within this new environment and propose a new perspective (Hollnagel et al, 2015; Patterson & Deutsch, 2015).

Healthcare can be characterized by placing a greater emphasis on identifying and examining failures of systems or individuals rather than recognizing and reflecting on positive processes or outcomes (Kelly, Blake & Plunkett, 2016). It is therefore possible that key opportunities to learn from high-quality practices are missed (Kelly et al., 2016). The perspective of Safety-II is based on the principle of looking at "what goes right", which is a greater incidence compared to what goes wrong (Patterson & Deutsch, 2015). Safety-II can be characterized by three key concepts; sharing best practices, resilience engineering and a proactive view.

The first key concept of Safety-II, sharing best practices, is an important feature that stimulates learning from high-quality practices. For example, where the focus with a Safety-I perspective is only on Doctor A, who was involved in a medical incident, Safety-II argues that it is also valuable to look at Doctor B, C and D and consider why they are able to perform their daily work without these errors. Where Safety-I thus focuses on individual events and cases, Safety-II aims to develop an understanding of patterns and relationships across successful events. By sharing these best practices we are able to

learn from each other through what went well instead of overlooking these positive work methods by only focusing on errors.

Though this sharing of best practices is very valuable, the Safety-II perspective recognizes that the treatment of patients seldom takes place according to the guidelines and that the work environment is rarely perfect (Kelly et al., 2016). More often the environment is complex, unpredictable, challenging and risky. The second key concept, resilience engineering, deals with the uncertainty that comes with this complex environment. Resilience is the ability (of healthcare workers) to adjust their performance according to varying environmental conditions (Braithwaite et al., 2015). Resilience allows a team or individual to function effectively in a demanding and changeable environment (Kelly et al., 2016). Safety-II argues that "desirable outcomes emerge because humans adjust their actions to respond to the actual, rather than imagined, conditions of work" (Patterson & Deutsch, 2015, p. 383). While some of this performance variation is unsuccessful, leading to error or harm, a great deal of variation in performance results in success through adaptive adjustments. These adjustments, also known as "workarounds", are strategies for overcoming problems or limitations to compensate for variable conditions. In a Safety-I perspective, performance adjustments and variability are seen as a negative aspect as they imply possible deviations from guidelines, norms and standards. Safety-II however considers employees resilience to be a basis for safe performance and productivity, making humans a valuable asset rather than a hazard in the system (Hollnagel, 2014). Learning from and analysing these successful performance adjustments that are made on daily basis to cope with (unexpected) situational demands is according to the Safety-II perspective just as important, or even more important, than finding the causes of infrequent adverse outcomes (Hollnagel, 2014).

The third key concept of Safety-II is that it stimulates a proactive safety management view. A proactive safety management system "focuses on how everyday performance usually succeeds rather than on why it occasionally fails, and thereby actively strive to improve the former rather than simply preventing the latter" (Braithwaite et al., 2015, p. 1). Thus, where the safety management system from a Safety-I perspective reacts in response to an error that was made, by installing new guidelines in order to prevent error from happening again, Safety-II aims not to act in response to the error but in prevention of the occurrence of an error in first place.

The culture that the Safety-II perspective aims to create can be termed as a just (safety) culture (Dekker, 2012). Just culture is a non-punitive culture, including a blame-free error-reporting atmosphere and is characterized by trust. Furthermore just culture is characterized by an environment supportive of open dialogue to facilitate safer practices (Khatri et al., 2009).

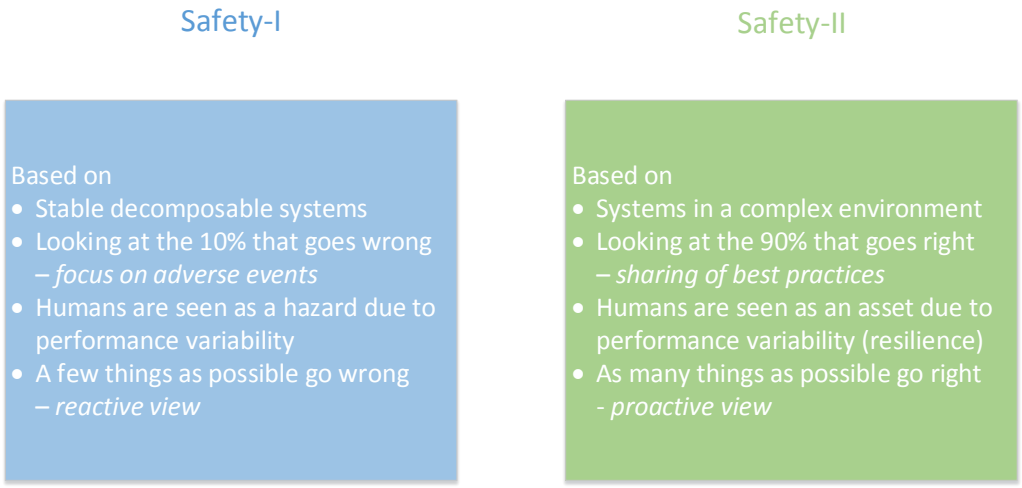


Figure 1. Comparison Safety-I – Safety-II

2.2 Factors that influence safety behaviour

2.2.1. Self-Efficacy

Bandura (1977) defined perceived self-efficacy as personal judgements of one's capabilities to organize and execute courses of action to attain designated goals. Important to notice here is that it is about a person's belief and perceptions of their capabilities and not necessarily the true capabilities of a person. Although self-efficacy refers to a person's belief, it cannot be seen as a personality characteristic that operates independently of contextual factors. In fact, a person's self-efficacy varies greatly depending on a particular task or (organizational) context he or she is confronted with. Furthermore self-efficacy influences people's behaviour as people on the one hand tend to avoid threatening situations because they believe it exceeds their capabilities. On the other hand people behave confident in situations when they judge themselves capable of handling a specific situation (Bandura, 1977).

Self-efficacy is an important factor in changing and improving people's behaviour and performance. A motivation to change behaviour and to learn can be caused if one perceives discrepancies between their performance and their standards, therefore self-efficacy plays a role in achieving behavioural change (Bandura, 1997; Strecher, DeVellis, Becker & Rosenstock, 1986; Zimmerman, 2000). People's level of self-efficacy, and thus their behaviour, changes for example based on performance accomplishments or vicarious experience. The first, performance accomplishments, refers to learning through personal experience where one achieves mastery over a difficult or previously feared task and enjoys an increase in self-efficacy. The second, vicarious learning, refers to learning through observations of events and/or other people. For example because they display behaviours that

illustrate a certain principle or rule, which makes you more familiar with the common ways of behaving.

Employee's level of self-efficacy is positively and strongly related to work-related performance (Stajkovic & Luthans, 1998), meaning that a higher level of self-efficacy positively influences the performance of the employee. When relating self-efficacy to the Safety-II perspective a positive relation can be proposed as Bandura (1977) argued that successes are more likely to enhance self-efficacy in case individual performances "are perceived as resulting from skill than from fortuitous or special external aids" (p. 201). Conversely, failures are expected to produce greater reductions in self-efficacy when these are attributed to personal ability rather than unusual situational circumstances (Bandura, 1977). Related to this it is expected that as Safety-II focuses on success it is likely that this will result in higher levels of self-efficacy compared to a Safety-I perspective that focuses on failures.

Proposition 1: A Safety-II perspective leads to a higher level of self-efficacy compared to a Safety-I perspective

2.2.2. Support

Support is defined as "the degree to which employees believe that the team values their contribution and cares for their well-being" (Bishop, Scott & Burroughs, 2000, p. 1114). Social support from co-workers has a positive effect on an employee's job satisfaction and lowers their intention to leave the organization (Acker, 2004; Munn, Berber & Fritz, 1996). In relation to the healthcare sector, van Pelt (2008) shows that the patient safety movement is beginning to acknowledge the need to support the human side of adverse medical events. Peer and team support is especially wishful after these adverse medical events (Dennis, 2003; van Pelt, 2008).

A factor that is important to create peer support and enhances patient safety and quality of care is open communication (van Pelt, 2008). Obstructions for perceived (peer) support can be the organizational culture and the fact that individuals feel like they are held individually responsible for adverse events which can be linked to a Safety-I perspective (van Pelt, 2008). This culture of blame can emerge due "to a misplaced focus on the caregiver as the source of error rather than the systems in which the caregiver must deliver care" (p. 250, Van Pelt, 2008). As within the Safety-I perspectives often humans are appointed as the source of the incident, and Safety-II focuses on the process and the circumstances under which errors occurred it is expected that Safety-II leads to a higher level of perceived support compared to a Safety-I perspective.

Proposition 2: A Safety-II perspective leads to a higher level of perceived support compared to a Safety-I perspective.

2.2.3. Employee Learning Experience

Kolb (1984) defines learning as "the process whereby knowledge is created through the transformation of experience" (p. 38). One type of learning is experiential learning: learning by doing and reflecting on an experience (Kolb, 1984). When we focus on the healthcare sector specifically it is stated that "a learning culture creates safety awareness among employees and medical staff and promotes and environment of learning through educational opportunities" (Sammer et al., 2010). Organizational learning is an important means for improving performance (Carmeli, Brueller & Dutton, 2009).

Traditionally, failures have been considered as better motivators for drawing lessons from an experience than successes (Sitkin, 1992; Weiner, 1985). The concept of error plays a key role in general learning theories, where it is acknowledged that learning is something that often happens by trial and error (Barret, 1998; Braun & Marom, 2009). This is the case because failure is challenging the status quo, therefore drawing attention to potential problems and stimulating the search for possible solutions (Sitkin, 1992).

Although this happens less frequently, successes can be used to draw important lessons as well since understanding why and how these successful events occurred, and under what conditions, can help to adapt future events in order to make them successful as well (Ellis & Davidi, 2005). Ellis, Mendel and Nir (2006) describe the following conditions for learning from successes:

> *If learners want to review a successful action, than they must, first of all, concentrate on the particular relevant behaviours. Then, by systematic generation of if-then optional propositions, they can improve their knowledge on how to repeat these behaviours without errors and ultimately improve their overall performance (p. 670)*

Although learning from successes could thus be considered as useful, the mainstream of literature on learning in healthcare still indicates that people are naturally more triggered to learn from failures than from successes, therefore it is expected that the Safety-I perspective results in a higher level of learning experience compared to a Safety-II perspective.

Proposition 3: A Safety-I perspective results in a higher level of learning experience compared to a Safety-II perspective.

2.2.4. Causal Attributions

Causal attribution describes how people attempt to explain the causes for events or behaviours (Fiske & Taylor, 1991). Explanations can be either internal, such as personality traits, or external, where the cause is assigned to a situation outside a person's control (Heider, 1958). Self-serving bias describes the tendency of people to attribute positive events and actions internally and negative events externally (Blackwood et al., 2003). When learners are expected to succeed but fail, they tend to put

the blame on the task (external attribution); whereas when they are expected to fail but succeed, they take credit for themselves (internal attribution) (McGill, 1989). Therefore, information processing is biased and failures can be dismissed and attributed to contextual causes like it is an isolated event, whereby they do not consider how to prevent this event from happening again (Ellis et al., 2006).

Consciously looking back at an event and forcing learners to consider all aspects of the event is an excellent opportunity for individuals to learn to take their responsibility, where it is expected that the relative number of internal as opposed to external attributions will increase (Ellis et al., 2006). Furthermore, when people make an internal attribution of good past performance this will positively influence future good performance (Flores, 2007). Based on these arguments it is expected that, since the focus of Safety-II is on the successes in the process and the resilient performance of employees, they tend to take more responsibility for their own behaviour (internal attribution) compared to a Safety-I perspective where it is expected that employees lean more towards external attribution.

Proposition 4: A Safety-I perspective leads to a higher level of external attribution, a Safety-II perspective leads to a higher level of internal attribution.

2.2.5. Psychological Safety

Psychological safety refers to a personal belief that one can express his or her self "without fear of negative consequences to self-image or status" (Kahn, 1990, p. 708). It describes "people's perceptions of the consequences of taking interpersonal risks in a particular context such as a workplace" (Edmondson & Lei, 2014. p. 23). Within a team, climate of psychological safety is "a shared belief held by members of a team that the team is safe for interpersonal risk taking" (Edmondson, 1999. p. 350). Climate of psychological safety is identified within organizational research as a critical factor in understanding for example team learning and teamwork (Edmondson & Lei, 2014). Climate of psychological safety is important for learning and therefore improving performance as people tend to act in ways that inhibit learning when they experience a potential threat (Argyris, 1982). Furthermore, climate of psychological safety has been associated with speaking up and voice. Speaking up and voice in organizational setting can be defined as "openly stating one's views or opinions about workplace matters, including the actions or ideas of others, suggested or needed changes, and alternative lines of reasoning for addressing job-related issues" (Premeaux & Bedeian, 2003. p. 1538). This is especially important when it concerns healthcare professionals speaking-up behaviour in a situation or action related to (patient) safety (Okuyama, Wagner & Bijnen, 2014).

A "blame and shame" culture and feelings of fear of punishment result in a lower hospital safety climate and a higher risk of experiencing patient safety incidents (Singer, Lin, Falwell, Gaba and Baker, 2009). It is expected that, as Safety-II focuses on successes and therefore diminishes the potential of

a blame and shame culture to emerge and lowers the threat to be held individually responsible, employees feel safer to speak-up and experience a higher level of psychological safety.

Proposition 5: A Safety-II perspective creates a higher level of psychological safety compared to a Safety-I perspective.

2.3 Conceptual Model

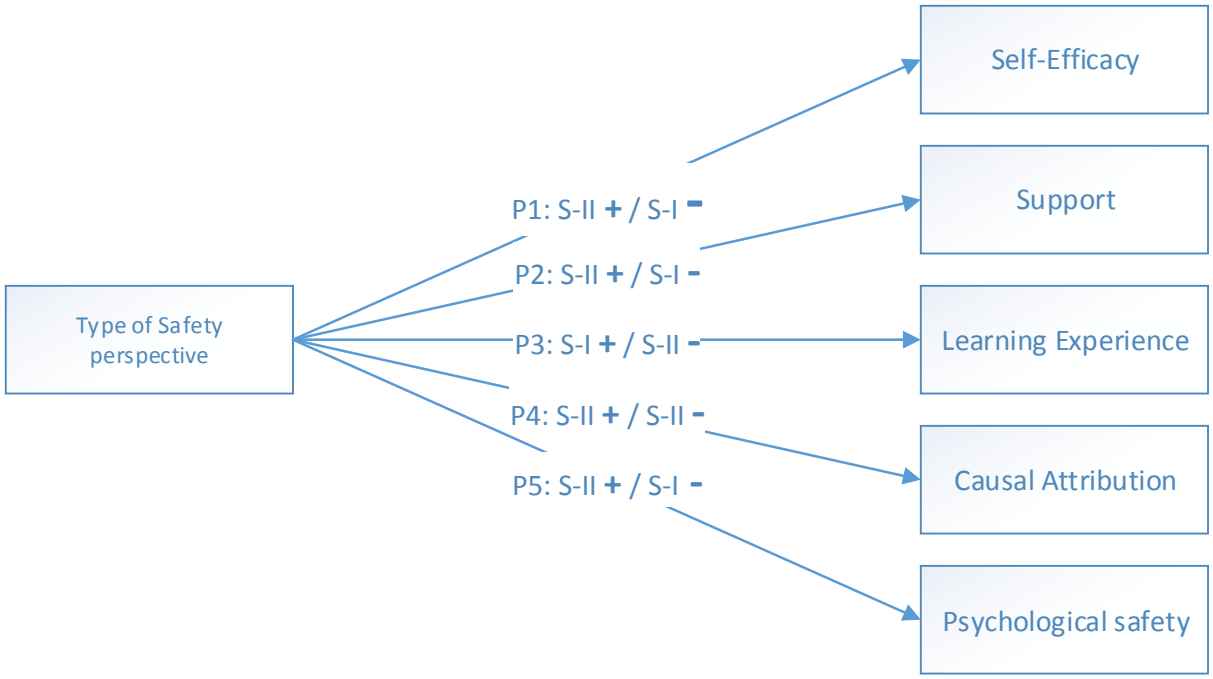


Figure 2. Conceptual model. P3: + = internal attribution, - = external attribution.

3. Method

3.1 Research Context

In order to provide an answer to the research question I conducted a qualitative research in the Dutch healthcare sector. The healthcare professionals that have cooperated with this research are all employed at the ETZ Elisabeth-TweeSteden Hospital located in Tilburg, the Netherlands. The ETZ hospital was created by a merger between the Sint Elisabeth hospital and the TweeSteden hospital in January 2016. Today, the ETZ has around 6500 employees, divided over three locations. With an amount of 44.000 hospital admissions each year the ETZ has become one of the largest hospitals in the Netherlands, and one of the largest employers in the region.

The ETZ Hospital has three main focus points: lean, hospitality, and quality & safety. This research relates most to the third focus point of the hospital. Various methods and initiatives have been deployed in the hospital in order to ensure the safest and highest quality of care to patients. Methods such as root cause analysis, risk assessment and calamities research are regularly used to assist departments in the delivery of safe care.

Similar to other hospitals in the Dutch healthcare sector the ETZ has to deal with increasing healthcare costs and more complex demands of care (Raad voor de Volksgezondheid & Zorg, 2011). As a result of this, the quality of care and the safety of patients and healthcare professionals is put under pressure. Important to mention is that this research was conducted shortly after the merger, and during the preparation phase for the new electronic health record. It is safe to say that these developments had a great impact on both the organization and its individual employees. The fact that this research was conducted in this very turbulent time in the organization has made it quite a challenge to collect the required data.

The research context brings certain limitations to the external validity of this research. The fact that this research was only conducted at one hospital prevents generalization across contexts. Nonetheless, it can be presumed that other organizations in the Dutch healthcare sector are currently dealing with similar changing environments and challenges, therefore it is likely that this research also provides useful insights for other healthcare organizations.

3.2 Research design

The design of this research was entirely focused on the collection of qualitative data. The qualitative design of this research has allowed me to observe healthcare employees, engage in conversation with respondents, ask them to elaborate on- and clarify their meaning which made a more detailed and in-depth understanding of the employees perception of the two safety perspectives possible. This

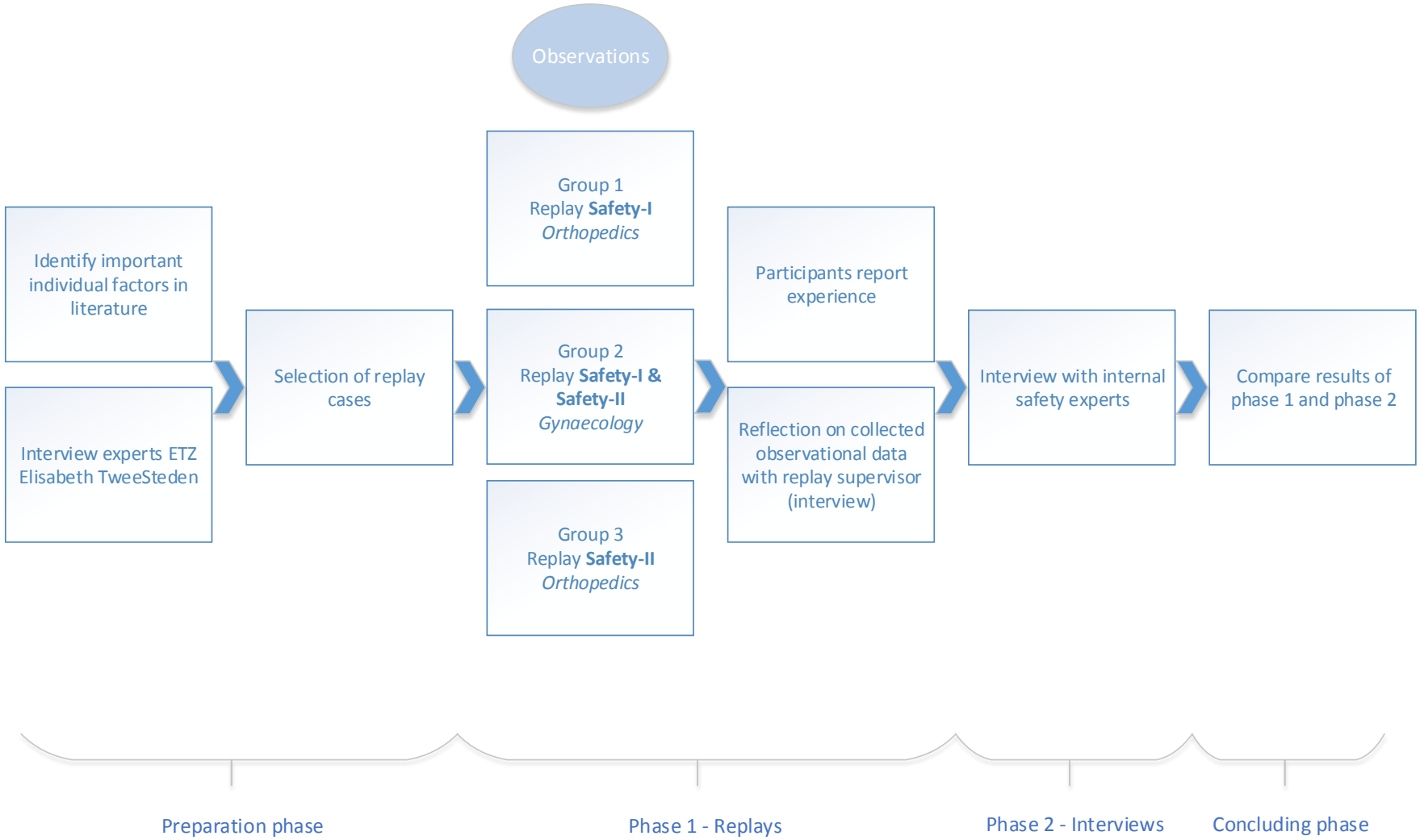
research has focused on the perceptions of the individual healthcare professional. Their perceptions were captured both in a team setting during a replay, and in individual settings during the interviews that were conducted. In order to get a complete picture of the examined subject, the research has been split up in two phases; an explorative part and an explanatory part. Figure 3 describes the data collection process of this research in detail.

The first phase of this research had a qualitative explorative nature and aimed to serve as a first insight on how the different safety perspectives influence the healthcare professionals. One major feature of qualitative data is that it focuses on naturally occurring, ordinary events in a natural setting, therefore it stays really close to the context (Miles, Huberman & Saldana, 2013). This way of collecting data has been advocated to be a good strategy for exploring new areas (such as the Safety-II concept) and has helped to develop an understanding of individuals or organization's behaviours in a natural setting (Miles et al., 2013). Furthermore, qualitative research seeks to explore the meaning of actor's beliefs and behaviours to explain why people behave the way they do, which fits well with the focus on subjective safety within this research (Mays & Pope, 1996). Field research was used to provide an answer to the research question. Data has been collected in three different ways. The first method consisted of evaluating and reflecting on a case in a team setting, called a replay, where observational data was gathered. Afterwards, participants were asked to reflect on the replay filling in a self-reporting questionnaire. Finally, interviews were conducted with the replay supervisors in order to check the data collected from the replay and to gain a deeper understanding of the events observed during the replay.

The second phase is explanatory, and served to supplement the data collected in the first phase. By adding this phase, it was aimed to get a more in-depth understanding about the effect of safety thinking in combination with the five independent variables on the daily work of the healthcare professionals. Furthermore it provided the opportunity to include people with expertise on safety who wouldn't have been included otherwise because they didn't participate in one of the replays. The data collection in this phase consisted of semi-structured interviews with healthcare professionals who have expertise in the field of safety. In these semi-structured interview they were asked to share their opinion about the current safety culture within the hospital, the new safety perspective Safety-II and the effect that both safety perspectives have on the healthcare workers in the hospital. Furthermore this phase assesses the results of the replays performed in the first phase and evaluates how the opinions and perspectives of the interviewees differ or correspond with the data gained from the replays. By doing so, it was aimed to get a more in-depth understanding about the effect of safety thinking on the performance of the healthcare professionals. The interviews conducted in this phase also provided this research with a more in-depth understanding about the boundary conditions that

need to be considered when gaining understanding of safety culture in general and when considering a shift in safety paradigm.

Figure 3.Data collection process



3.3 Data collection

3.3.1. Phase 1 - Replay

The tool used to gather data is called “replay”. In literature this method is also known as after-event-review and after-action-review (Ellis & Davidi, 2005; Ellis et al., 2006), however, as the employees included in this research are familiar with the term replay, this term will be used here. Replay is a method in which stakeholders from different disciplines get together, usually when something in a process went wrong, to evaluate and reflect on the case. Basically they look back at the process and analyse it from beginning to end, thus “re-play” the situation. This method is used to draw lessons from experience (Ellis & Davidi, 2005). Evaluation of the learning process encourages the opportunity to share lessons learned, and considers the education process to be continuous and evolving (Sammer et al., 2010). Ellis, Mendel and Nir (2006) argue that replay “can constitute an excellent opportunity for individuals to learn how to take responsibility for past performance regardless of the type of event “(p. 672).

Three replays have been included in this research. The preparation process of these replays consisted of four steps (Figure 4). First two departments, orthopaedics and gynaecology, were selected to perform the replay. Either because a department was interested in taking part in this research and, as a result of this, they choose a case themselves that was fitted for the replay. Or, the other way around, because an interesting case had come up and as a result of this the department was approached by the researcher to ask if they wanted to cooperate. All cases that have been discussed in the replays are situations that have actually happened within the hospital with real patients. It was chosen to work with real cases, and not fictional situations, to increase both the relevance for the involved healthcare professionals as well as the experiential learning experience. An important selection criteria for the discussed cases was that the case had happened recently, less than one year ago, as it was important that the caregivers were able to recall the situation. Furthermore the length and occurred events in the case should be manageable to discuss in a replay of two hours or, in the case that a more comprehensive case is discussed, it is demarcated in such a way that it can be discussed in two hours. This because, in the time available, it is not possible to discuss every detail of a patient that has stayed in the hospital for an extensive period of for example six months.

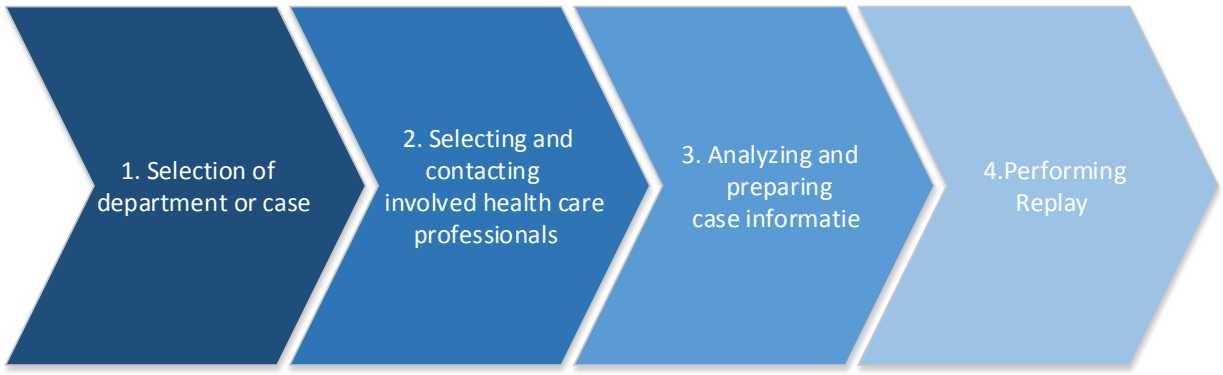


Figure 4. Preparation process Replay

Besides this, a distinction was made between the selected cases. One case was about a situation in which most things went very well, this had to be a case that normally wouldn't have been selected to evaluate (since no serious consequences had been attached to it), in order to emphasize the perspective of looking at things that went well and that normally spoken aren't considered as a learning moment (after this called Safety-II replay). The second and third case were a patient case in which an incident, complication or calamity occurred that, under the usual conditions, also would have been up for evaluation because of the seriousness of the errors made and because of the obligation of the healthcare inspectorate to report and investigate these situations (after this called Safety-I replay). As can be seen in Figure 3, the second replay which was initially categorized as a Safety-I replay due to the severity of the error that occurred in this case, turned out to be a combination of Safety-I and Safety-II. The replay supervisor applied a combination of both the Safety-I replay method and the Safety-II replay method (Appendix G) after which it was decided to label this replay as a Safety-I & Safety-II replay. Further implications of the combined perspectives within this replay will be discussed in the results.

After a case had been selected to perform a replay on, the healthcare professionals that had been involved with the particular patient were selected. It was aimed to let the majority of the replay participants (with the exception of the replay supervisor and researcher) consist of healthcare professionals that had actually met the patient and been involved in the care process to be able to get a clear view on how they experienced the care process and get an in-depth insight of the circumstances under which the case took place. On the average this group consisted of 6-10 healthcare professionals, depending on the length of the patient's stay and the amount of disciplines involved with the patients care. The professions of the healthcare professionals varied from physicians to team leaders to nursing staff. It was deliberately chosen to put this variation of professions within the same replay as this reflects the daily contacts each

healthcare professional has to work with, therefore facilitating the transmission of their learning experience to their daily work situation. However, considering that the work schedules and times of the various professions differ from each other (due to different shift-times and night- and day shifts) this resulted in quite a challenge to get all these professions around the table at the same time. This issue has put a considerable pressure on the timeline of this research and resulted in a longer period of data collection than initially intended.

In the preparations and the implementation of the replay an important role was played by the replay supervisor. This supervisor was either a healthcare professional or senior advisor employed in the organization. He or she had the task to guide the group through the replay method and function as a discussion leader. Hence, a requirement for the supervisors included in this study was that he or she was experienced with guiding a replay. This way it was aimed to minimize the differences between supervisors. Initially it was intended to let all the replays be supervised by the same person. However, this turned out not to be a possibility in practice due to available time of the supervisors and the overlap with other key appointments in their agendas. Hence, it was chosen to aim for minimal variance in supervisors and use the same supervisors as much as possible.

The third step in the preparations for the replay consisted of analysing and preparing the case information. The replay supervisor made a summary of the case information and described the course of the case based on nursing and medical reports. The participants of the replay got the information e-mailed to them beforehand so they could read this and prepare themselves in order to save time during the replay. The participants of the Safety-II replay were asked to focus on things that went well during this case in their preparations, whereas the participants of the Safety-I replay were asked to pay attention to the things that went wrong in the case.

The final step was the performance of the replay. The replays lasted two hours and took place on both location ETZ Elisabeth and ETZ TweeSteden. The group consisted of the participants, the replay supervisor and the researcher. The detailed description of the method through which the replays were conducted can be found in Appendix G.

3.3.2. Phase 1 - Observational data

Qualitative data from the replays has been captured through the observations of the researcher. Observation can be defined as “the act of noting a phenomenon, often with instruments, and recording it for scientific purpose” (Angrosino, 2007, p. 54). Direct observation has been used, meaning that interaction processes and behaviours have been captured at the moment they occurred (Ritchie & Lewis,

2003). Observations were captured by the researcher, who took the "observer-as-participant" role, meaning that the researcher was known and recognized but did not participate in the replay and was there solely as researcher (Angrosino, 2007). The advantage of making observations was the ability to not only observe verbal expressions, but also facial expressions and body language creating a richer dataset. Furthermore it allowed the researcher to capture the group dynamics during the replay. Due to the confidentiality of the data discussed, and the mentioning of patient names during the sessions, no permission was given to make video- or audio recordings during the replays. Therefore, the researcher developed an observation recording sheet in order to be able to structurally gather data and increase the transparency and consistency of the collected data compared to making open notes (Faries, Obenchain, Haro & Leon, 2010). The items on the observational recording sheet have been based on existing questionnaire items that have been used in previous research to gather data about the dependent variables which can be found in Table 1. Self-efficacy was for example observed by using the statement *"participants' show that they have been, or are, insecure about their actions within this case or in general".* Learning experience was observed using the statement *"participants indicate that they have learned how to adjust their actions in a following situation".* One of the statements through which support was observed was *"participants give each other compliments".* Climate of psychological safety was observed by answering the statement *"it is perceived that there are hierarchical differences during the meeting".* And lastly, causal attribution was for example observed by making notes on the statement *"participants mostly talk about external factors".* Room was left for field notes to include unexpected events and observations. The exact information about the usage of this questionnaires has been further specified in Appendix B. This observational recording sheet was, before using it in this research, tested by the researcher. The researcher took place in a "test" replay, filling in the observation checklist and making sure that the statements stated in the checklist were actually possible to be observed. This test replay also provided the researcher with some insights on the best positions to be seated in the room, in order to be able to observe all body and facial expressions.

A critical point that can be made towards using observational data within a research, is that it is susceptible to bias from subjective interpretations (Angrosino, 2007). Therefore it was chosen to double-check the observational data during interviews with the replay supervisors in order to increase the validity (chapter 3.3.4.).

3.3.3. Phase 1 - Self-reporting

The next step in the data collection process has been the self-reporting of the participants. Directly after the closing of the replay, participants were asked to write down their feelings and perceptions through a questionnaire. This method was chosen to capture the perception of the participants without the (possibly subjective) intervention of the researcher. Since these reports were filled in anonymously, incentives to give false answers were kept to a minimum (McCroskey, 1984). These questionnaires served as a controlling mechanism for the observational data captured by the researcher, and as input for the semi-structured interviews that followed on the replays. The questionnaire consisted of 24 items, all scored on a five point Likert scale, which were derived from existing validated questionnaires and one open question (Table 1, further elaborated on in Appendix B and C). As shown in Table 1, causal attribution does not meet the general required level of α= .7. Initially, the Cronbach's alpha of causal attribution was reported α= .538, after deleting item 4, Cronbach's alpha raised to α= .690. Although this does not meet the general standard of causal attribution, arguments can be found that also a Cronbach's alpha of .6 can be taken as criterion of acceptability (Loewenthal, 2001). Furthermore, as this research is qualitative of nature, and findings will be supported by verbatim quotes of respondents, it was chosen to take no further actions in order to increase the Cronbach's alpha.

Table 1. Composition of the questionnaire

Item	**Measurement**	**Cronbach's alpha**
Self-efficacy	Five items derived from the "Dutch adaption of the general self-efficacy scale" – *Teeuw, Schwarzer, Jerusalem, 1994.*	**α= .749**
Perceived support	Four items derived from Rhodes, Eisenberger and Armeli (2001) derived from the measurement of Eisenberg et al. (1997).	**α= .762**
Learning experience	Six items derived from Kirkpatrick's (1967) model of evaluating education and training programmes (Alliger & Janak, 1989).	**α= .723**
Causal Attribution	Four items derived from the Revised Causal Dimension Scale (CDSII) of Mcauley, Duncan and Russel (1992).	**α= .690**
Climate of psychological safety	Five items derived from the questionnaire developed by Edmondson (1992).	**α= .706**

3.3.4. Phase 1- Semi-structured interviews with replay supervisors

The final step in the data collection process of the first phase consisted of semi-structured interviews with the replay supervisors. The aim of these interviews was to reflect on the replay they had supervised, in order to check if their perceptions and feelings about the replay corresponded with the data that was collected through the observations. A topic-list was used to structure the interview and ensure essential documentation of the central topics in this research (Appendix D) (Ritchie & Lewis, 2003; Gelissen, 2010). In order to increase the reliability of the data, open questions were asked first about the five dependent variables. Once the interviewee had given their own perception about the influence of the replay on this variable, the observations of the researcher were presented to him or her to check whether they recognized these events. Since the interviews are semi-structured, respondents had room to point to other important factors considering safety thinking next to structured questions on the topic list.

3.3.5. Phase 2 – Semi-structured interviews with safety experts

A second phase was added to this research in order to increase the quality and substantiate the results from the replays. The aim of this second phase was to gain a more in-depth understanding on the mechanisms that influence the effect of safety thinking on the five dependent variables. Also, another motivation to add this phase later on in the research process, was because it was noticed that during the research this subject about safety thinking started to gain a lot of attention in the organization. When talking informally to the healthcare professionals in the organization they came up with a lot of interesting statements about why a new way of safety thinking might be important, but also why a transition to this is not so obvious. In order to be able to incorporate these informal statements into this research it was decided to invite these people to talk about this subject in formal semi-structured interviews. Hence, the aim of this second phase is to respond to the results of the first phase by interviewing respondents with expertise on quality and safety (nurses, physicians, and policy advisors) and using their views to give a more in-depth explanation of the results found in the first phase and how these results can be extended to the daily work process. Furthermore, interviewing healthcare professionals from different departments of the organization provided the opportunity to see whether the results from the replays are consistent with the views expressed in other care units, and therefore can be generalized throughout the organization.

The semi-structured interviews were conducted using a topic guide to indicate the key issues and subtopics to be explored (Ritchie & Lewis, 2003). In these interviews I asked them about their opinion

about the current safety culture in the hospital, their view on Safety-II and additional factors that need to be taken into account when considering a shift in safety perspective (Appendix E).

3.4 Sample strategy

The replays were conducted based on the availability of a case, or the availability of a team, also known as convenience sampling (Miles et al., 2013). Three different groups have been analyzed with an average of 8 participants. As Miles et al. (2013) describe, qualitative samples tend to be purposive rather than random which is also the case for this research. Each group consisted of people with different functions in the organization, but they were joined together because they all were involved with the particular case that was discussed, therefore purposive sampling was used within this research.

The inclusion criteria that (the majority of the) participants of the replay had been involved with the patients care resulted in an exclusion of an intended fourth replay from this research. Due to last-minute cancellations of participants, the final replay group consisted of only one involved healthcare professional whereas the rest of the group consisted of advisors or other healthcare professionals who were interested in the replay method. This resulted in conversations about general work processes which did not comply with the replay method used in the other three replays. Furthermore the fact that the majority of the participants had not been involved with the case made that they could not fill in the questionnaires and could not be scored on the five dependent variables. Following the advice of the replay supervisor it was decided to exclude this replay from this research.

The fact that three different groups were observed is an obstacle to the comparability of the different forms of replay (the Safety-I and Safety-II replay). However, justified reasons made that there was no other way to sample the groups. Since, in this research, replays have been performed on real cases, it was inevitable to end up with different groups. Considering nursing departments consist of a pool of nurses, who work different shifts each week on different days and different (day- and night) times, combined with a difference in physicians, patients are almost never treated by the exact same team. And, since only the people who were involved with the care of the patient participated in the replay, it was not possible to select two or more case in which the exact same group of caregivers were involved. Still, comparability was achieved as two replays were conducted within the same department. It can be assumed that, given the work processes are the same and employees work according to the same values, standards and guidelines, the groups can be compared.

For the second phase of the research purposive sampling and snowball sampling was used. Six interviews were held with nurses, physicians, and policy advisors in the organization, who came to the attention of

the researcher due to their expertise on the field of quality and safety. Snowball sampling was used as these people indicate other people to me of which they though it would be interesting to have an interview with (Miles et al., 2013). It was deliberately chosen to interview two nurses, two physicians and two advisors in order to get a balanced picture of the thoughts about safety culture throughout the organization.

3.5 Data analysis

Qualitative data analysis entails segmenting and reassembling the data with the aim to transform data into findings (Boeije, 2010). The data is examined for patterns and relationships, sometimes in connection to ideas derived from literature, existing theories, or thoughts that have emerged during the fieldwork. In order to be able to analyse the collected data from the replays (observational data, self-reporting's and interviews) and the semi-structured interviews with the healthcare professionals, a systematic approached has been used which facilitated structuring the result section of this research.

First, data gained from the observations is listed in the observation checklist. This observation format is based on the themes of the five independent variables that have emerged from the literature and internal expertise of the hospital. In order to determine the observed level of the dependent variables, a code list has been developed which can be found in Appendix H. Codes were attached to the statements noted in the observational checklist in order to determine the observed level on each variable. These codes facilitated me in comparing the observed levels of the different replays. Second, data obtained from the self-reports has been analysed calculating the average score per item per replay using Excel. By calculating these average scores I was able to get a clear view on how the participants scored their perceived self-efficacy, support, learning experience, causal attribution and level of psychological safety. Furthermore these scores enabled me to make a comparison between the perceptions of the participants, and to check if these were consistent with the observed scores. Also, they were used as input for the interviews with the replay supervisors. Given that these self-reports were not intended to function as quantitative data in this research, among others given the fact that the amount of completed questionnaires isn't sufficient for this kind of research, no further analysis in for example SPSS, apart from determining the Cronbach's alpha, has been conducted. The range of individual score per variable has been used to get insight in the individual differences within the group. Subsequently, the interviews with the replay supervisors (phase 1) and with the safety experts (phase 2) were transcribed and analysed by codification. The raw data of these in total eleven interviews consisted of audio fragments, which were recorded with permission of the interviewees. Interviews where transcribed shortly after the interview in order to enable

improvements for future interviews and enrich the researchers understanding of the data (Baker, 1999). Coding was used as a tool to systematically organize data and group this data into categories and patterns (Boeije, 2008). First, a combination of open and thematic coding was used. Open coding is the process of breaking down, examining, and conceptualizing data. It encourages a thematic approach, because it forces the analyst to break the text into pieces, compare them and assign them to groups that address the same theme (Boeije, 2010). Therefore it contributes to a clear organization of data (Boeije, 2010). A code list was developed based on the five independent variables that are central in this research, and was used to analyse both the observations and the interviews which facilitated the comparison of data gathered from both methods. New codes were developed in order to analyse pieces of text that were considered relevant to the research but did not fit a code directly related to the five independent variables. Especially in the second phase these new codes were applied, as the interviews conducted in this phase were aimed at gathering additional insights. The development of new codes helped me in organizing and constructing categories within the additional data that I gathered from the interviews. Second axial coding has been used, where data is coded around several single categories, and where it is checked whether the data codes developed thus far cover the data sufficiently. The primary purpose of the process of axial coding is to determine which elements in the research are the dominant ones and which are the less important ones (Boeije, 2010).

Finally, data has been organised and analysed cross-sectional across the four methods of data collection – observational data, self-reporting, interviews with replay supervisors, interview with healthcare professionals with safety expertise - based on the five independent variables (Ritchie & Lewis, 2003). This has been done by mapping the data obtained from the three different methods in a data matrix organized per theme in excel.

4. Results

Within this result section the findings of the three replays conducted in phase 1, and the findings of the interviews conducted in phase 2 will be discussed. The details of each replay conducted in phase 1 can be found in Table 2. In order to enable the reader to get a more comprehensive impression of the replays I decided to add short case-descriptions. The information about these cases has been fully anonymized to ensure the privacy of the respective patient and involved healthcare professionals. Additional, quotes of how the supervisors experienced the replays have been added to the table to serve as a first impression of progress of the replay. Within the result section each replay will be discussed according to the independent variables, being self-efficacy, support, learning experience, causal attribution and climate of

psychological safety. It was chosen to discuss each replay separately for each independent variable as it turned out that the features of each group had a considerable impact on the results. In the table at the beginning of each section a short summarization of the results of each replay can be found. Within this table the observational scores, average self-report scores and minimum and maximum individual scores were included. By adding the maximum and minimum individual scores it is shown what the range of scores is, therefore giving insight in the individual differences within the replay group. Furthermore, description of the underlying mechanisms were included in the table as they form an essential aspect in understanding the findings of each replay. In the result section following on the table, the observations conducted from the replays will be elaborated on, supported by quotes from the replay supervisors which were collected through interviews and the self-reports filled in by the participants. In the second part of the results, the insights and perspectives from the interviews conducted in the second phase on the influence of both safety perspective on healthcare professionals will be discussed. Each section will be concluded with a discussion of the proposition of the respective variable. It has be taken into account that the quotes that were used within this result section were translated from Dutch into English and thereby could involve subjectivity. The result section will be finalized with an integrative overview of the findings. Lastly, a section with additional findings was added to this research consisting of additional insights that I gained during the interviews.

Before we start discussing the results of this research, a first aspect that is important to note is the combination of Safety-I and Safety-II which was used during replay 2. Initially this replay had been categorized as a Safety-I replay considering the outcome of the case and the fact it would normally be processed using a Safety-I approach. However, during the replay the supervisor managed to make the participants also look at the case from a Safety-II perspective, by asking them to describe what they thought went really well despite the fact that the outcome of the case was less positive. Although the course of the replay thus didn't correspond with the intended method of data collection the replay turned out to be a dynamic and interesting process where in this case aspects of both methods have been observed which was confirmed by the supervisors. It provided this research with the important insight that both safety perspectives are not static perspectives consisting of rules and guidelines, but that they are in motion and depend upon the behavior and attitude of the employees. Furthermore, it showed that within one replay it is possible to implement both perspectives. The implications of these combined perspectives are further discussed in the result and discussion section.

Table 2. Features of the replays included in this research

Name	Nursing Departments	Participants	Case description	How the supervisors described the replay
Replay 1 *Safety-II*	Orthopaedics	N=7 1 physician 1 physician assistant 5 nurse practitioners	Patient H was hospitalized for an operation following a spinal cord injury. No severe errors were made within this case, points that were evaluated as very good were among others the contact of the doctor with the family.	*"The replay started difficult because the participants didn't know what to discuss as it wasn't based on a complaint which is usual the case" "But in the end we got some points out of it which we can work on"* – Supervisor A
Replay 2 *Safety-I + Safety-II*	Gynaecology	N=7 1 gynaecologist 1 paediatrician 1 physician assistant 1 operation assistant 3 neonatology nurses	This calamity was about a birth during which unexpected complications occurred. The start of the birth did not deviate from a normal birth. However, when the child was born it had problems with among others breathing after which reanimation followed.	*"I would describe this replay as a positive experience" "The emphasis was on interaction rather than on errors"* - Supervisor B *"We both looked at positive aspects but also at aspects which had been more difficult. Once we started to look at those difficult aspects you tend to go back towards analysing errors (or nearly errors) again"* - Supervisor C
Replay 3 *Safety-I*	Orthopaedics	N=11 2 physicians 1 physiotherapist 2 house officers 2 team leaders 4 nurse practitioners	Reason for this replay was a complaint letter written by a patient. She was operated at ETZ Waalwijk to receive a new knee. Due to complexities that occurred after the surgery, a longer stay in the hospital was necessary than intended after which she was transferred to ETZ TweeSteden. During her stay she perceived her care to be non-optimal.	*"I think this replay was prepared very well, which was beneficial for the course of the replay. Furthermore the ambiance within the replay was good. The only thing that diminished the learning effect was the fact that some time had passed since this patient had stayed on this department"* – Supervisor D *"In my opinion this replay was a positive experience, where everyone was very open". "I don't feel like we have looked at any successes, mostly on identifying the points of improvement"* – Supervisor E.

4.1. Self – efficacy

4.1.1. Replay results

Table 3. Results of the observation checklist and the self-reports on self-efficacy

Name of the Replay	*Observation score*	*Average Self-report score**	*Minimum individual score*	*Maximum individual score*	*Underlying mechanism*
Replay 1 (SII)	Moderate level of self-efficacy	3.8	*3*	*4*	*Focus on work processes in general*
Replay 2 (SI+SII)	High level of self-efficacy	4	*3*	*5*	*No clear errors in process* *Preparation beforehand* *No judgment on their actions*
Replay 3 (SI)	High level of self-efficacy	4.1	*3*	*5*	*Different perceptions about case description and patient complaint*

**1=low level of self-efficacy, 5=high level of self-efficacy*

Replay 1 – Orthopedics –Safety-II

Through the observational scores it was observed that the participants showed a moderate level of self-efficacy. From the start of the replay onwards it became clear that the participants had difficulties discussing this case. According to the participants this was because there was no clear complaint that had to be discussed about this case, which caused in their eyes a lack of focus. In the beginning of the replay participants explained the actions they had conducted during this case and the rationales behind this. Supervisor A observed that this was difficult to do for the participants: *"people had a hard time recalling their own actions".* One reason that was appointed for this was because participants perceived their actions hadn't influenced this case in any significant way. This made that during the replay participants focused more on work processes in general, hereby acknowledging that they sometimes feel insecure about their work in general. This is also shown in the range of individual scores, where no one scored their self-efficacy on the highest level. The participants experience this insecurity because of their dependency on other colleagues, for example physicians or supporting services. Because they have to wait to receive information from other parties they are not always able to provide the best care in their eyes. Also, they lack clarity in the work processes of these colleagues. Another reasoning behind the moderate level of self-efficacy was due to the way compliments were given and received by the participants. During the replay it was observed that when employees

received compliments they wouldn't fully accept them right away as they didn't perceive their actions to be special: *"but I always do it like that" (replay participant).*

Replay 2 – Gynecology – Safety-I + Safety-II

The observations of the level of self-efficacy were during the first part of the replay mainly focused on one person who was telling the story. She did most of the talking as she was the main character involved in the case. This person showed a high level of self-efficacy as she could clearly tell which decisions she had made during the course of the case, and why she had made these decisions. While doing so she expressed that she hadn't doubt her knowledge and experience while doing her job. Critical questions of the replay supervisors didn't seem to change this confidence. Also through the observations it was reported that the other participants showed barely signs of insecurity about their knowledge and actions. As supervisor (C) stated: *"Everyone could perfectly tell why they did what they did".* One of the respondents reported: *"Sometimes you have situations where the sweat breaks out, but I did not experience such thing here".* From the observations and during the interviews with the replay supervisors two underlying reasons were appointed for this high level of self-efficacy: the preparation of the group and the fact that they hadn't been able to indicate a clear flaw in their actions. *"The group had on beforehand taken a critical look at their actions" (supervisor B).* This was confirmed by supervisor C: *"They had reflected before, but during the replay they went through the process again".* However, a critical note was voiced by the second supervisor as he stated that *"sometimes I felt like they extra stressed their confidence in their actions in order to convince us, a kind of overcompensation" (supervisor C).* The second reason that was appointed for the high level of self-efficacy was the fact that the group hadn't been able to indicate clear flaws in their actions. One of the respondents stated that: *"Next time, I would do things in the same way"* (r*eplay participant).*

Replay 3 – Orthopedics –Safety-I

During the replay it was observed that the participants were confident about the work they did, showing little insecurities. The main reason that was repeatedly cited for this was the fact that the participants didn't recognize the points that the patient cited in her complaint letter. During her hospital stay they hadn't been aware that she was unsatisfied with the care she received. *"They are not insecure about the work they performed because they had an entirely different perception of this case" (supervisor D). "Therefore, I think the nurses won't change their work routines, but probably only pay more attention to the way they communicate with the patient" (supervisor D).*

4.1.2. Interview results

Safety-I. Both physicians, nurses and advisors state that in their eyes the Safety-I perspective in the organization definitely has an impact on the confidence of employees in their actions. *"I can absolutely*

say that the way we currently handle mistakes influences the confidence employees have in their work. No matter how safe we want to make it feel, it still feels like "you made a mistake" and the trigger to start making improvements is an error, something negative. An employee feels bad about this, and from this negative feeling they are trying to improve their work" (physician A). However, it is argued by most respondents that the effect of the Safety-I perspective is stronger felt after someone made a mistakes than during their daily work. *"I think during their daily work the Safety-I perspective won't decrease their self-efficacy as we are not constantly saying what they are doing wrong" (advisor A).* About the effect of Safety-I after someone made a mistake advisor B says *"After someone made a mistake this person is going to check his or her work three times. This is a good thing, but the motive is out of fear which won't improve their work".* Physician A says *"One of our nurses made a mistake, and she felt super bad about this. After an investigation some procedural adjustments were made to prevent this error from happening again. But this is only a procedural adjustment, the nurse stays with the idea 'I did something wrong'".*

Safety-II. All respondents are confident about the positive effect of Safety-II on the level of self-efficacy. *"Of course, if someone is interested in- and compliments you about your work it gives you a good feeling, those things makes you grow" (nurse A). "Often you don't realize that you are good at something. But if people start asking you how you always manage to get that patient on the radiology department, that is when you start realizing that you are good at this. I'm sure that does something with your self-efficacy" (advisor A).* Physician B recognizes the observations from the replays that people found it hard to accept compliments: *"we are not used to be proud of ourselves, as we consider it normal that we do our work the best we can. This is also how we handle feedback, mostly looking for points of improvement".* Nurse B argues about this: "*Once you do it more often they learn to accept and appreciate what you say, also because they know that I only say it if I really mean it". "We have to stop trying to improve the things some people are not good at, but start to appreciate them for the things they are good at. If people are appreciated for what they are good it this enhances their self-confidence".* Thereby she is also acknowledging that it has to be recognized that best practices are not the same for everyone.

4.1.3. Self-efficacy – Proposition

The following proposition was stated for the effect of safety perspective on the level of self-efficacy:

Proposition 1: A Safety-II perspective leads to a higher level of self-efficacy compared to a Safety-I perspective

This proposition was *not supported* by the replay results. The score on level of self-efficacy of replay 3 (Safety-I) was higher compared to the scores of replay 1 and 2 (Safety-II).

This proposition was *partially supported* by the interview results. The respondents argued that Safety-I only leads to a lower level of self-efficacy in case of errors. All respondents were positive that Safety-II leads to a higher level of self-efficacy, although this effect might differ per person.

4.2. Support

4.2.1. Replay results

Table 4. Results of the observation checklist and the self-reports on support

Name of the Replay	*Observation score*	*Average Self-report score**	*Minimum individual score*	*Maximum individual score*	*Underlying mechanism*
Replay 1 (SII)	High level of support	4.4	*4*	*5*	*Team familiarity* *Sharing of best practices is not stimulated at all levels*
Replay 2 (SI+SII)	High level of support	4.5	*4*	*5*	*Team familiarity*
Replay 3 (SI)	Mediate level of support	4.4	*3*	*5*	*Binding by negative factors*

**1= level of support is perceived to be low 5=level of support is perceived to be high*

Replay 1 – Orthopedics –Safety-II

This replay was conducted within a team that works with each other on a daily basis. Supervisor A confirmed that this is a team that is constantly working to improve the quality of care, also by stimulating each other to improve. The support level during the replay was observed to be high. Supervisor A instructed the participants in front to also appoint to the good behavior of colleagues. Participants complimented each other and appointed to each other's plus points. This was clearly something that they were not used to do as some participants reacted with *"but I always do it like that?"* Thereby, it was made clear by the others that this was a good thing, but that this was not always done in the same fashion by other colleagues. The nurses appointed that this was especially the case with the physicians. They gave the present physician some compliments about his work processes, and asked him why the other physicians didn't do it in the same way. The physician reacted by saying that the other physicians have their own work processes and habits. According to supervisor A this potentially lowers the support and the feeling that they are responsible together as an organization and as a team. *"At the department we are all working together on continuous improvement. I think it*

is important that the physicians are also paying attention to this. They should share their best practices as well, instead of all doing their own thing. Especially if it is indicated by the department that they find a specific workaround enjoyable" (supervisor A). It thus can be said that the support within this replay was high, and that they were supportive towards each other's work practices. They recognized the benefits of appointing to- and sharing of best practices. Yet, the support and sharing of best practices throughout the different layers within the organization could be improved according to supervisor A.

Replay 2 – Gynaecology – Safety-I + Safety-II

This replay scored high on the level of support. Both during the observations and during the interviews afterwards it was indicated that the people that took part in the replay were not there as separate individuals, but as a team that was familiar with each other and work together regularly. Also the participants themselves indicated that they felt a high level of support, resulting in an average score of 4.5 on the support items. In the observation checklist it can be found that the participants often gave each other compliments, both specifically aimed at this case but also compliments about their work in general. Both supervisor B and C emphasized the large base of trust within the team, and the positive effect of their support towards each other on their performance: *"This has been a resilient team, they have adapted to each other and they have been flexible and resilient. Because of this, this case has ended well."* This was also reflected in the fact that the group indicated that they not only felt responsible as an individual, but also as a team and as an organization. One of the underlying reasons being the fact that they had worked with each other for a longer period: *"I have been working with them for many years. It feels very familiar" (replay participant).* Interestingly, the fact that this case was a calamity, and that an internal investigation had been started, seemed to only raise the level of support within the group. They were eager to confirm each other's stories and complemented each other if they deem it necessary. A more critical interpretation of this behavior was made by supervisor C who stated that: *"they acted understanding towards each other, but at one point I also felt that this became a bit defensive. That they expressed this confidence towards each other to keep the intruder out, and to make clear that these actions didn't need to be questioned".* Still, he indicates that when the replay progressed this behavior disappeared as the group had gained more confidence in the replay supervisors, and that real support was shown towards each other.

Replay 3 – Orthopedics –Safety-I

As can be seen in *Table 4 t*here is a discrepancy between the observed and the self-report score. The (peer) support that was created during the meeting was mainly characterized by joint disapproval of the fact that the main physician of this patient was absent during the meeting. *"I, and the rest of the participants as well, found it very disturbing that doctor name was absent. He should have been there" (supervisor D).* The participants that were part of the replay were very friendly towards each other, but

very critical towards participants that weren't part of the replay. Especially the nurses were supportive towards each other, but they gave the impression that they only felt responsible for their own team and less as an organization.

4.2.2. Interview results

Safety-I. All respondents agree on the fact that the perceived level of support differs per department within the organization. "T*he feeling of shared responsibility is not always felt, which I find regrettable" (nurse A).* Both advisor B and nurse B think this difference is mainly caused by the different doctors, team leaders and management teams working at these departments. *"When someone on my department has made a mistake, I say to these people 'I do not mind that you make a mistake but the way you deal with this is what matters to me".* But she emphasizes that not all team leaders act like this. *"When I hear how some team leaders act I can understand that the culture on those departments is not very good" (nurse B).* Important to mention is that the respondents do not directly link this differed level of support to either of the safety perspectives. However, as all respondents have stated that the current safety management system of the hospital is based on a Safety-I perspective, the divided level of support can possibly be attributed to this perspective.

Safety-II. All respondents agree that an emphasis on best practices, and a more positive approach to safety, will contribute to a higher perceived level of support within the team. Nurse B argues that she is confident that one of the reasons for the low level of sickness absence on her department is because people feel appreciated for what they do. *"I have colleagues walking around here, and all of them can tell you for what qualities I value them".* Furthermore she argues that this personal stimulation is reflected in the rest of the group: *"those who I compliment for their good behavior and practices are going to express this behavior more, after which the rest of the group mostly follows them".* Physician B has recently transformed his meetings with his physician-assistants from "complication-meetings" into "quality-meetings" with the Safety-II perspective in the back of his mind. Within these meetings he also discusses cases that went very well, in which he emphasizes that he is very proud of the way his team handled a case. About the question how this affects his team he states *"Of course that is a bit subjective as I haven't measured this, but I absolutely believe that is has a positive affect".* Though he is realistic *"I think in the issues of the day the effect will get lost again, therefore it is important that we keep emphasizing this positive practices also during work on the work floor. If only by saying these little things like 'you gave that patient a nice bandage'".*

4.2.3. Support – Proposition

The following proposition was stated for the effect of safety perspective on the level of support:

Proposition 2: A Safety-II perspective leads to a higher level of perceived support compared to a Safety-I perspective.

This proposition was *partially supported* by the replay results. The (observational) score on level of support of replay 1 and 2 were higher compared to the observed level of perceived support within replay 3 therefore supporting the proposition. However, the self-report scores of replay 3 showed a high level of perceived support thereby not supporting the proposition, although it can be discussed if this is a desirable kind of support and the range of scores show that not everyone felt this high level of support.

This proposition was *supported* by the interview results. The respondents argued that within the current Safety-I system a differed level of support is perceived among the different departments. All respondents were positive, and some already experienced, that Safety-II leads to a higher level of perceived support.

4.3. Learning experience

4.3.1. Replay results

Table 5. Results of the observation checklist and the self-reports on learning experience

Name of the Replay	*Observation score*	*Average Self-report score**	*Minimum individual score*	*Maximum individual score*	*Underlying mechanism*
Replay 1 (SII)	Mediate learning experience	3.7	*2*	*4*	*Not used to focus on successes*
Replay 2 (SI+SII)	High learning experience	4.2	*3*	*5*	*Enthusiasm about the replay method*
Replay 3 (SI)	Mediate learning experience	4.2	*2*	*5*	*Aging of the case* *Different perception of the case*

*1 = learning experience is perceived to be low 5 = learning experience is perceived to be high

Replay 1 – Orthopedics –Safety-II

This replay scored mediate on learning experience. Two coherent reasons can be appointed for this: the preparation of the replay by the participants and the fact that this was the first time they had to focus on the successes within a case. One of the participants commented that she wasn't sure what was expected from her. Replay supervisor A said that although this was clearly stated in the invitation the participants obviously had trouble focusing on the successes within a case instead of the

complaints. *"The focus wasn't on the complaints, so it seemed that they had more trouble finding out what to focus on"* (*supervisor A)*. Furthermore, during the preparation phase it was showed that the participants were less triggered to discuss a case that wouldn't be discussed in a Safety-I perspectives. The physician responded to the invite by stating that he didn't see why to invest time in a case that went well. This clearly showed that learning from what went well didn't directly trigger the invited employees. Still, in the end the supervisor indicated that they derived some valuable points of attention and improvement from the replay. However, she thinks that it will take a fair amount of time before people consider it to be normal to also learn from successes.

Replay 2 – Gynaecology – Safety-I + Safety-II

This replay scored high on the level of learning experience. The participants reported an average of 4.1 on learning experience. They mention that the main reason for this is the replay method which was used for the first time on this type of case. The difference is that, within this replay, the case was reflected upon in a group setting, compared to the individual interview setting that is customary in this type of cases. As already explained in the introduction, this is also the main reason this replay turned out to be a combination of Safety-I and Safety-II. As is usual in this case, it started out as Safety-I, questioning the possible errors that were made. However, it quickly turned towards Safety-II as they were questioned more about the circumstances and the usual procedures creating a more positive approach. Supervisor C explains: *"I have the feeling that they have learned more in-depth, and that everything that was learned was more internalized".* Supervisor B gives a more detailed description of his perspective on the learning experience of this group: *"Through the replay people get a glimpse into the world of people who have been in the same situation, making them realize that sometimes they have misinterpretations of the situation that took place. This has to do with the fact that everyone focuses on their own responsibilities, look at things from a different perspective and experiences things differently. This replay makes broadening of what has happened possible, which in my opinion is the learning effect for this group".* The only thing that made learning from this case a bit harder in the eyes of the participants is that during the replay they stated they found it difficult to indicate what they have learned as this was an exceptional situation, and what they would do differently in the next situation. Still, this did not affect their positivity about this way of learning.

Replay 3 – Orthopedics –Safety-I

A few critical points were made both by the supervisors as well as by the participants that, in their eyes, diminished the learning effect of this replay. The first being the fact that the patient had been treated already a few months ago. *"This made it hard for some of the participants to recall the exact course of events" (supervisor D).* Furthermore, the fact that not all people involved in the case were present was by some people, especially by the present physician, indicated as a significant

disadvantage because not all parts of the story could be filled in completely. Still, everyone concluded that they got some valuable learning points out of the meeting, which is also reflected in the high scores from the self-reports. *"During the daily work routines you often only have time for a short reflection or feedback, but you never get to the core points. Also because there are multiple disciplines involved" (supervisor E)*. Supervisor D indicated furthermore that a good preparation on forehand of the case had contributed much to the smooth running of the replay.

4.3.2. Interview results

Safety-I. All respondents experience that people are more triggered and used to learn from errors than from successes. Furthermore all respondents agree that this learning is still done in a retrospective view. Physician A argues *"We are truly focused on what went wrong. When you ask people to reflect on their own actions this always start with what went wrong. I noticed that I also do it like this myself".* Nurse A explains why she thinks people find it easier to learn from a case in which something went wrong: *"people remember it very well when something goes wrong. But, in case they have a patient and something threatens to go wrong but in the end everything turns out to be fine, they do not store this in their memories. It is not like they think 'oh I have to report this because it went so well".* Hereby it is argued that learning from errors is not a bad thing, only that is has to be done in the right way. *"We try to learn from cases without a hindsight bias. When you start at the beginning of the case and then step by step evaluate the process, and reconsider the cognitive thinking process of the involved person, people start to realize that they can end up in the same situation, which makes them less judgmental towards the person who made the error" (physician B).*

Safety-II. All respondents agree the Safety-II perspective currently leads to a lower learning experience compared to a Safety-I perspective. Nurse A explains why she thinks this is the case: *"I think it is a challenge to identify those cases that were successful as people often do not consider them to be successful as a result of their individual actions".* Advisor A adds to this *"the current mindset of our employees makes it more difficult to discuss a positive case. I think it will take a few years before people consider it to be normal to look a positive cases".* Physician B explains during the interview that he already tried to experiment with these positive cases in his daily work. He asks his physician assistants to share the cases with him that they are really proud of. According to him this gives them insight in how resilience can lead to a positive outcome. *"These cases show them situations in which they thought "At first I didn't expect this situation to go well but in this end it did go well anyway, that's really cool!". "It really shows them how flexible, resilient and innovative they can act" (physician B*). Still, also he has to admit *"it takes quite some time to get used to this approach. We consider it a normal thing to do our job the best we can, and often use feedback mostly to learn from our mistakes instead of our excellence performance".*

4.3.3. Learning Experience – Proposition

The following proposition was stated for the effect of safety perspective on learning experience:

Proposition 3: A Safety-I perspective results in a higher level of learning experience compared to a Safety-II perspective.

This proposition was *supported* by the replay results. The scores on learning experience were higher for replay 3 compared to replay 1. Even though, that during the execution of the second replay an additional Safety-II perspective was adopted, the trigger to start a replay, and thus the trigger to learn from, still included a Safety-I perspective. Thereby, confirming the proposition as this replay showed a high level of learning experience.

This proposition was *supported* by the interview results. The respondents argued that within the current mind-set of the employees Safety-I triggers a higher learning experience than Safety-II.

4.4. Causal attribution

4.4.1. Replay results

Table 6. Results of the observation checklist and the self-reports on causal attribution

Name of the Replay	*Observation score*	*Average Self-report score**	*Minimum individual score*	*Maximum individual score*	*Underlying mechanism*
Replay 1 (SII)	Both internal and external	3.2	*2*	*5*	Room to discuss more general (external) causes that influence daily work
Replay 2 (SI+SII)	Mostly internal attribution	3.4	*1*	*5*	Rewarded for internal analysis
Replay 3 (SI)	Mostly external attribution	2.8	*1*	*5*	Many disciplines involved Not used to reflect on own actions

*1 = complete external attribution 5 = complete internal attribution

Replay 1 – Orthopedics –Safety-II

From both the observational scores and the self-report scores it can be observed that both internal and external attributes were discussed during the replay. Starting with the internal attribution it was clearly observed that the participants acknowledged their responsibility in taking care of the safety of the patient. They motivated the actions they performed, thereby admitting that they possibly could have done this differently. Attention was paid to external causes as well. The main reason that was appointed for this was the broad focus of the case. As there wasn't one person who was mainly involved in the case, or one main event to be zoomed in on, room was left to look at more general

factors. Participants were discussing external factors that influence the way they do their job. For example the fact that the patient was treated during the weekend in which the routines are different compared with during weekdays.

Replay 2 – Gynecology – Safety-I

The observational scores and how the participants reported their own causal attribution are in line. Both show that they felt safe to acknowledge their responsibility during the replay as they have expressed themselves the same during the replay as while filling in the questionnaires. Mostly, the participants acknowledge that they are responsible for the way they behaved, the choices they made and the consequences of their actions. The reason for this is according to supervisor B that they have had the time to look critically at their own behavior and doing an internal analyses. By doing so they created clear view for themselves and were able to recognize to what extent they had been responsible for the course of the case. An important aspect in this is, according to supervisor B that they felt that during the replay this internal analysis was rewarded and appreciated lowering the threat to take responsibility. Furthermore, some environmental factors were discussed as well. However it was indicated that these were not part of the core problem. For example technical failures and unfamiliarity with the design of the crash cart. The average of scores are lowered by the people who were less involved within the case, for example because they were only involved for a short period of time. This is also reflected in the range of individual scores, where one participant indicated that she had very little responsibility during the course of this case.

Replay 3 – Orthopedics –Safety-I

During this replay attention was mostly paid to external factors. Both from the observational scores and self-reports can be derived that the participants mostly held external factors instead of internal factors responsible for the course of the case. According to supervisor E this could possibly be explained by the many disciplines that were involved in the process, together with the fact that the nurses had only been involved for a short period of time, diminishing the feeling of individual responsibility. This was also noticed by supervisor D, who at one point interrupted the participant who was talking, and made the comment *"stop holding others responsible, instead take a look at yourself and consider what you could have done better".* Reflecting on this during the interviews he argued: *"the nurses are not yet on the level were they really look at themselves to see where they can improve".* Supervisor E made a similar comment about this during the interview: *"you can see that they are not used to reflect on their own actions and that they still have to learn how to do so".*

4.4.2. Interview results

Safety-I. The interview respondents agree that Safety-I can lead to more external attribution compared to internal attribution, although different reasons are cited for this. Within the replays it was seen argued that this is because nurses are not used to reflect on their own behavior when it comes to errors. Nurse A experiences this in her daily work *"I see that people are soon tempted to put the responsibility on someone or something else, they do this to protect themselves from being blamed, it is something natural". "I think it is very important that if something went wrong because of your actions you own up to this, and do not hide behind the rules" (Nurse A).* Another explanation for the fact that people mostly look at external factors when something went wrong was given by both physicians and advisor B, arguing that people blame external factors because often these factors actually do play an important role in the occurrence of the error. *"Often the circumstances are the substantial factor that cause the error, not so much the professionals themselves because they really want to perform a good job. They find it super tedious when something goes wrong" (physician B).* Advisor B states "*I think sometimes it is justified that people hide behind these systemic factors, as there are certain boundary conditions to do your job that are not well arranged around here. Of course you can still take a critical look at yourself then, but the system also doesn't facilitate you to do a good job*". Furthermore, physician B argues that also the form of feedback that is given in response to a made mistake plays a role in taking responsibility for actions: *"when we give feedback in a non-constructive manner you notice that people are going in the defensive-mode".*

Safety-II. The respondents expect that a Safety-II view stimulates employees to look more at internal attribution compared to a Safety-I perspective. Nurse A agrees that a perspective where more attention is paid to the functioning of the system, and less to the employee itself as the responsible factor, could stimulate employees to take responsibility for their work in daily practice. *"I think it is very important that we make it feel safe for them. That when you open up about something that you feel like you are being heard and taken serious" (nurse A). "I think people feel more confident to look at themselves at the moment this is done from a positive approach" (advisor B).* Physician B emphasizes that it is important that people look at their internal attribution to realize how their actions have influenced the outcome of the case, however he argues that in doing so it is important to also take the conditions in consideration. *"I know how these circumstantial factors play an important role, so I always ask things like "what was the time, how busy was it, how many other patients were you threating?" So you go back to that situation and realize under what circumstances this case took place" (physician B).*

4.4.3. Causal attribution – Proposition

The following proposition was stated for the effect of safety perspective on learning experience:

Proposition 4: A Safety-I perspective leads to a higher level of external attribution, a Safety-II perspective leads to a higher level of internal attribution.

This proposition was *supported* by the replay results. The replay using a Safety-II perspective showed higher levels of internal attribution compared to the Safety-I perspective were focus was more on external attributes.

This proposition was *supported* by the interview results. The respondents argued they expect Safety-II to trigger higher levels of internal attribution compared to a Safety-I perspective.

4.5 Climate of psychological safety

4.5.1 Replay results

Table 7. Results of the observation checklist and the self-reports on climate of psychological safety

Name of the Replay	*Observation score*	*Average Self-report score**	*Minimum individual score*	*Maximum individual score*	*Underlying mechanism*
Replay 1 (SII)	High level of psychological safety	4.3	*3*	*5*	Room to discuss more general (external) causes that influence daily work
Replay 2 (SI+SII)	High level of psychological safety	4.3	*2*	*5*	Rewarded for internal analysis
Replay 3 (SI)	High level of psychological safety	4.3	*2*	*5*	Many disciplines involved Not used to reflect on own actions

*1= low psychological safety experienced 5= high psychological safety experienced

Replay 1 – Orthopedics – Safety-II

As is reflected both through the observational scores and the self-report scores there was a high level of psychological safety within this replay. It was observed that everyone in the replay felt safe to ask questions both to each other as well as to the present physician. In line with this there was no hierarchical difference perceived. According to supervisor A this is due to the culture on the department: *"On this department there are hardly hierarchical differences and people are able to openly communicate with each other".* Because there was no main responsible person in this case, everyone was able to equally give their opinion. There were no dominant participants. An exception

to this was the nursing student who raised her voice less as she wasn't as familiar with all the processes as the rest of the group. Still, the supervisor suggested that there is always room for improvement. Speaking up and voice can, according to her, be improved by organizing more these replays as they form a good opportunity to openly question each other in a safe environment.

Replay 2 – Gynaecology – Safety-I + Safety-II

As can be seen from the self-reported scores the climate of psychological safety was scored very high. Interestingly, the development from a Safety-I to a Safety-II perspective is clearly visible through the observational results and the interviews with the replay supervisors. This resulted in an opportunity to compare the two perspectives within one replay. Supervisor C stated that in the beginning people were scanning the setting, being a bit suspicious. According to supervisor C the reason for this being that they are not used to the fact that others are also interested in what went well and the background and circumstances under which things happened. He described it as: *"People were thinking: you want to know what went right? Up till what point? So you can use it as a nice bridge to get back to what I did wrong?"* This is also indicated in the range of individual scores, where one participant indicated that he not totally felt safe to admit certain errors that were made. However, this is an exception as this was the only "2" that was scored, which is reflected in the high average score. Trust was therefore named by one of the supervisors as a key concept here. Once people experienced that they could trust the people leading the replay, and that the goal of the meeting was not to shame or blame people but a genuine interest in the process and people involved, it was felt by the replay supervisor that the participants felt safer to express their opinion. Three aspects clearly showed this. First, the fact that the participants not only talked about facts but also about how they felt, expressing their emotions. Second, the barrier to address each other, both on errors and compliments, was experienced to be very low. Although different function levels were presented it was indicated both through the observations and the interviews that there was no hierarchical difference felt. Third, where everyone stated that they were confident about their actions during the case there was one participant who, in the end, voiced that she had felt very insecure during the situation. This indicated that there was sufficient room for everyone to express their opinion and feelings. *"Everyone felt save enough to give their opinion and ask questions" (supervisor B).*

Replay 3 – Orthopedics –Safety-I

The level of psychological safety was experienced to be high during this replay. There were no dominant participants and everyone was equally giving their opinion. Although during the replay it was observed that the present physician could more easily attract the attention than the other group members, this didn't result in the feeling that there was a hierarchical difference. According to supervisor D this was also due to the fact that although many different disciplines were involved

everyone was familiar with each other's working methods. Another reason to assume that the participants felt safe during the replay was the fact that participants were openly expressing their critiques towards the course of the case. It should be noticed however that most critical comments were aimed at the physician who was absent and the fact that they could not find themselves in how the patient described her hospital stay. Thus, the comments did not directly point to employees who were present in the group. Lastly, a factor that, according to supervisor D, contributed to the high level of psychological safety was the fact that the supervisors were independent. "*I thinks it is very nice to have an independent person leading the replay as they do not know the patient and are therefore very open minded and have no pre-judgements".* According to supervisor D this stimulated the feeling of safety within the group.

4.5.2 Interview results

Safety-I. All respondents agree the safety culture within the hospital is based on a Safety-I perspective, taking errors and mistakes as starting point for the analyses of safety. It is stated by advisor A & B, nurse B and physician A that they perceive that the Safety-I perspective does not have a negative influence on the daily work of the employees due to the open reporting culture. *"I really think that there is a reactive culture, in which we can openly talk with each other about incidents and use them as learning points. And that people are not afraid to report these mistakes." (advisor A).* Which is confirmed by nurse B stating *"we have a very open reporting culture, which makes it easier for us to seek for the best solutions".* Advisor B states *"we are aware that we make errors and that it is okay to look at them, people are not offended or scared about this anymore".* Nurse A expresses the same vision about reflecting on incidents *"we have a very open reporting culture, which is reflected in the amount of VIM's we receive".* VIM (veilig incidenten melden) is the internal system for reporting incidents. Also physician A expresses that he perceives the internal VIM system as being safe. However, he states that this feeling changes if an incident is taken to a higher level. *"When an investigation is started following an error this automatically feels unsafe because it is reported to the healthcare inspectorate" (physician A).* Contradictory to what advisor A & B, nurse A and physician A stated, physician B indicates that he perceives the Safety-I perspective certainly affects the daily work processes: *"because of the way cases are treated we are constantly trying to seal everything, report every detail. Of course it is important to document everything well but you have to do this because it is important for yourself, or for the patient. And not because we are afraid for external authorities. But this is the daily reality, certain sentences are reported to make sure everything is sealed. This costs a lot of effort and time that could also be invested in taking better care of the patient".* When looking at hierarchical differences and speak-up culture it was observed during the replay that, although different function levels were presented, everyone was able to equally give their opinion, and no hierarchical

difference was perceived. According to the interview respondents this reflects the daily situation with the departments. However, they state that speak up culture is influenced by the extent to which physicians and nurses are familiar with each other. *"Within the department it is fine to address each other on errors, but outside the department I think the threshold is slightly higher to do this" (nurse A).*

Safety-II. All respondents think a Safety-II perspective would be more beneficial for the climate of psychological safety and the speak-up culture compared to a Safety-I perspective. *"It is easier to ask your colleague to explain something he's doing really well compared to talking to him about an error he made" (advisor A).* Physician A argues that if processes are looked at from a safety-II perspective, taking into account the circumstances under which things happened and focusing on things that went right this has a positive effect on the level of psychological safety. *"This makes people less scared to, if they happen to be part of a case that goes wrong, open up about this. Because they know it could have happened to anyone else. And that the cause isn't just that one person" (physician A).* However, everyone emphasizes that the team leaders and the management have an important influence on the level of psychological safety. *"I think the extent to which people dare to speak up depends on which department or level you work in the organization. I believe there are departments where speaking up is fully accepted and even appreciated, but I also believe that there are still departments where speaking up is less valued. I think this difference is due to different managers, doctors and underlying team dynamics" (advisor B).* Furthermore, the respondents argue that also the personality of the employee plays an important role *"I think the extent to which you feel free to give your opinion really depends on what kind of person you are" (advisor A).*

4.5.3 Climate of psychological safety – Proposition

The following proposition was stated for the effect of safety perspective on learning experience:

Proposition 5: A Safety-II perspective creates a higher level of psychological safety compared to a Safety-I perspective.

This proposition was *not supported* by the replay results. Even though replay 3 scored a bit lower on climate of psychological safety this is a negligible difference as the observed level showed a high climate of psychological safety, which can be explained by the fact that people are used to look at errors.

This proposition was *partially supported* by the interview results. The respondents argued that the level of psychological safety is only lower in a Safety-I perspective if the error is taken to a higher level, most respondents agree that this depreciating effect is not felt during their daily work. Yet, the respondents expect that a Safety-II perspective will lead to a higher climate of psychological safety compared to a Safety-I perspective.

4.6 Integrative overview of the results

Table 8 provides a summary of the findings for each proposition highlighting the most important findings for each independent variable

Table 8. Overview of the results.

Proposition	Replay results	Interview results	Reasoning
Proposition 1: A Safety-II perspective leads to a higher level of self-efficacy compared to a Safety-I perspective	*Not supported*	*Partially supported*	●Dependent on whether the processes focus on individual actions or work in general ●Dependent on perception of the case (if the individual perception is consistent with how the case is described). ●Dependent on the extent to which actions are judged.
Proposition 2: A Safety-II perspective leads to a higher level of perceived support compared to a Safety-I perspective.	*Partially supported*	*Supported*	●Dependent on the extent to which the team is familiar with each other ●Dependent on the difference between different layers within the organization ●Different kinds of support were observed (e.g. positive and negative support)
Proposition 3: A Safety-I perspective results in a higher level of learning experience compared to a Safety-II perspective.	*Supported*	*Supported*	●Not used to focus on successes ●Aging of the case (how well are the respondents able to recall the actions they conducted within the case) ●Enthusiasm about learning through replay method
*Proposition 4: A Safety-I perspective leads to a higher level of **external attribution**, a Safety-II perspective leads to a higher level of **internal attribution.***	*Supported*	*Supported*	●Dependent on the extent to which individuals are rewarded for internal analysis ●Dependent on how much the participants are used to reflect on own actions ●Dependent on the amount of disciplines involved
Proposition 5: A Safety-II perspective creates a higher level of psychological safety compared to a Safety-I perspective.	*Not supported*	*Supported*	●No hierarchical differences felt ●Ability to equally voice opinion ●The extent to which trust is present within the group

4.7 Additional findings

The results described in the sections above are for the purpose of testing the propositions and answering the main research question of this research. Next to the answers presented above, some additional findings have emerged from the interviews that, although they are not directly related to the research question, are still considered worth mentioning. Because if the Safety-II perspective is seen as a valuable contribution to the safety culture, which from the results mentioned above can be suggested, the next question focuses on how this safety perspective can actually be implemented in the organization. This chapter provides a first insight in this topic by discussing some points of consideration that were raised by the interviewees: the institutional environment, the organizational structure and the lack of safety instruments.

Table 9. Categorization of additional findings

Overarching findings	Specific points of attention
Institutional environment	• The healthcare inspectorate • (social) media
Organizational structure & culture	• Hierarchical organization with lots of different layers • Importance of team leaders and board of directors
Safety instruments	• Lack of tools to implement perspective and make it measurable

4.7.1. Institutional environment

The first factor that has been named by all six interviewees as having a considerable influence on the (change of) safety culture within the healthcare industry is the institutional environment. *"The fact that we have trouble changing towards a more positive perspective is because we are influenced by the way society, the healthcare inspectorate, and the media look at us" (physician B).* The healthcare inspectorate is according to the respondents the main influencer of the current Safety-I culture. *"The healthcare inspectorate expects from us retrospective analyses, in particular on calamities" (advisor B). "This makes it's hard to change people's mindsets, they think 'good that we do all these positive things, but in the end we still have to report our errors and mistakes to the inspection'" (advisor B).* Nurse A recognizes this hurdle: *"you have to justify everything that went wrong, so where is time left to look at that other part?"* Physician A recognizes that it is hard to achieve a positive safety perspective as *"the healthcare inspectorate demands things from us that are the opposite from this philosophy".* Still, he argues *"we have to keep investing time in these reports as they are required by law. So the question is, how can we combine these legal demands with this perspective of looking at things that went well?". "I think it is important that we go with this concept to the healthcare inspectorate, and figure out with them how to demonstrate that we have secured patient safety in a different way" (physician A).*

4.7.2. Organizational structure & culture

The second factor that was addressed by the respondents as having a considerable influence on the shift in safety perspective is the hierarchical structure and current culture within the organization. *"When you have an initiative a lot of people have to say something about this and have to give their permission to implement it which makes it difficult to get something done. This can demotivate you to share your ideas" (nurse A).* About the current situation she says: *"I think regarding Safety-II that we are on the right way, but you notice that right now everyone is working on an initiative on their own island. And the connection between these island is missing therefore making distributions of these ideas hard" (nurse A).* The respondents argue that, in order to make a shift in safety perspective possible in the organization, it is important that this is stimulated and supported by all the different layers in the organization, respectively nurses, team leaders, head of departments, doctors and the board of directors. Nurse B emphasizes the importance of the role of a team leader *"I think it is important to show to your team that you are proud of them, because it is my profound belief that the behaviour you show as a team leader is reflected in the behaviour of your employees".* Second, all respondents agree that the board of directors plays an important role: *"If we want to achieve a more positive safety perspective it has to be expressed by the board of directors that this is how we work in this organization" (physician A). "It would be nice if we would hear from them what we are doing well, but currently I feel like I have to get all the positive energy out of myself. To give an example, after my holiday I came back and my entire mailbox was filled with new rules that have been implemented and protocols that have been adjusted. Not any positive messages from the management team" (nurse B).* Physician B more explicitly explains why this support of the board of directors is so important in achieving a Safety-II culture: *"In order to achieve a shift in safety perspective we have to look at our entire organization, maybe provide our employees with training or invest in other safety systems. This is going to cost money, so the board of directors has to believe that in the end this will be beneficial for us. Maybe because we make less errors, or that we do our work more efficiently and with more joy. The problem is that at this point this is hard to prove, so in the beginning we may fall on our faces as it is a challenge to get all those managers, doctors and nurses on board" (physician B).* To answer the question what would stimulate a shift towards this Safety-II advisor B argues that *"we have to have a few enthusiastic professionals who are spreading it throughout the organization".* In congruence, physician A states *"next Friday at 4 o'clock we implement a culture change, it doesn't work like that. We have to start small, with a few initiators".*

4.7.3. Safety Instruments

The third factor that has been named by some of the interviewees as a point of attention are the safety instruments that are used in the hospital. When I asked the interviewees how safety and quality, and

the risks concerning safety and quality, are controlled and measured they are all able to present me with a list of instruments that are used. This fits well with the first additional factor that was discussed, because part of these instruments are used in order to meet the set requirements by the institutional environment. Nurse A indicates that she is very enthusiastic about the Safety-II perspective but that *"it remains very hard to apply it in practice". "It would be nice if there were some tools or handles that would help me to start implementing this perspective within the department" (nurse A).* Also physician A indicates *"I think we still miss some tools to make it measurable". "This is also important to be able to gather information in order to make management reports that show improvements and to justify our actions" (physician A).* Contrastingly, nurse B indicates that she has no need for these instruments *"I don't think you need those instruments to be able to create a Safety-II perspective. More importantly, it has to come from yourself, from your own attitude".*

5. Discussion

The goal of this research was to examine how the Safety-I and Safety-II perspective influence the safety performance of healthcare employees. By doing so it answered to the call of the National Patient Safety Foundation (2015) to consider new perspectives and methods to foster a safety culture and stimulate movement towards a safer health system. In total 1 replay has been conducted with a Safety-I perspective, 1 replay with a Safety-II perspective and 1 replay with a combination of both a Safety-I and Safety-II perspective. Additional interviews were held with physicians, nurses and advisors to gain additional insight in the effects of both safety perspectives. Contradictory to the interview results, the replay results showed that Safety-I, compared to Safety-II, does not lead to a lower level of self-efficacy, support, and psychological safety. Both interview and replay results agreed that a Safety-I perspective leads to a higher learning experience and more external attribution compared to a Safety-II perspective which triggers a lower learning experience and more internal attribution.

5.1 Main findings

5.1.1. Discussion on results

This research has provided some insights on how the Safety-I and Safety-II perspective relate to each other. This discussion will start with the first insight that the expected negative influence of the Safety-I perspective might not be as negative as was expected on forehand. Second, although this research showed that the negative influence of Safety-I might need some nuancing, it was still showed that healthcare professionals certainly feel that the Safety-II perspective will be a positive improvement in relation to the current dominant Safety-I perspective, in the second section it will be discussed why this is the case. Finally, a possible blended approach of both safety perspectives will be discussed.

The propositions that Safety-I would lead to a lower level of self-efficacy and a lower level of climate of psychological level compared to a Safety-II perspective were not supported, also the level of support wasn't diminished with a Safety-I perspective. This would incline that Safety-I, thus a focus on errors, does not have a negative influence on the confidence of the employees in their actions, the extent to which they feel safe to speak up and voice their opinion, and the support they perceive within their department. Some points need to be taken into account when interpreting these results. First, the fact that the scores resulted from the replays showed the level of self-efficacy from a total group. Although the observed scores were aimed to look at individuals, and their reaction to a certain safety perspective, this was still done in a group-setting. The group-setting made it difficult to reveal the true feelings of each individual and the effect on their level of self-efficacy. Since questionnaires were filled in anonymously to enhance the credibility of the data, connecting questionnaire results directly to observational results was not possible. Furthermore it has to be considered that, although everyone in the replay was involved in the process of the patient, it was showed that there is often one main event or moment in the process which had a crucial effect. Only a small group of persons, or even just a single person, is involved and responsible for this moment. Therefore it can be assumed that the effect of discussing this error is different for this single individual compared to the rest of the group who were less involved. Also, as shown in the research of Bandura (1977), failures only reduces self-efficacy when the failures are attributed to personal ability rather than situational circumstances. Within the Safety-I replays however, it was shown that participants mostly appointed to external attributes, which could explain that the focus on failures didn't lead to a lower level of self-efficacy. This research has not been able to get a clear picture about the effect of a Safety-I perspective on these single individuals. Yet, this research has appointed that, for the majority of the employees, their level of self-efficacy and their confidence in their own knowledge and actions in their daily work is not directly influenced by the Safety-I perspective. The same can be said for climate of psychological safety, where it was showed that the participants didn't report a lower climate of psychological safety when discussing errors compared to discussing successes. Within this research it seemed that the current culture and safety climate of the organization managed to diminish the negative effect of learning through looking at errors (Firth-Cozens, 2001). The interviewed respondents reported that the organization is characterized by an open incident reporting culture, in which people don't find it disturbing anymore to reflect on errors. This is in line with the found result on level of support. The fact that errors are discussed within a group doesn't lead to a lower level of support within that group, which could be explained by the familiarity and psychological safety that participants experience within that group (Firth-Cozens, 2001). Taken altogether, a possible explanations for the results of this research is because it can be assumed that, since people are already used to the Safety-I perspective, the supposed negative influences have faded and are less visible.

Yet, one of the main insights of this research remains that, although Safety-I might affect the development of safety performance in a less negative way than expected, the Safety-II perspective is still considered to be of higher potential in increasing the performance of healthcare professionals as can be seen by the results from the interviews. Most interviewed respondents indicate that they perceive the current safety management system to mark their work in a negative way. In their eyes, the increasing amount of rules and protocols adjustment won't lead to improvements on how people are doing their job, and thus won't bring us any closer to the optimal care for the patient with minimum potential to cause harm. It can be argued that this conviction, that Safety-II constitutes a better safety perspective than Safety-I, is less reflected in the results of the replay. However, important to have in mind here is that the people included in this research are currently exposed to a Safety-I culture and have been for many years. This makes it difficult to make an effective comparison between the two perspectives, as for most people this research served as a first acquaintance with the Safety-II perspective. In order to be able to expose the real effects of both perspectives it would be more useful to do this with people who have experience with both perspectives. The results that show best that the participants lack experience with both perspectives are the results on the comparison of learning experience between both perspectives. It was clearly shown that the participants of the Safety-II replay found it difficult to appoint to good practices. Not only because this was the first time they discussed a case without a specific focus on an error or mistake, but also because they were not aware of their own positive performance within this process. Besides, it has to be recognized that the Safety-II perspective contains more than just looking at best practices. As the respondents indicated the shift in perspective is not something you are going to achieve within a day. Hence, it can be argued that one replay is too short to give people a good impression of a new safety perspective which differs a great deal from what they are used to. Still, this does not diminish the enthusiasm that the interviewed respondents expressed about the Safety-II perspective. Since these respondents are the ones who will have to work in this different safety culture their enthusiasm is most important for assessing the potential of a Safety-II perspective.

Now that we concluded that a Safety-II perspective might be more beneficial for healthcare professionals than a Safety-I perspective, does this mean that we have to start implementing a health care system fully regulated by a Safety-II perspective? This research gave insight that this might not be the optimal goal to aim for. As referred to in the introduction, this research started with acknowledging that the annotation of Safety-I and Safety-II gives the impression that the second is an improved version of the first, where in fact it merely indicates that it is about two different ways of looking at safety. Interestingly, as presented as a first finding within the result section, the second replay showed that a combination of both perspectives is possible. Meaning that it was found that one perspective

does not have to exclude the other. Taken all the results together, the fact that it seems to be possible to combine both perspective is an important finding. As discussed people see the benefits of Safety-II, but a transition to this perspective is, according to the nurses, physicians and advisors, in the current society not possible. Due to legal requirements it won't be possible to totally step away from a Safety-I perspective. Besides, although all respondents agree that a Safety-II perspective contains factors that could be beneficial for the safety performance of healthcare employees, they also acknowledge that the healthcare industry is a complex and unpredictable environment in which human work with human and that errors are therefore unavoidable. Hence, neglecting these errors and only focusing on positive performance is not something that is considered to be real or even desirable. Even more so because it is also shown in this research that these errors do constitute a very good learning experience, which is in line with other studies who confirm the benefits of learning from errors both small failures in the daily process as well as large errors with severe consequences (Edmondson, 2004). As stated in the white paper "from Safety-I to Safety-II" (Eurocontrol, 2013): *"many of the existing practices can therefore continue to be used, although possibly with a different emphasis".* As main finding of this research we can say that, in order to achieve an improved safety culture, Safety-II should definitely be promoted but it should not replace the entire Safety-I perspective. Rather, the Safety-I and Safety-II perspective could considered to be complementary to each other.

Safety-I and Safety-II as complementary perspectives

Proposing that the Safety-I and Safety-II perspective are complementary can be considered as the next step in the development of safety thinking in the healthcare industry. One way to look at the complementary of these two perspectives is through the two-factor motivational theory from Frederick Herzberg (1966). This theory has its rationale in the dual nature of its approach to sources of job satisfaction and ultimately job motivation (Miner, 2005). Herzberg makes a distinction between hygiene factors, factors that avoid dissatisfaction on the job, and motivator factors that lead to satisfaction on the job. Hygiene factors include for example working conditions, company policy and administration and security. Motivator factors are achievement, recognition for achievement, responsibility and advancement (Herzberg, 1968). When making the connection between this two-factor motivational theory and organizational safety perspective and the performance of the employee, we could argue that Safety-I is related to the hygiene factors and Safety-II to the motivation factors. Both safety perspectives thus have different effects in that sense. This line of reasoning is outlined in Figure 5.

Figure 5. Proposed effect of Safety-I and Safety-II as complementary perspectives.

Without a safety management system and an organizational safety perspective there is a low level of safety within the organization, with a high risk for both patients and employees. When the safety management system according to Safety-I was introduced twenty to fifteen years ago in the hospital this resulted in an increase in safety level. Safety-I makes sure to avoid mistakes and control risks and errors by facilitating safe working conditions, and developing policies and guidelines to be followed to facilitate avoidance from errors and incidents. These factors relate to the hygiene factors described by Herzberg (1966). Furthermore the Safety-I management system complies with the environmental context by following the law through reporting errors to the healthcare inspectorate (Herzberg, 1974). The Safety-I management system has positively attributed to a safer healthcare system, but it has failed to achieve that next level, from having a sufficient safe functioning system to an excellent organizational safety culture with highly motivated employees. Related to the motivational factor theory of Herzberg, it can be argued that adding a Safety-II perspective enhances a higher level of job satisfaction and motivation leading to a higher level of safety and excellent performance. In congruence with the motivational factors, Safety-II provides recognition for achievement by emphasizing the successful performances of healthcare employees and enabling them to be proud of their performance by stimulating them to share their best practices. As can be seen in Figure 5 it is expected that this transition, from Safety-I to a combination of Safety-I and Safety-II, will not evolve in a straight upward line. The findings in this research show that the Safety-I perspective is set in the culture and mind-set, therefore it is expected that this transition will evolve gradually. Implementing and introducing a combination of both perspectives will be done by early initiators who will inspire others to follow.

Theoretically this transition to a combination of Safety-I and Safety-II, and thereby reaching a higher safety level, sounds interesting and attractive. But how to reach this stage of excellence in practice? A first insight in this practical implementation was gained through the combination of the Safety-I and Safety-II replay that emerged within this research. This replay showed that, although the reason to start learning from something is an error, this doesn't mean that you only have to learn from what went wrong. It was showed that discussing and reflecting on a case like this also provides to opportunity to learn from what went well and ask the question: "what did you appreciate in the actions

of your colleague in this hazardous situation?" Another example which spoke to me, and which showed the practical possibility of two ways of learning, was a case within the hospital in which a patient was placed on the "wrong department" since the department that was specialized in his illness was full. When reflecting on this case, the people in the audience focused on the fact that the patient was placed in the wrong bed, thus on the error in this case, and how to avoid this error from re-occurring. However, there was one person who asked the nurse, who had taken care of this patient, how he felt about the process. The nurse indicated that he had no bad feelings about the care process. When it was asked why this was the case the nurse indicated that he was content about the care process because of the good communication around the care of this patient. Through good communication with the physician, with his colleagues and with the patient and the patient's family the nurse experienced that he had been able to deliver good care to the patient. This meeting gave insight that when we only focus on errors, thus the patient laying in the "wrong bed", opportunities are missed to learn from the positive aspects of the case. In this case, these positive aspects can help us to deliver resilient care the next time we have to deal with circumstantial conditions that cause a high occupation rate in the hospital.

From these practical examples it speaks that, in order to reach excellent healthcare delivery, the focus should be on the healthcare professionals, as ensuring patient safety requires the ongoing, focused efforts of every member of the healthcare team (Ulrich & Kear, 2014). The promotion of patient safety culture "can best be conceptualized as a constellation of interventions rooted in the principles of leadership, teamwork, and behavior change, rather than a specific process, team, or technology" (Weaver, Lubomski, Wilson, Martinez & Dy, 2013, p. 370). This is in line with the found assumption of this research that not the focus on a specific process or single error, but the principles of leadership and teamwork are important. Additional practical inspiration on how to reach this excellent patient safety culture can be detracted from research on high reliability organizations (Ulrich & Kear, 2014), where it is proposed that becoming a high reliability organization is a strategy to improve patient safety. High reliability organizations are "organizations in which accidents rarely occur despite the potential for catastrophic failure" (Ulrich&Kear, 2014, p. 452). According to Christanson, Sutcliffe, Miller and Iwashyna (2011), high reliable hospitals "behave in ways that sometimes seems counterintuitive" (p. 314), thereby emphasizing the importance of resilient performance. "They seek out problems but avoid focusing on one aspect of the work and are able to see how all parts of the work fit together, expect unexpected events and develop capability to manage them, and they defer decision making to local frontline experts who are empowered to solve problems" (p. 314). As this definition fits with the assumption of this research (that a combination of Safety-I and Safety-II (e.g. a focus on both errors and success, and resilient performance) leads to a positive enhanced patient

safety culture), it can be argued that the practical recommendations given to reach a high reliable organization are also useful for the achievement of a combination of Safety-I and Safety-II perspective. One of these practical recommendations is the importance of the management role in enabling and implementing a safety culture. Leaders play an important role in raising awareness about patient safety, creating a safe environment for people to discuss safety issues, and involve frontline to staff to reflect upon safety (Pidgeon & O'leary, 2000; Vogus, Sutcliffe & Weick, 2010).

Concluding the reasoning of Safety-I and Safety-II as complementary perspectives, it could be argued that Safety-I makes sure that you avoid mistakes and perform at the minimum required level. But Safety-II is needed to get you at that excellent level and go the extra mile. When an organization is able to combine both perspectives a positive safety culture can be reached with a broad range of learning opportunities that enables the organization to be resilient and function in a continuously changing environment.

5.1.2. Discussion on methodology

Four theoretical and methodological points of discussion can be brought forward when interpreting the results of this research. Respectively; the interrelatedness between the independent variables, the culture of the organization in which this research was conducted and the different results between the first and second phase of this research.

An important point of consideration, that hasn't been brought up before in this research, is how the dependent variables that are looked at in this research influence each other and how they are related. These factors were chosen due to their influence on the development of safety performance of the individual healthcare worker. It can however be assumed that the found results do not stand alone, and that the dependent variables have had an influence on each other. To start with the relation between support and self-efficacy; in this research it was shown that the level of support was high due to an in-group binding. Possibility exists that this has also influenced the level of self-efficacy, as the research of Brewer & Weber (1994) showed that comparison with members of an in-group can enhance self-esteem, which together with self-efficacy forms a construct for self-evaluation. Additionally, it may be assumed that support also exerts influence on causal attribution, as was showed by the research of Hewstone (1990). Hewstone (1990) argued that 'group members' attributions do typically favor in-group rather than outgroup members, when explaining positive and negative outcomes, successes and failures or group differences" (p. 331). Next, two other dependent variables that could have possibly influenced each other are support and climate of psychological safety, of which Edmonson (1999) argues that both are also related to learning experience of the team. Furthermore, it can be assumed that there is a relation between self-efficacy and causal attribution (Bandura, 1993). It was found that self-efficacy influences causal attribution which in turn has an

influence on performance (Bandura, 1993). The question can therefore be raised if people's self-efficacy is stimulated by a positive safety approach, their internal attribution also increases. Additional quantitative research is necessary to get clear insight into the interrelatedness of these variables.

The second factor that needs to be taken into account for the overall interpretation of findings is the culture of the organization in which this research was conducted. During the interviews it became clear that, although every respondent agrees that the ETZ views things from a Safety-I perspective, they are doing this in an advanced stage and worked hard to create an open reporting culture about (near) incidents (Waring, 2005). From this it can be concluded that both the Safety-I and Safety-II perspectives are not static. Not every organization whose safety management system is based on a Safety-I perspective, being reactive in response to errors, has the same safety culture or will automatically be dominated by a culture of blame (Khatri et al., 2009). Hence, an important implication that needs to be taken into account when interpreting the results of this research is the culture of the organization in which the research was conducted as it turned out that this can have a considerable influence on the results. Therefore, in order to get a more advanced picture of the effects of both a Safety-I and Safety-II perspective, it would be useful to conduct this research in multiple organizations, where the safety culture of each organization is mapped in advanced.

Third, the two methods that were used in this research, being the replays in the first phase and the additional interviews in the second phase, showed contrasting results on three of the five propositions. A first explanation that can be given for this is the fact that all replays were conducted based on one case. This makes that the results might be influenced by the character of the case and are not representative for the daily situations on the work floor. Furthermore, as was indicated during the results, the influence of safety perspective differs per person. For example by the fact that one person is less bothered by the fact that he or she receives critique on his work, where the other person finds this more difficult to accept. The same applies for sharing and applying of best practices, the one physician or nurse is more open to do this, and the other one rather sticks to his own preferred way of working. Thus it can be assumed that the results have been influenced by the different personalities that were included within this research. Finally, the fact that most interviewed respondents have only theoretical knowledge and no or limited practical knowledge about the Safety-II perspectives makes that their answers are highly influenced by subjective thoughts. However, as they all have knowledge about the current design of the safety management system within the organization their subjective thoughts on how to improve this system are still of great value.

5.2. Practical implications

Insights gained from the replay method

Ellis & Davidi (2005) and Ellis et al. (2006) already used a method in their research similar to the replay method named after-event review. These after-event reviews were used to look at both successes and failures in the US army. However, no research was found that has used a similar method to look at cases in the healthcare industry. This research gave some important insights about the use of this method which are considered to be useful to improve the replay method for future research. First, to enhance the efficiency of the replay it is beneficial if the replay supervisor has experienced with the method and is able to facilitate the group sessions. In this research the replay supervisors were not involved with the case themselves, which participants indicated to find comfortable as this made that the supervisors were not pre-judged and asked open question which enhanced the learning experience. Second, a good preparations of the replay participants made that the time we had for the replay was used more efficiently which increased the learning experience. Third, in order to create the most valuable learning experience it is recommendable to conduct the replay shortly after the occurrence of the case. Due to planning issues some of the replays were conducted a few months till half a year after the patient had stayed in the hospital. This made that people found it hard to remember the patient and had trouble to recall their own actions. The fourth recommendation, and probably the most important one, is that it is essential for the replay that (most of) the caregivers that were involved with the patient are present. The main reason that replay 4 was excluded from this research was because this replay did not function as only one person who had been involved with the patient was present. The rest of the participants consisted of team leaders, advisors and one physician making it more of a general discussion in which general agreements and workaround were discussed instead of the actual case which is not consistent with the goal of a replay.

Recommendations for the organization

Two main point can be taken away from this research that are of valuable information for the improvement of safety culture and employees safety performance. First, the important role for both team leaders and higher management. Healthcare professionals are enthusiastic about the new way of safety thinking, but emphasize that a shift towards an improved safety culture can only be realized when it is supported throughout the organization. Management should facilitate early adopters in spreading their view throughout the organization, and provide them with a platform to spread their ideas. Thereby it is the task of the early adopters to start developing instruments that could help others to implement a more positive safety perspective. Furthermore, to take it to the next level, management could consider to enter into consultation with the healthcare inspectorate for alternative measures to indicate the quality of care within the organization. Team leaders could facilitate a

transition to a positive safety perspective by stimulating their colleagues through emphasizing their qualities, and connecting them to each other to facilitate the sharing of best practices. Second, it was found in this research that people find it hard to indicate how their specific actions influence in the outcome of the care of the patient in a positive way. A practical implication that results from this is that it could be beneficial to invest in personal development and personal leadership of employees. This way healthcare professionals gain insight in their strong points which makes it easier to share best practices with each other. Also, insight in best practices that are present in the entire organization could stimulate exchange of them beyond department boundaries. A concrete idea to realize this is by taking the current system that is used to report errors, and recreate this system so it enables you to report positive experiences.

5.3. Limitations and recommendations for future research

Research technically various criticisms can be expressed about this study. I have been aware of these difficulties while performing these replays, and several things have been incorporated to limit the depreciation of this research. However, giving insights in the pitfalls of this research is important as they need to be taken into account when interpreting the findings of this research.

The first thing I have to be critical about is the fact that the Safety-I and Safety-II method are not mutually exclusive, making them not optimal for comparability of the replays. In first instance it was aimed to conduct the replays with a full focus on either errors or successes. However, it was felt by the replay supervisors that by obligating people to only take into account one perspective and by prohibiting them to talk about the other side of the story you take away the natural incentive to look at both sides of the story, therefore bypassing the main goal of the replays namely to create the best learning experience. Unfortunately arranging sufficient replays required for this research turned out to be a challenge. Due to staff-shortages, workload being perceived as very high and the fact that the data-collection period of this research was mainly planned during the summer-holidays resulted in a deviation from the planned time-schedule. Maximizing the incentives for the nursing departments to take part in this research was thus priority, and concessions had to be made to the ideal research design I had in mind. In order to still be able to make a distinction between the methods applied it was decided to determine a focus, whereby the replay supervisors instructed the participants to mainly focusses on successes, or on what could have been done better within this case. This was done in order to be able to let the discussion take its natural flow without the replay supervisor having to continually interrupt.

Some other factors have limited the comparability of the replays within this research as well. First, the fact that not all three replays were led by the same replay supervisor. As the style of the replay supervisor had a considerable impact on the course of the replay, it can be assumed that the fact that not all thee replays were guided by the same supervisor limits the comparability. In first instance, it was planned to let two supervisors each lead two replays (a Safety-I replay and a Safety-II replay). Unfortunately, due to the fact that it took quite long to plan these replays this was not possible anymore as one of the supervisors went on maternity leave and the other one shifted jobs. Therefore a recommendation for future research would be to let all the replays be guided by the same supervisor to minimize the effects that might result from supervisor style. The second fact that has to be taken into account is the fact that the replays were done within different departments. It can be assumed that this decreased the comparability of the replays as it was found in the research that the culture within the department had a considerable impact on the results. Therefore, it would be recommended to map the culture of the department on forehand to be able to incorporate the effect of cultural differences. Third, in this research cases were used that have actually happened. This was done in order to increase the learning experience for the participants, and get a closer reflection of what they are confronted with in their daily work. It has to be noted that each case has different features, leading to a different discussion within the replay. Furthermore, it differed per replay how shortly after the stay of the patient the replay took place. It turned out that this had a considerable impact on the course of the replay, and the learning experience, as sometimes people found it hard to remember this exact patient and what actions they had conducted within this case. It was aimed to lower these limitations by providing extensive descriptions of how these factors influenced the results.

Another fact that has to be taken into account was the possibility that people behaved differently than they would have done otherwise due to the presence of me as a researcher in the group. Especially since sensitive and private information was discussed. It was aimed to decrease this possible influence by introducing myself at the beginning of the research. Thereby it was emphasized that I was focusing on the effect of the replay, not on the substance of the case, and that all data gathered would be processed anonymously. Furthermore it was indicated that if people felt disturbed or uncomfortable by my presence in any way they were allowed to notify this, after which I would leave the meeting. It can be assumed that the influence of my presence within the replay has had a minimal impact, as the replay supervisors indicated that the people didn't behave in any way differently because of my presence.

Finally, it has to be named that Safety-II is an emerging topic with the first (white) paper being published in 2013. Although extensive literature research had been conducted both in advance and

during this research, opportunity exists that recent publication of Safety-II literature have been missed. It is therefore strongly recommended for future research to conduct new literature research on this topic to ensure a complete picture of the Safety-II literature.

6. Conclusion

6.1 Answer to research question

The aim of this research was to gain insight in how the current Safety-I perspective and the emerging Safety-II perspective differ in their influence on employees' safety performance. This conclusion is based on the results that came forth from an analysis of three replays and additional interviews collected in a hospital in the Netherlands. This concluding section will consist of answering the following research question:

How do the Safety-I and Safety-II perspective differ regarding their influence on individual employees' self-efficacy, support, learning experience, causal attribution and psychological safety?

The replays showed that Safety-II leads to higher level of support and to higher levels of internal attribution compared to a Safety-I perspective. Within the interviews it was argued that Safety-II also leads to a higher climate of psychological safety and for some cases to a higher level of self-efficacy. Both replays and interviews showed that Safety-I leads to a higher level of learning experience and a higher level of external attribution compared to a Safety-II perspective. One of the main influencers on the results on both safety perspectives was the current culture of the organization which was characterized as an open (incident) reporting culture.

The final conclusion that can be conducted from this research is that although Safety-II seems to be more beneficial in some aspects for the safety performance of the employees compared to the current Safety-I perspective, the full implementation of this perspective is neither realistic nor desirable. Therefore it can be stated that the recommendation will not be aimed at changing the entire safety culture within the hospital to a Safety-II perspective. Rather it is argued that the perspectives can be looked at as complementary, and that a combination of both perspectives creates the most beneficial safety culture and employee performance. Errors and incidents should still be used as an opportunity to learn from and improve performance. However, it is important to recognize that with a focus solely on errors important opportunities are missed to learn from each other's excellent performance. A combination of a Safety-I and Safety-II perspectives won't only lead to a wider range of learning opportunities, as attention is not only more on those single events in which something went wrong, but also a more positive approach towards the performance of the employees within the organization.

7. References

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