Leadership in safety-critical contexts

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Sara Guediri

MANCHESTER BUSINESS SCHOOL
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ABSTRACT

This research explored whether the effectiveness of leadership styles differs in safety-critical contexts compared to contexts where safety is less salient. The existing leadership literature lacks consideration of the context in which leadership takes place. Leadership styles that are valued and effective in one work context, might be less desired and less effective in another context. Using Bass’s (1985) transformational-transactional leadership framework, the present research argues that the extent to which safety is salient within a work environment, impacts on the effectiveness of transformational, transactional and passive leadership. Existing leadership research has focused on transformational leadership, but has paid little attention to transactional leadership. The present research argues that transactional leadership might be effective in safety-critical contexts, but might be less effective in contexts where safety is not salient. In work contexts, where employees are exposed to hazards and there is a high risk for injury, directive leadership practices, such as vigilantly monitoring performance and proactively correcting mistakes (i.e., transactional leadership), might be important for effective leadership. However, if safety is not salient within a work environment, then these leader behaviours might be less relevant. In addition, the research explored the competency of leader flexibility, which refers to leaders’ ability to adjust their behaviour to the requirements of a certain setting.

Two questionnaire studies were conducted to investigate the research objectives. In both studies three aspects of safety salience were explored, i.e., level of hazard exposure, likelihood for injury and impact on safety of others. In study 1, the sample consisted of participants with leadership responsibilities who work in contexts with varying degrees of safety salience. Results showed that leaders’ perceived effectiveness of transformational-transactional leadership, and the frequency to which they adopt these two leadership styles, differed in dependence on the level of safety salience. Hazard exposure moderated the relationship between transactional leadership and safety incidents, indicating that transactional leadership is associated with lower incident rates if hazard exposure is high, but not if hazard exposure is low. Leader flexibility showed a significant relationship with leader self-efficacy and team performance whilst controlling for transformational-transactional leadership. In study 2, a two-source design was used where subordinates rated their leader’s behaviour and leaders rated their subordinates’ job and safety performance. The research was conducted in two host organisations; an oil and gas service provider and a food manufacturing company. Safety salience measures were investigated as team-level moderators. Results showed several cross-level interactions, which suggested that team-level safety salience impacts on the influence of transactional, transformational and passive leadership on safety and job performance. The research made an important contribution by merging the transformational-transactional leadership framework with contingency views of leadership (i.e., safety salience as a contextual attribute) and by considering leader flexibility as a leader trait in addition to leader behaviours.
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To my mother, for her continuous encouragement and support.
**LIST OF ABBREVIATIONS**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AIC</td>
<td>Akaike’s Information Criterion</td>
</tr>
<tr>
<td>BPS</td>
<td>British Psychological Society</td>
</tr>
<tr>
<td>CFA</td>
<td>Confirmatory Factor Analysis</td>
</tr>
<tr>
<td>CFI</td>
<td>Comparative Fit Index</td>
</tr>
<tr>
<td>CI</td>
<td>Confidence Interval</td>
</tr>
<tr>
<td>CR</td>
<td>Contingent Reward</td>
</tr>
<tr>
<td>CSB</td>
<td>Chemical Safety Board</td>
</tr>
<tr>
<td>FIML</td>
<td>Full Information Maximum Likelihood</td>
</tr>
<tr>
<td>IC</td>
<td>Individualised Consideration</td>
</tr>
<tr>
<td>ICC</td>
<td>Intra-class Correlation Coefficient</td>
</tr>
<tr>
<td>IIA</td>
<td>Idealised Influence Attributed</td>
</tr>
<tr>
<td>IIB</td>
<td>Idealised Influence Behaviour</td>
</tr>
<tr>
<td>IM</td>
<td>Inspirational Motivation</td>
</tr>
<tr>
<td>IP</td>
<td>Internet Protocol</td>
</tr>
<tr>
<td>IS</td>
<td>Intellectual Stimulation</td>
</tr>
<tr>
<td>LF</td>
<td>Laissez-Faire</td>
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<tr>
<td>LMX</td>
<td>Leader-Member-Exchange</td>
</tr>
<tr>
<td>LPC</td>
<td>Least Preferred Co-Worker Scale</td>
</tr>
<tr>
<td>MBA</td>
<td>Masters of Business Administration</td>
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<tr>
<td>MBEA</td>
<td>Management-By-Exception-Active</td>
</tr>
<tr>
<td>MBEP</td>
<td>Management-By-Exception-Passive</td>
</tr>
<tr>
<td>MCAR</td>
<td>Missing Completely At Random</td>
</tr>
<tr>
<td>MI</td>
<td>Modification Index</td>
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<tr>
<td>MLQ</td>
<td>Multifactor Leadership Questionnaire</td>
</tr>
<tr>
<td>MLR</td>
<td>Maximum Likelihood Robust</td>
</tr>
<tr>
<td>MTMM</td>
<td>Multi Trait Multi Method</td>
</tr>
<tr>
<td>RMSEA</td>
<td>Root Mean Square Error of Approximation</td>
</tr>
<tr>
<td>SEM</td>
<td>Structural Equation Modelling</td>
</tr>
<tr>
<td>SRMR</td>
<td>Standardised Root Mean Square Residual</td>
</tr>
<tr>
<td>TF</td>
<td>Transformational leadership</td>
</tr>
<tr>
<td>TLI</td>
<td>Tucker Lewis Index</td>
</tr>
<tr>
<td>VIF</td>
<td>Variance Inflation Factor</td>
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1 Introduction

1.1 Chapter Overview

This chapter provides a brief introduction to the research’s main themes, leadership and workplace safety. It summarises the importance of studying the topic of workplace safety and the importance of leadership for workplace safety. The last section of the chapter provides an overview of the thesis’s structure.

1.2 Workplace Safety

Obligations for organisations to protect their workforce from injuries are in many countries determined within legislation; for example in the UK the Health and Safety at Work Act (1974). Beyond the legal responsibilities, management of safety involves not only moral aspects of avoiding human loss and pain, but also has financial benefits for organisations. In 2012/13 workplace injuries in the UK led to 4.3 million lost working days, which is associated with considerable financial costs to employers and the economy (Health and Safety Executive, 2013).

There is growing evidence that effective management of health and safety is linked to business performance (e.g., Huang, Leamon, Courtney, Chen, & DeArmond, 2007; Kaminski, 2001; Maudgalya, Genaidy, & Shell, 2008). Moreover, as well as causing financial and human losses, other adverse effects of poor workplace safety such as damage to corporate reputation (Hart, 2010) and decreased workforce morale (Behm, 2009) underline that effective management of safety adds value to a business.

1.3 Organisational Approaches to Safety

Traditionally, research has explored occupational safety as an engineering and ergonomic problem (Cox & Cheyne, 2000; Zohar, 2002a). Organisations have made significant progress in accident reduction through the implementation of strategies
aimed at the control of physical hazards, technological advances in machinery and equipment, and safety management systems. However, major accident events such as Piper Alpha (Cullen, 1990) and the sinking of the Herald of Free Enterprise (Sheen, 1987) have highlighted organisational aspects as key factors that have contributed to the incidents. This recognition initiated a shift towards a study of organisational and social factors that contribute to workplace safety. Within this focus on organisational approaches to safety, leadership and management commitment to safety are elements that are recurrently identified as key for safety (O’Dea & Flin, 2001). Thus, emphasis has increasingly moved away from interventions at the ‘coal-face’ (e.g., behavioural safety) towards the managerial and organisational level (e.g., leadership interventions).

1.4 Leadership

Within the organisational literature, leadership has been mainly approached in a context-free way (Liden & Antonakis, 2002; Pawar & Eastman, 1997; Rowold, 2011). In the 1960s and 1970s contingency views of leadership were prominent within leadership thinking, but due to empirical and conceptual weaknesses interest in these theories declined. Transformational-transactional leadership theory (Bass, 1985) dominates the current leadership theory. The framework emphasises charismatic and inspirational leadership and gained popularity as part of a shift towards a focus on emotional elements in leadership. Whilst research has produced an impressive amount of empirical evidence on transformational leadership and how these practices can inspire employees, it has been noted that this only offers limited insight into how leaders can prevent and manage errors (Rodriguez & Griffin, 2009). This is an important notion for safety leadership where failure has the potential for far-reaching consequences. Transactional leadership, which is the second component of Bass’s (1985) framework, refers to clarifying objectives and responsibilities, monitoring performance and ensuring that standards are met. However, only a small body of research has investigated transactional practices and the existing understanding about its effectiveness is fragmented. Work environments that are inherently hazardous and have the potential to cause serious harm pose particular challenges for leaders that makes them distinct from work settings where safety is less salient. If safety is salient,
leadership needs to compatibly promote performance outcomes such as productivity and satisfaction as well as safety. However, research within the leadership literature seldom takes the characteristics of a work environment into account (Antonaki & Liden, 2009; Rowold, 2011). Yet, it can be argued that knowledge on leadership that has been acquired without consideration of the embedded context cannot necessarily be transferred to any kind of setting, in a one-to-one fashion. It cannot be assumed that a certain leadership behaviour is universally effective without any sort of constrictions or boundary conditions. Leadership practices that are effective for increasing employee satisfaction in a marketing company might not be effective for influencing employees’ correct usage of personal protective equipment on a construction site. O’Dea and Flin (2003) highlight that safety as a performance measure is particularly distinct from other common organisational targets, as it is more intangible than for example turnover or productivity, and is characterised through non-events (i.e., the absence of safety incidents). Thus it can be suggested that, contrasting leadership in safety-critical contexts to leadership in non-safety critical contexts offers a particularly adequate approach of investigating the role of context. However, most leadership research has been conducted without consideration of the context in which the leadership process takes place. The present research made an important contribution to overcoming this shortcoming and investigated whether the salience of safety impacts on the perceptions and effectiveness of leadership.

1.5 Safety and Leadership

Investigations into major accident events such as Piper Alpha (Cullen, 1990) or the Texas City refinery explosion (Baker, 2007; US Chemical Safety Board [CSB], 2007) have highlighted leadership as an underlying factor that has contributed to the incident. In the investigation report into the Piper Alpha incident, Cullen (1990) states that, “no amount of detailed regulations for safety improvements could make up for deficiencies in the way that safety is managed by operators” (p. 301). Although his statement referred to leadership at higher levels of the organisational hierarchy, it has been demonstrated that leadership behaviour at all organisational levels, from senior
management to front-line team leaders is critical for safety (Fruhen, Mearns, Flin, & Kirwan, 2013; O’Dea & Flin, 2003; Zohar & Luria, 2010).

Lekka and Healey (2012) reviewed the causes identified in investigations of sixteen major accident events and identified nine themes that spanned across all investigations: “training and competence, learning from previous incidents, safety communication, hazard awareness and management, commitment to safety, clarity of roles and responsibilities, complacency and lack of oversight, adequacy of procedures and management of change” (p. 44). They point out that each of these nine themes can be linked to the role of leaders at all levels of an organisation’s hierarchy. Joseph, Kaszniak and Long (2005) conducted a similar analysis of twenty-three major incidents and listed awareness of reactive hazards, management of change, hazard evaluations, inadequate plant design and maintenance, ineffective employee training and emergency planning as overarching causes that were common to the incidents reviewed. Again, it can be argued that many of these factors have relevance to managers’ and supervisors’ actions and attitudes. Moreover, Joseph et al. (2005) note that these themes were identified within investigations of accidents that happened over two decades ago (e.g., Bhopal gas leak incident in 1984), and yet still emerge as key underlying causes in more recent major accident events. This underlines that although organisational factors such as leadership are recognised as important aspects for safety, the understanding and implementation of these are incomplete.

Whilst there appears considerable consensus amongst academics, industry leaders and practitioners that leadership is important for workplace safety, the amount of empirical research that has looked at how leaders can improve safety is limited. In comparison to the vast amount of research that has been conducted on the topic of leadership in general, the body of research on leadership in safety-critical contexts is relatively small. O’Dea and Flin (2003) point out that this is a paradox to safety becoming a more important goal for many modern organisations. There is little doubt about the importance of leadership for occupational safety (Clarke, 2013; Flin & Yule, 2004; O’Dea & Flin, 2001, 2003), but research on specific tactics that can be employed by leaders to influence safety is limited. For example, the focus amongst studies on safety leadership has been placed on transformational practices, as modelled on generalised leadership research. It can be argued that this narrow focus might have overlooked the potential of other leadership practices such as transactional leadership for enhancing
safety. Similarly, Lekka and Healey (2012) pointed out in their review of major incident investigations that passive leadership played a critical role in several of the accidents. However, with some exceptions (Kelloway, Mullen, & Francis, 2006; Mullen, Kelloway, & Teed, 2011), the safety leadership literature has mainly focused on active forms of leadership and less on the negative effects of passive leadership behaviour.

Here, it is investigated whether context (safety-critical vs. non-safety-critical) moderates the relationship between transactional-transformational leadership and leader outcomes. A further aim of the research is to test whether leadership flexibility as a leader trait has an influence on outcome criteria beyond individual leadership behaviours and to investigate its role in safety-critical contexts. Leader flexibility refers to the competency to adjust leadership behaviour to the requirements of a particular situation or context. In relation to the criticism that existing leadership research has focused too exclusively on transformational leadership, it has been pointed out that leaders are likely to use a spectrum of different leadership practices. Thus, to ensure impact, leaders need to be able to interpret the demands of a situation and select the most appropriate leadership behaviour accordingly. This competency of leader flexibility might be particularly relevant in safety-critical contexts where leaders have to integrate conflicting demands such as safety and cost.

1.6 Structure of the Thesis

Chapter two provides a theoretical background to the research’s objectives and outlines the three major schools within leadership research; trait perspectives, behavioural perspectives and contingency perspectives of leadership. The chapter suggests that these three strands of research within the leadership tradition lack integration. It is shown how the research presented in this thesis addressed this shortfall by merging transformational-transactional leadership with a trait perspective (through investigation of leader flexibility) and with a contingency perspective (through investigation of salience of safety as a contextual factor).
Chapter three reviews Bass’s (1985) transformational-transactional leadership framework, which provided a guiding theory for the current research. The second half of the chapter discussed the role of leadership for occupational safety. It is argued that whilst research has mainly focused on the transformational leadership style, effective leadership in safety-critical contexts might require transactional as well as transformational leadership behaviours to maximise leaders’ influence on safety.

Chapter four suggests that existing leadership literature lacks consideration of contextual factors. Research is reviewed that indicates that leadership is not context-free, but that the effectiveness of leadership behaviours such as transformational-transactional leadership might be influenced by the context in which leadership takes place. It is explained that salience of safety might constitute a contextual characteristic that impacts on the effectiveness of transformational, transactional and passive leadership. Leader flexibility is outlined as a meta-competency that extends individual leadership behaviours.

Chapter five presents how the conducted research advances existing leadership and safety research. This chapter outlines the research’s main objectives and states the propositions that were empirically tested in the two studies.

Chapter six outlines the general methodology for the empirical research conducted in study 1 and study 2. This chapter addresses philosophical assumptions, ethical considerations and discusses the Multifactor Leadership Questionnaire, which was used in both studies to measure transformational-transactional leadership. Other measurement instruments and specifics of the data collection procedures are outlined in the method sections of the study 1 and study 2 chapters respectively.

Chapter seven presents the empirical research conducted in study 1. The study investigated whether safety salience impacts on the perceived effectiveness and occurrence of transformational-transactional leadership and examines the role of leader flexibility in safety-critical and non-safety critical contexts. The chapter states the study’s hypotheses and presents the study methods. Results from the statistical analysis are outlined and the main findings of study 1 are discussed.
Chapter eight presents the empirical work conducted in study 2. The chapter explores how study 2 complements the research in study 1. It outlines that study 2 uses a two-source design to investigate safety salience as a moderator of transformational, transactional and passive leadership as well as leader flexibility with safety-specific and generalised outcomes. The chapter provides information on measurement and data collection procedures. It describes the study sample, which consisted of employees and their leaders from a food manufacturing and an oil and gas service provider organisation. The chapter explains that multilevel modelling was used, and outlines the study results. Key findings from the research are discussed.

Chapter nine presents an overall discussion of the results from study 1 and study 2. The chapter integrates the findings from the two studies and links these with existing research. It highlights the main contributions of the research and discusses theoretical and practical implementations. Limitations of the two studies are considered and suggestions for future research are presented. The chapter closes with core conclusions that can be drawn from the research programme.
2 Leadership Theories

2.1 Chapter Overview

Few phenomena in science have instilled as much interest and fascination as the concept of leadership (Antonakis, Cianciolo, & Sternberg, 2004). This chapter provides an overview of the main strands within the scientific field of leadership. In the first section a brief definition of the concept of leadership is provided, and the idea is presented that existing theories of leadership lack integration (section 2.2). The following three sections review the three main perspectives on leadership: Trait theories, behavioural theories and contingency theories. Early trait approaches focused on identifying leader characteristics that discriminate leaders from non-leaders (section 2.2.1). Behavioural approaches to leadership explored the influence of specific leadership behaviours and later gave rise to the transformational-transactional leadership framework, which dominates current leadership thinking and provided the main guiding theory for this thesis (section 2.2.2). Contingency theories recognise that leadership is not universal and focus on identifying boundary conditions of leadership (section 2.2.3). In the last section of the chapter, it is argued that these three perspectives each contribute to the understanding of leadership, but exist in isolation within the literature (section 2.2.4). A model is presented that demonstrates how the present research contributes to overcoming this segregation and integrates trait, behavioural and contingency views of leadership.

2.2 Major Schools of Leadership

Leadership has been an omnipresent subject of research in social sciences with few other constructs having received as much enduring popularity. As is common with such long-existing, prevalent subjects, a plethora of definitions of leadership exist (Northouse, 2013; Stogdill, 1974; Yukl, 2010). Northouse (2013) identified four aspects as central to most definitions and descriptions of leadership: “(a) leadership is a process, (b) leadership involves influence, (c) leadership occurs within a group context and (d) leadership involves goal attainment” (p. 3). Based on the common
themes, he argues that “Leadership is a process whereby an individual influences a group of individuals to achieve a common goal” (p. 3).

Conceptual as well as empirical work on leadership continues to pullulate. Yet, criticism is growing that the expansion of leadership research has resulted in a lack of linkage between the different strands that exist within the leadership literature (DeRue, Nahrgang, Wellman, & Humphrey, 2011; Vroom & Jago, 2007). One aim of this research is to integrate behavioural, trait and contingency views of leadership on the applied example of safety-critical contexts. It was investigated whether context (safety-critical vs. non-safety-critical) moderates the relationship between transactional-transformational leadership and leader outcomes. A further aim of the research was to test whether leadership flexibility as a trait has an influence on outcome criteria beyond individual leadership behaviours, and to investigate its role in safety-critical contexts.

At the core of these empirical investigations stands the objective to synthesise tenets from different leadership paradigms and theories. A number of conceptual approaches to leadership co-exist. These can be grouped into the trait, the behavioural and the contingency paradigm as the three major traditions (Northouse, 2013). The trait paradigm considers stable individual leader characteristics (e.g., Judge, Bono, Ilies, & Gerhardt, 2002; Mann, 1959; Stogdill, 1948) whereas the behavioural paradigm focuses on leadership styles and their influence on outcome criteria (e.g., Avolio, 1999; Bass, 1985; Conger & Kanungo, 1987). Contingency approaches identify situational variables that impact on leadership effectiveness (e.g., Fiedler, 1964, 1967; Hersey & Blanchard, 1969; Kerr & Jermier, 1978).

Each of these three perspectives on leadership has fundamentally advanced the understanding of the leadership process. Empirical research within these three schools of leadership has produced support for their respective point of view, endorsing the legitimacy of the trait, behavioural as well as contingency approaches (Zaccaro, 2012). However, to fully capitalise on the knowledge that these different perspectives on leadership have produced, research needs to progress into a phase of theory integration (Graen, Rowold, & Heinitz, 2010).
In the following sections, an overview of the three major schools of thought on leadership, (1) trait, (2) behavioural and (3) contingency, is provided. This offers a theoretical background for the individual objectives of the research presented here, and the overarching aim to incorporate trait, behavioural and contingency views into a more comprehensive approach to leadership.

The following outline does not aim to provide an exhaustive description of the evolution of different leadership theories, but is a selected overview of the theoretical developments and paradigm shifts in the leadership literature relevant to the present research’s objectives.

2.2.1 Trait perspective

Early formal theories on leadership adopted a trait perspective, aiming to determine individual characteristics that discern leaders from non-leaders. This approach to leadership developed from the ‘Great Man’ idea (Carlyle, 1908), which assumes a set of qualities inherent to leaders (Day & Zaccaro, 2007). The rationale for the trait approach, in an organisational context, is that such standout traits would easily allow companies to identify who is a leader, and recruit or promote people who have the necessary traits for successful leadership. In the first half of the twentieth century, early empirical research and review studies attempted to uncover attributes that set leaders apart from followers (e.g., Bird, 1940; Jenkins, 1947; Mann, 1959; Stogdill, 1948). Suggestions for traits characterising leaders were compiled, mainly focusing on aspects of mental abilities and personality, but also on physical traits (e.g., height, physique). Thus, the results of this early leadership research produced a multitude of individual attributes with lists containing as many as seventy-nine personal characteristics (Bird, 1940). However, the confusing array of traits led to concerns over the viability of this approach. Although some traits, such as intelligence, could be repeatedly linked with leadership emergence (Lord, De Vader, & Alliger, 1986; Mann, 1959), critics doubted whether it is possible to produce a stable, ubiquitously valid set of leader traits (Muchinsky, 1983). Critique of the trait approach was consolidated by remarks that studies suffered from methodological artefacts (Gibb, 1954). Also, it was raised that a trait approach to leadership is elitist in its premise that leader traits are assets that an individual either possesses or does not (Antonakis, Day,
& Schyns, 2012). Thus, early trait research was heavily criticised on conceptual and methodological grounds.

In an influential review, Stogdill (1948) concluded that despite a vast number of empirical studies, trait research failed to determine a definitive, universally applicable list of leader characteristics. Much of the criticism of the trait approach noted that it is insufficient to simply depict individual characteristics of leaders (Sternberg, Vroom, & Searle, 2002; Zaccaro, 2012). It was asserted that the trait perspective blanks out the requirements of the specific situation in which leadership takes place and is oblivious to the followers who are involved in the process of leadership (Ghiselli & Brown, 1955; Stogdill, 1948; Zaccaro, 2007). Zaccaro, Kemp and Bader (2004) noted that the aims of trait leadership research at the time remained mainly at a descriptive level, which is limited in enabling an understanding of the process through which leadership takes effect. Subsequently, research activity in the leadership area shifted its attention towards a behavioural perspective in the second half of the twentieth century and later situational theories began to flourish. However, despite the pessimistic conclusions drawn from trait studies in the 1940s and 1950s, the trait perspective was not entirely abandoned. In a meta-analysis, Lord et al. (1986) state that the harsh disfavour of trait leadership research was misguided. Making use of methodological advances in meta-analytical techniques, they reassessed earlier trait studies and found support for the contention that intelligence, masculinity, dominance and adjustment are linked to leadership emergence. In a second review, Stogdill (1974) also reviewed and revoked his initial negative conclusion, and others have also demonstrated leader traits to be a valid part of an understanding of the leadership phenomenon (Kenny & Zaccaro, 1983).

In contemporary leadership literature, trait views continue to play a role and numerous studies have linked cognitive abilities (Hall, Lord, & Foster, 2009; Judge, Colbert, & Ilies, 2004) and personality factors to leadership emergence and leadership effectiveness (Judge et al., 2002).

Compared to early trait studies, contemporary leader trait research places stronger emphasis on going beyond a descriptive level and has moved onto conceptual models that explain the process of how leadership qualities impact on outcome criteria (Antonakis et al., 2012). Yukl (2010) criticised that single traits or a small set of traits
is unlikely to explain substantial and meaningful amounts of variance. Most trait research does not connect leader qualities to leadership behaviours, which is needed in order to understand how leader traits impact on effectiveness (Kirkpatrick & Locke, 1991; Zaccaro, 2007). Other authors have echoed this concern and called for trait research to tie in situational and behavioural perspectives (Day & Zaccaro, 2007; Dinh & Lord, 2012). Dinh and Lord (2012) contrast the classic trait approach, which considers the direct effect of leader traits on leader-outcomes, with a process view which underlines the combination of leader traits and leader actions in understanding the leadership process.

In recent years, leader trait research has started to explore social leader competencies such as self-monitoring (Caligiuri & Day, 2000; Day & Schleicher, 2006; Jung & Sosik, 2006), social intelligence (Zaccaro, 2002; Zaccaro, Kemp, & Bader, 2004) and behavioural complexity (Hooijberg, 1996; Lord, Hannah, & Jennings, 2011). Although empirical research is very limited, some studies suggest that behavioural flexibility is positively linked to leader emergence and followers’ evaluations of leadership (Day & Schleicher, 2006; Zaccaro, Foti, & Kenny, 1991a). The concept of behavioural flexibility fits in with a process-oriented view of leadership as it inherently acknowledges trait and behavioural perspectives (Zaccaro et al., 1991a). Leader flexibility describes leaders’ ability to identify situational demands and adjust their leadership behaviours to these situation-based requirements. Thus, leader flexibility itself is defined as a relatively stable ability, but recognises that individual differences are connected to the display of leader behaviours and that leadership occurs in a changeable environment (Denison, Hooijberg, & Quinn, 1995).

### 2.2.2 Behavioural perspective

In response to the criticism of trait research, the behavioural or style approach to leadership began to emerge in the 1950s and 1960s, which places the behaviour of leaders at the centre of understanding leadership. While trait theories focused on leaders’ personality characteristics, the style approach concentrates on leaders’ actions and behaviours. Northouse (2013) comments that the style approach goes beyond trait theories as it no longer ignores the followers that are the recipients of a leader’s actions.
Bryman (1992) notes that this change in focus from stable personality traits to behavioural leadership styles that can be learned and developed, has also signalled a shift in the practical implications of leadership research. Whereas trait theories provided information for selecting the best leaders, the style approach offers practical implications for developing and training employees to become effective leaders (Bryman, 1992). The Ohio State studies (Fleishman, 1953; Stogdill, 1950) and the University of Michigan studies (Katz & Kahn, 1966; Likert, 1961) are the two groups of researchers primarily known for the style approach to leadership. Propelled by the negative evaluation of early trait studies, researchers at the Ohio State University began to analyse the behaviour that leaders exercised (Stogdill & Coons, 1957). The work by the Ohio State group identified two crucial styles of leadership that are referred to as initiating structure and consideration. Initiating structure focuses on task-oriented behaviours such as defining and clarifying role responsibilities, outlining performance expectations and organising and coordinating work actions (Bass & Stogdill, 1990; Fleishman, 1953). Consideration describes leader behaviours that give emphasis to leader-follower relationships, attend to followers’ individual welfare and are aimed at building mutual respect and trust (Bass & Stogdill, 1990; Fleishman, 1953). To operationalise the two forms of leadership, the Ohio State researchers developed the Leadership Behaviour Description Questionnaire. In the Ohio State taxonomy, initiating structure and consideration were conceptualised as two independent dimensions, so that a leader can make use of both leadership behaviours.

Almost simultaneously with the Ohio State studies, a similar line of leadership research developed at the University of Michigan (e.g., Katz & Kahn, 1966; Likert, 1961). This group of researchers also investigated the behaviours of leaders and, parallel to the Ohio State studies, identified two core leadership styles: employee orientation (oriented towards follower support) and production orientation (oriented towards task accomplishment and goal attainment). The former corresponds with the Ohio State researchers’ concept of consideration, and the latter is akin to the dimension of initiating structure.

Both the Ohio State University and University of Michigan movements spawned a substantial amount of empirical research. Often studies in this strand of research focused on whether one leadership style is superior to the other and less on mutual impact or interaction effects (Northouse, 2013; Yukl, 2010). Individual studies found
evidence for task-oriented leader behaviours (initiating structure, production orientation) or relationship-centred leader behaviours (consideration, employee orientation) (Fleishman & Harris, 1962). Which one of the two forms of leadership emerged as the more effective practice, appeared to be dependent on the type of criterion that was applied to assess leadership effectiveness. It was suggested that consideration is more strongly related to employee satisfaction whereas initiating structure is related to measures of job or organisational performance (Bass & Stogdill, 1990). This notion was confirmed more recently in a meta-analysis by Judge et al. (2004). Other leadership scholars have also revisited initiating structure and consideration (Keller, 2006; Nadler & Tushman, 1994). It has been shown that initiating structure might play a unique role in addition to transformational and charismatic leadership (Keller, 2006). This notion supports the proposition that transformational leadership alone might represent an incomplete conceptualisation of effective leadership. Instead a changing use of different leadership behaviours might be closer to how successful leaders operate in reality.

Blake and Mouton (1964) developed the managerial leadership grid, which incorporated conceptions from the Ohio State and the University of Michigan research into a new model. They used the terms ‘concern for production’ and ‘concern for people’ to describe the two-dimensional conceptualisation which emanated from the Ohio State and Michigan studies (Arvonen & Ekvall, 1999; Blake & Mouton, 1964). Their model posited a ‘high-high’ standpoint, which declares that leaders need to maximise concern for people as well as concern for production. However, studies that empirically tested the high-high proposition did not find definitive support for this claim (Larson, Hunt, & Osborn, 1976). The somewhat equivocal findings from the style approach research, support the idea that the success of leader behaviour is dependent on the situation in which leadership takes place (Zaccaro & Klimoski, 2001). Hence, akin to trait theories, behavioural theories lack a consideration of the context.

In the late 1970s and 1980s, leadership research started to attribute greater importance to emotional elements of leadership (e.g., Conger & Kanungo, 1987). Bryman (1992) termed this change in leadership thinking ‘new-genre leadership’ approach. House and Aditya (1997) used the label ‘neocharismatic leadership’ to describe this paradigm
shift as part of which Bass’s (1985) transformational-transactional leadership theory emerged. Transformational-transactional leadership framework continues to dominate current leadership thinking and copious empirical research has linked transformational leadership to positive organisational outcomes (Dumdum, Lowe, & Avolio, 2002; Judge & Piccolo, 2004, Lowe, Kroeck, & Sivasubramaniam, 1996), including safety-related criteria (e.g., Clarke, 2013; Zohar & Luria, 2010). However, much less conceptual and empirical consideration has been given to transactional leadership (Antonakis, Avolio, & Sivasubramaniam, 2003; Clarke, 2013; Griffin & Talati, 2011). Yet, recent studies have indicated that transactional leadership is relevant for safety-specific outcomes (Clarke, 2013). In addition, transformational-transactional leadership has been increasingly criticised for lacking contextual sensitivity as research often proclaims transformational leadership as a universally effective leadership style, without addressing potential boundary conditions. Further research is needed to address these two shortcomings within transformational-transactional leadership research, i.e., the lack of contextualisation and the lack of investigation of the transactional leadership style. As Bass’s (1985) conceptualisation of transformational-transactional leadership forms a core theoretical foundation for this thesis, the framework is discussed separately in more depth in chapter three.

2.2.3 Contingency perspective

Both trait and behavioural views on leadership faced criticism that they do not give consideration to the role of situational aspects. Ayman (2003) states that “...all universal quests have ended in one point: Whether it is a leader’s trait or a behaviour under consideration, its contribution to success depends on particular contingencies” (p.152). Several frameworks emerged throughout the 1960s and 1970s that proposed leader effectiveness to be contingent on aspects of the situation in which leadership occurs.

In his pioneering work on leadership, Lewin (Lewin, Lippit, & White, 1939) already recognised that leadership is embedded within a social context and that situational factors interplay with leader behaviour. The first formal contingency theory was developed by Fiedler (1964; Fiedler & Chemers, 1974), which used leaders’ ratings of their least preferred co-worker (LPC) as a proxy to assess whether a leader is more relationship-motivated or task-motivated. Depending on a combination of situational
parameters, the effectiveness of leaders’ orientation for either relationships or task-objectives, as derived from the LPC scale, varied. The situational variables that Fiedler (1964, 1967) included are (a) leader-member relations, (b) task structure and (c) leader’s position power. According to his contingency model, the composition of these three variables, determines whether leaders who place stronger emphasis on follower relations or whether leaders who are more task-achievement oriented will be most effective. For example, if a leader’s relations with subordinates are friendly and cooperative, the leader is in a position with authority, but the task is unstructured, then a task-motivated leader is predicted as more effective (Yukl, 2010). If a leader has poor interpersonal relations with subordinates, the task is structured, but the leader has only weak power in their position, then according to the model, a relationship-motivated leader will be most effective (Yukl, 2010). Altogether the model considers eight combinations, and prescribes a task-motivated leader as more successful in four situational combinations and a relationship-motivated leader as effective in the other four combinations.

Although some studies have demonstrated empirical support for the model (Ayman & Chemers, 1991; Peters, Hartke, & Pohlman, 1985), Fiedler’s theory (1964) has received substantial amounts of criticism (Schriesheim, Tepper, & Tetrault, 1994; Strube & Garcia, 1981). In particular the use of the LPC scale to indirectly gauge a leader’s orientation towards task-achievement or interpersonal-relations remains controversial (Schriesheim, 1997). Its construct validity has been questioned and it is unclear what exactly the LPC scale measures (Arvonen & Ekvall, 1999). A further conceptual criticism of Fielder’s contingency model is its focus on leader orientation as a trait (Ayman, 2002, 2003). The model does not envisage that leaders can change or adapt their orientation to match the situation. Instead the model views leaders’ orientation as a stable trait. This means that to achieve a situation-leader orientation match, the situation can be amended but the model does not allow for leaders to be adaptive in their leadership style (Ayman, 2002, 2003). In contemporary leadership literature, Fielder’s model (1964) often features as a pioneering approach to acknowledge the context of leadership and uses it as an underlying foundation for situational leadership research, but few contemporary studies aim to test its specific propositions.
Other contingency theories have focused on how situational cues impact on the effectiveness of various leadership behaviours rather than stable, leader traits. Situational leadership theory (Hersey & Blanchard, 1969, 1984) views the appropriateness of leadership behaviour as dependent on subordinates’ characteristics. Hersey and Blanchard (1969, 1984) propose telling, selling, participating and delegating as four leadership behaviours with their effectiveness varying as a function of subordinates’ maturity levels. Maturity levels in the theory are defined by employees’ ability and their willingness or commitment. Hersey and Blanchard (1984) differentiate between four maturity levels ranging from low ability and low commitment, to highly able and willing employees. Situational leadership theory only considers subordinate characteristics as a situational factor, but does not make assumptions about other contextual variables. Although the intuitive appeal of the theory is often highlighted and the theory has received considerable attention from practitioners (Ayman, 2003), robust empirical support for the theory does not exist (Vecchio, Justin, & Pearce, 2008).

Path-goal theory (House, 1971; House & Mitchell, 1974) includes four leadership styles: directive, achievement-oriented, supportive and participative. The first two refer to more instrumental, task-oriented styles and the latter two describe more relationship-oriented styles. The theory proposes that the effectiveness of these leadership behaviours is dependent on situational parameters, which refer to task and subordinate characteristics. Locus of control or subordinate ability, are follower characteristics, which are considered in the model, and environmental characteristics refer to the structure and complexity or formalisation of the work environment (House & Mitchell, 1974). According to the theory, in circumstances of unstructured tasks and deficient employee ability, instrumental leadership will be the most adequate match for the situation (House & Mitchell, 1974). In situations with a high degree of task structure and highly competent employees, the theory postulates that these behaviours can have a detrimental effect, as subordinates would experience them as an exercise in unnecessarily close control (Vroom & Jago, 2007; Yukl, 2010). Some studies have empirically examined the propositions of House and Mitchell’s (1974) path-goal theory, including a meta-analytic review (Wofford & Liska, 1993). The results from these studies have produced partial support for path-goal theory overall, but have in particular provided evidence that task structure functions as a situational moderator.
(Evans, 1996; Vroom & Jago, 2007). However, empirical work on the theory is not extensive and Yukl (2010) states that path-goal theory continues to lack rigorous testing.

2.2.3.1 Substitutes for leadership theory

Based on path-goal theory, Kerr and Jermier (1978) developed their substitutes for leadership theory, which is potentially the most situation-centred theory in the contingency approach. Other contextual models made suggestions as to which situational factors increase or decrease the effectiveness of leadership behaviours, but argued that all situations call for some form of leadership. Kerr and Jermier (1978) suggested that certain conditions diminish or entirely nullify the effect of leadership and in a later extension of the model, enhancers that amplify the effect of leadership were added (Howell & Dorfman, 1986; Howell, Dorfman, & Kerr, 1986). Overall, Kerr and Jermier (1978) proposed fourteen situational factors that can be grouped into task characteristics (structure/routine, feedback provided by the task, intrinsic satisfaction), subordinate characteristics (ability, commitment, indifference towards rewards) and organisational characteristics (formalisation, group cohesion, inflexibility of rules, distance of work sites, power position). Moreover, Kerr and Jermier (1978) proposed two behavioural categories, supportive leadership and instrumental leadership that are more or less effective depending on the aspects of a situation. Supportive leadership refers to more relationship-oriented leader behaviours whereas instrumental leadership refers to more task-oriented leader behaviours. Thus, according to the theory, the fourteen proposed situational factors can substitute, neutralise or enhance supportive and instrumental leadership (Kerr & Jermier, 1978; Howell & Dorfman, 1986; Howell et al., 1986). A substitute has a direct influence on the outcome, which acts in the place of leadership and therefore makes leadership unnecessary. For example, Kerr and Jermier (1978) posited an intrinsically satisfying task as a substitute for supportive leadership. A neutraliser creates an environment where it is impossible for leadership to make an impact. It does not replace the need for leadership, but creates an “influence vacuum” (Podsakoff, MacKenzie, & Bommer, 1996a, p. 380). For example, according to the theory employees will remain unaffected by both supportive and instrumental leadership if they are indifferent towards rewards.
In an extension of the model, enhancing situational factors that amplify a leader’s effect were also theorised (Howell & Dorfman, 1986).

The theory has received some empirical support, but overall findings have been mixed (Dionne, Yammarino, Atwater, & James, 2002; Muchiri & Cooksey, 2011; Podsakoff et al., 1996a, Podsakoff, MacKenzie, & Bommer, 1996b). Podsakoff et al. (1996a) found support for the situational factors, organisational formalisation, intrinsically satisfying tasks, group cohesiveness and professional orientation to function as leadership moderators. Dionne et al. (2002) tested several of the theory’s propositions using a research design with two- and three-source data. They found some evidence for individual hypotheses, but overall concluded that support for substitutes for leadership theory was weak. However, in their study, they sampled data from forty-nine organisations and noted that this approach might have been too generic or indistinct, and that detecting substitute effects might require a less broad view of a specific organisational context (Dionne et al., 2002).

Additionally, Yukl (2010) raised a number of conceptual criticisms that might have contributed to the lack of robust empirical evidence for the theory. He pointed out that whilst the substitutes for leadership theory proposes different situation factors, the theory does not provide an explicit rationale for the process through which each of these factors impacts on the influence of leadership. Moreover, Yukl (2010) notes that the two behavioural categories, supportive leadership and instrumental leadership, are too crudely defined and lack specification of types of leadership behaviours that are subsumed under these two labels. He asserts that more concrete leadership practices are required to identify situational factors that substitute, neutralise or enhance leadership. Moreover, Yukl (2010) remarks that the two broad categories, supportive and instrumental leadership, have not been expanded to include other aspects of leadership that have been shown to be important for leader effectiveness since the theory was developed in 1978. Despite these conceptual weaknesses, substitutes for leadership theory has been claimed as the model with the most potential compared to other contingency frameworks (Wang & Rode, 2010; Yammarino, 2013). It has been repeatedly stressed that although empirical support for the substitutes for leadership model and the traditional contingency approach more widely, is inconsistent, this should not deter research from exploring the role of context in leadership (Den Hartog & Belschak, 2012). More recently, there has been renewed interest in contingency
approaches and the substitutes for leadership model (e.g., Den Hartog & Belschak, 2012; Künzle, Zala-Mezö, Kolbe, Wacker, & Grote, 2010; Muchiri & Cooksey, 2011; Stoker, Gutterink, & Kolk, 2012; Wang & Rode, 2010). These more recent studies have often taken certain tenets of substitutes for leadership theory and modified or combined these with other theoretical perspectives rather than strictly adhere to the propositions of traditional contingency theories. Thus, this underlines the argument that it should not be concluded from the mixed empirical evidence on traditional contingency research, that context does not play a role in the leadership process. Instead future research is needed to explore how traditional contingency theories can be amended and supplemented through other leadership theories, to overcome their shortcomings. For example, in relation to Yukl’s (2010) criticism that the behavioural categories of traditional contingency leadership theories are too broad, future research is required that examines how existing behavioural leadership perspectives can be utilised to overcome this weakness. Behavioural frameworks such as Bass’s (1985) transformational-transactional leadership model, which have received considerable support, should be investigated as ways to ameliorate traditional contingency theories. A generic criticism of contingency theories is, that the proposed context factors are too theoretical and lack real-world value, which might have contributed to the theories’ weak empirical support (Villa, Howell, Dorfman, & Daniel, 2003). This notion is related to Yukl’s (2010) point that substitutes for leadership theory does not detail mechanisms on to how the proposed situational factors impact on leadership in the real-world leadership process. Hence, future research is required that investigates context factors that have a strong applied meaning, such as the salience of safety within a context.

The scientific study of leadership has evolved for over a century during which leadership has been approached from a variety of perspectives. The theoretical background of the major approaches to leadership presented above, demonstrates that within the multiple leadership paradigms (trait, behavioural and contingency), there are numerous theories with considerable overlap but also contradictions. Exclusion of contingency influences has been a strong criticism of trait as well as behavioural perspectives. Trait and behavioural theories without implicating potential situational effects are often deemed as oversimplified (Northouse, 2013). However, individual situational theories have not always been able to produce strong empirical support or
require more testing (Podsakoff et al., 1996a). This highlights that without consolidating the different perspectives of leadership, each of the three major approaches to leadership will remain incomplete (DeRue et al., 2011). DeRue et al. (2011) warn that proliferation of leadership theories has hampered research in producing an understanding of leadership that matches the complexities of reality, where trait, behavioural and contextual elements take effect concurrently. In addition, they remark that the lack of integration between leadership paradigms impedes the practical utility of leadership research. Each paradigm produces isolated snippets of advice for practitioners. For example, behavioural theories point to transformational leadership as an effective leadership technique (Judge & Piccolo, 2004), and trait theories highlight certain leader attributes as important traits for leader emergence (Judge et al., 2002). Practical guidance that takes into account leader characteristics, leadership behaviour as well as contextual requirements, however is scarce (DeRue et al., 2011; Rowold, 2011). Avolio (2007) echoes this call to synthesize theories. He asserts that answering the core questions that persist in the leadership literature, such as when a certain leadership style is more or less effective, requires a combination of theories.

In an effort to overcome deficiencies in theory integration, DeRue et al. (2011) combine the trait and behavioural leadership paradigms. The debate on these two leadership perspectives has traditionally been shaped in a competitive form, aiming to ascertain whether trait or behavioural aspects determine leadership effectiveness (Zaccaro, 2007). As discussed earlier, contemporary process views of leadership no longer see trait and behavioural perspectives as two disparate approaches, but instead proclaim an interactive relationship between traits and behaviours in their impact on leadership outcomes (Dinh & Lord, 2012; DeRue et al., 2011). DeRue et al. (2011) propose that leader traits are linked to leadership effectiveness by eliciting certain leadership behaviours and found empirical support for this conceptualisation in a meta-analytical study.
2.2.4 Theory integration: The present framework

Appeals have repeatedly been voiced that contextual boundaries of leadership styles receive too little consideration in major leadership taxonomies outside the contingency paradigm (Liden & Antonakis, 2009; Rowold, 2011). Yukl (2010) has made the criticism that frameworks are too often discharged and replaced without sufficient interlinking of existing theories. Arvonen and Ekvall (1999) note that the disordered variety of situational variables and theory proliferation within the contingency perspective, has made it difficult to link situational views with universal leadership theories such as the transformational-transactional framework.

To overcome this lack of theory integration, the current research borrowed tenets from substitutes for leadership theory and integrated these with existing behavioural and trait perspectives that have accumulated empirical support (i.e., transformational-transactional leadership theory). It should be clarified that the present research endorsed the principal idea of substitutes for leadership theory, that in certain contexts a particular leadership style is not necessary whilst in another context the same behaviour is highly influential. The research however did not attempt to test the specific situational factors and individual propositions of the theory. As aforementioned, the rigid specificity and abstract contextual concepts of contingency theories have been alluded to as reasons for the lack of empirical support (Villa et al., 2003).

Furthermore, contextual factors might not only be important for the influence of leadership behaviour on employee outcomes, but might also play a role in the relationship between leader traits and leader effectiveness (Dinh & Lord, 2012). In ambiguous situations that are not characterized through strong behavioural scripts, leader traits such as leadership flexibility might be crucial for successfully influencing employee performance (Meyer, Dalal, & Bonaccio, 2009). Therefore, the present research explored the role of leader flexibility and whether this competency is particularly important in safety-critical contexts.

The present research merged behavioural perspectives of leadership with a contingency view by exploring whether salience of safety impacts on the effectiveness of transformational, transactional and passive leadership behaviours. This addresses the criticism that behavioural frameworks lack consideration of contextual factors.
It also addresses the conceptual and empirical weakness of contingency theories’ proposed behavioural categories by employing transformational-transactional leadership framework as an established leadership model. Moreover, the research merges behavioural and trait perspectives by extending transactional-transformational leadership through leader flexibility. This addresses the notion that leadership behaviours and traits interact in their influence on leadership and are both required for a more complete understanding of leadership. Furthermore, trait and contingency perspectives are merged, by assessing whether leader flexibility is particularly relevant in safety-critical contexts compared to non-safety critical contexts. In summary, the research integrates behavioural, trait and contingency perspectives of leadership by exploring the effectiveness of transformational-transactional leadership theory (behavioural perspective) and the role of leader flexibility (trait perspective) in dependency of the level of safety salience within a work environment (contingency perspective). This integration of theoretical perspectives is schematically displayed in Figure 1. In the following chapters the specific links proposed in Figure 1 are further addressed. In chapter three, the transformational-transactional leadership framework and empirical research that has explored its links with leadership outcomes are outlined. In chapter four, contextual approaches that go beyond traditional contingency theories, and empirical research that has considered contextual boundaries of transformational and transactional leadership, are explored. In both chapters, existing research is linked to safety-critical contexts and their specific requirements are considered.

### 2.3 Chapter Summary

Leadership research has been of interest to the social sciences for over a century and three main strands of research approaches to leadership, i.e., trait, behavioural and contingency perspectives have been discussed. Within each of these schools there has been overlap in conceptualisations, but there has not been substantial linkage between the different schools. Trait perspectives overlap in the way that they focus on stable characteristics and abilities that enhance leader effectiveness, but have been criticised for neglecting more dynamic leader behaviours and contextual influences. There is
considerable overlap between behavioural theories as they often propose leadership behaviours that can be conceptually distilled to relation-focused and task-focused practices (Yukl, 2010). However, these approaches have been criticised for overlooking how such practices are embedded in the context in which leadership takes place. Contingency approaches to leadership identify contextual factors that influence the leadership process, but have been criticised in that their behavioural categories are often vague or incomprehensive. Also, empirical support for the distinct propositions of contingency theories has been weak. Each of these leadership perspectives’ shortfalls cannot be overcome unless different theoretical standpoints on leadership are merged. The theoretical model on which the current research is based, integrates behavioural, trait and contingency perspectives of leadership on the specific example of transformational-transactional leadership theory (behavioural perspective), leader flexibility (trait perspective) and safety-critical contexts (contingency perspective).

The following two chapters review theoretical and empirical research that underpins the proposed model and relates to the specific relationships as displayed in Figure 1. Chapter three reviews research on transformational and transactional leadership and outlines evidence regarding their effectiveness with a particular focus on safety-related criteria. In chapter four contextual considerations of transformational and transactional are considered with a particular emphasis on safety-critical contexts.
Figure 1. Integration of contingency, behavioural and trait perspectives.
3 Transformational–Transactional Leadership and Safety

3.1 Chapter Overview

Transformational-transactional leadership (Bass, 1985) constitutes the dominating framework in the current leadership literature and provides the guiding theory for the research presented in this thesis. The model has sparked a volume of research in the wider organisational leadership literature and the field of occupational safety. Transformational leadership has been positively linked to a range of outcomes including safety-related criteria (Barling, Loughlin, & Kelloway, 2002; Clarke, 2013; Wang, Oh, Courtright, & Colbert, 2011). However, transactional leadership is less researched and evidence for its effectiveness is inconclusive (Judge & Piccolo, 2004). This chapter outlines the transformational-transactional framework and reviews the empirical work that has been conducted in the organisational and safety-specific literature.

The first half of this chapter outlines the structure and components of Bass’s (1985) transformational-transactional leadership model, and compares the model to other related leadership theories. The core empirical research on the effectiveness of transformational and transactional leadership in the wider organisational literature is addressed. The second half of the chapter provides an overview of the role of leadership in occupational safety and reviews empirical research that has linked transformational, transactional and passive leadership to safety-related outcomes. The concept of safety climate is reviewed as it has been identified as a key mechanism through which leadership impacts on safety behaviour and accident rates. One issue within the body of safety leadership research is whether studies should adopt a safety-specific or generic perspective on leadership. The last section addresses this debate.
3.2 Transformational-Transactional Leadership

One of the current, most dominant leadership frameworks is Bass’s (1985, Bass & Avolio, 1994) transformational-transactional leadership theory. The emphasis in transformational leadership lies on inspiring and motivating followers through charisma, a compelling vision, intellectual stimulation and demonstrating concern and consideration (Bass, 1985; Bass & Avolio, 1994). Transactional leadership is described as an exchange relationship between leaders and followers, which is concerned with the setting of objectives and of clear goals, taking corrective measures and rewarding employee performance (Bass, 1985; Bass & Avolio, 1994).

Bass’s (1985) framework of transformational-transactional leadership is rooted in Downton’s (1973) primal notion of transformational leadership and Burns’s (1978) early conceptualisation of transformational and transactional leadership in his book on political leadership. Bass (1985) refined and extended Burns’s (1978) version of transformational-transactional leadership by elaborating on the specific practices that constitute transformational and transactional leaders. An important difference between Bass’s (1985) and Burns’s (1978) view of transformational and transactional leadership lies in their perspective on the relationship between these two leadership styles. Burns (1978) proposed that transformational and transactional leadership are opposed ends of the same continuum and discussed the two styles in an either-or fashion in his writings. Bass (1985) defined transformational and transactional leadership as separate concepts, which are not mutually exclusive but can be used in conjunction (Bass & Avolio, 1994; Bass & Riggio, 2006). Later, Bass and Avolio (1994) extended the transformational-transactional leadership framework into the full-range leadership model by including laissez-faire leadership, referring to the absence of leadership.

3.2.1 Components of transformational and transactional leadership

The following section provides an overview of the individual leadership practices that constitute the transformational and transactional leadership style respectively. In Table 1, a summary of these individual components is provided.
Bass’s (1985) original formulation of the model, proposed four central components, which make up transformational leadership: (1) Idealised Influence, (2) Individualised Consideration and (3) Intellectual Stimulation. In a revision of the theory a fourth sub-component was added, labelled (4) Inspirational Motivation (Avolio & Bass, 1994; Bass & Riggio, 2006). Idealised Influence refers to behaviours that instil follower trust and respect through acting as a role model and placing the greater good of the group before self-interests (Bass & Stogdill, 1990; Avolio & Bass, 1994; Bass & Riggio, 2006). Initially this dimension was referred to as ‘charisma’, but was later re-named Idealised Influence. In a further revision, Idealised Influence was partitioned into an attributional and a behavioural component (Bass & Avolio, 1993; Bass & Riggio, 2006). Idealised Influence-Attributed refers to the extent to which followers attribute charisma to the leader. Idealised Influence-Behaviour includes the display of charismatic behaviours. Individualised Consideration includes taking an interest in followers’ individual needs and offering individualised coaching and support. Intellectual Stimulation refers to fostering innovative consideration of issues and problems, stimulating new perspectives and challenging old beliefs. Inspirational Motivation refers to providing meaning to followers’ work, demonstrating optimism and enthusiasm and disseminating an appealing, shared vision.

Central components of transactional leadership in Bass’s (1985) original model are (1) Contingent Reward and (2) Management-By-Exception. Contingent Reward describes an exchange-based relationship between leader and followers, where leaders set clear objectives for followers and show recognition upon achievement of these goals. Management-By-Exception refers to taking corrective action to intervene with any problems and mistakes. In a revision of the theory, this dimension was divided into an active and a passive form (Hater & Bass, 1988). Management-By-Exception-Active describes corrective action in a preventive manner, in which leaders try to pre-empt any issues through monitoring performance, taking action as soon as problems arise and correcting errors as they are about to happen (Hater & Bass, 1988; Bass & Riggio, 2006). Thus, leaders vigilantly pay attention to exceptions from normal working procedures and manage these in a proactive fashion. In contrast, Management-By-Exception-Passive refers to correcting mistakes and dealing with problems after they have occurred. Thus, whilst both dimensions are concerned with corrective action, the difference between the two lies in the timing. In Management-By-Exception-Active
leaders try to anticipate any mistakes or deviations from standards and address these before they become an issue. In Management-By-Exception-Passive leaders wait until a situation has gone wrong and deal with mistakes after they have already happened. Laissez-faire leadership, which was added to the model to represent ineffective leadership practices, describes the absence of leadership, ignoring follower needs and decision-making (Bass & Riggio, 2006; Avolio, 1999).

In the following sections further theoretical aspects of the transformational-transactional framework are considered, and in section 3.4 empirical research relating to transformational-transactional leadership is reviewed.

Table 1. Summary of transformational-transactional leadership dimension

<table>
<thead>
<tr>
<th>Leadership dimension</th>
<th>Leadership behaviours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transformational leadership</strong></td>
<td></td>
</tr>
<tr>
<td>Idealised Influence</td>
<td>Displaying role model behaviour (behavioural element), being perceived as charismatic (attributional element)</td>
</tr>
<tr>
<td>Inspirational Motivation</td>
<td>Communicating a positive vision, demonstrating enthusiasm and optimism</td>
</tr>
<tr>
<td>Intellectual Stimulation</td>
<td>Challenging existing beliefs, encouraging new and innovative approaches</td>
</tr>
<tr>
<td>Individualised Consideration</td>
<td>Demonstrating concern for followers’ individual needs, training and coaching</td>
</tr>
<tr>
<td><strong>Transactional leadership</strong></td>
<td></td>
</tr>
<tr>
<td>Management-By-Exception-Active</td>
<td>Monitoring performance, proactively checking for and correcting errors, vigilantly ensuring that standards are met</td>
</tr>
<tr>
<td>Contingent Reward</td>
<td>Clarifying goals and responsibilities and rewarding these on achievement</td>
</tr>
<tr>
<td><strong>Passive leadership</strong></td>
<td></td>
</tr>
<tr>
<td>Laissez-faire leadership</td>
<td>Absence of leadership and avoidance of responsibilities</td>
</tr>
<tr>
<td>Management-By-Exception-Passive</td>
<td>Correcting errors and mistakes after they have occurred</td>
</tr>
</tbody>
</table>
3.2.2 Dimensionality of transformational-transactional leadership

The dimensionality of the transformational-transactional leadership model has largely been empirically investigated and developed using the Multifactor Leadership Questionnaire (MLQ, Bass, 1985; Avolio & Bass, 1995), which is the instrument most often used to operationalise transformational-transactional leadership (Hinkin & Schriesheim, 2008; Van Knippenberg & Sitkin, 2013). Whilst some research has provided support for the individual components of transformational-transactional leadership as proposed by Bass (1985; Bass & Avolio, 1994), multiple studies have not empirically replicated the suggested structure (Den Hartog, Van Muijen, & Koopman, 1997; Tepper & Percy, 1994). Studies investigating the components of transformational-transactional leadership often report inconsistencies in particular with regards to the dimensions of Contingent Reward and Management-By-Exception-Passive. In Bass’s (1985; Avolio & Bass, 1995) framework these are described as transactional leadership practices. However, evidence is growing that Contingent Reward constitutes a component of transformational leadership and that Management-By-Exception-Passive combines with laissez-faire leadership not Management-By-Exception-Active (Edwards, Schyns, Higgs, & Gill, 2012; Heinitz, Liepmann, & Felfe, 2005; Garman, Davis-Lenane, & Corrigan, 2003). Additionally, some studies have reported very high correlations amongst the transformational leadership sub-dimensions (in particular between Idealised Influence and Inspirational Motivation), so that it can be questioned whether these represent distinct components (Bycio, Hackett, & Allen, 1995; Lowe et al., 1996; Lievens, Van Geit, & Coetsier, 1997).

3.2.3 The augmentation hypothesis

As noted above, Bass (1985) proposed that transformational and transactional leadership are complementary to each other. The relationship between transformational and transactional leadership is further addressed in his framework by the so-called augmentation hypothesis, which proposes that transformational leadership extends transactional leadership (Bass, 1985; Bass & Riggio, 2006). This has sometimes been interpreted as implying that transformational leadership constitutes the superior leadership behaviour, which renders transactional leadership
redundant. Transformational leadership is often referred to as a leadership style that motivates subordinates to achieve extraordinary levels of performance and inspires followers to go ‘beyond expectations’ (Bass, 1985). Thus, some research has construed the augmentation hypothesis as implying that transformational leadership surpasses transactional leadership, but that this effect does not apply in the reverse direction (Bycio et al., 1995). However, others have urged that while the augmentation hypothesis entails that transformational leadership can reach beyond transactional leadership, it also imparts that the successful implementation of transformational leadership depends at least to some extent on transactional leadership behaviours (Judge & Piccolo, 2004; Rodriguez & Griffin, 2009; Waldman, Bass, & Yammarino, 1990). In other words, it is argued that the practice of transactional leadership behaviour is a necessary prerequisite in order for the use of transformational tactics to be successful (Howell & Avolio, 1993). Bass (1998) argued that, “transformational leadership does not substitute for transactional leadership” (p.21). Instead he proposed that effective leadership is characterised by both, transactional and transformational leadership. Rodriguez and Griffin (2009) explain that, “transactional leadership behaviours are characterised by establishing consequences and contingencies on subordinates’ actions that help clarify the meaning of transformational leadership behaviours” (p. 98). Their statement underlines the need for both leadership styles.

3.2.4 Empirical work on the augmentation hypothesis

Whilst some studies have empirically confirmed the augmentation hypothesis, results are not entirely without inconsistencies. Several studies have provided support for the augmentation effect in its traditional sense that transformational leadership explains unique variance over and above transactional leadership (Heinitz et al., 2005; Ivey & Kline, 2010; Judge & Piccolo, 2004; Rowold & Heinitz, 2007; Vandenbergh, Stordeur, & D’Hoore, 2002; Waldman et al., 1990). However, this empirical support for the augmentation effect was often not entirely unconfined. For instance, Bass, Avolio, Jung, and Berson (2003) found that the augmentation effect of transformational leadership over Contingent Reward was only confirmed when Contingent Reward was assessed by a restricted set of two items that described an explicit follower-leader exchange contract. Moreover, some research has only found support for the augmentation hypothesis with regards to certain outcome measures but
not others. Judge and Piccolo (2004) found an augmentation effect of transformational leadership over Contingent Reward for follower attitudes but not for follower job performance. Similarly, Wang et al. (2011) found in their meta-analysis that transformational leadership extended transactional leadership with regards to team performance and contextual performance, but not individual-level task performance.

It was stated above that researchers have stressed that the augmentation hypothesis must not be interpreted as implying that transformational leadership renders transactional leadership redundant. It has been suggested that the augmentation hypothesis presents a two-way effect, with the possibility of transactional leadership going beyond the effects of transformational leadership (Veccio, Justin, & Pearce, 2008; Wang et al., 2011). Yet, little research has explored this proposition. In one of the few studies testing for this reverse augmentation effect, Veccio et al. (2008) discovered that for job performance as well as job satisfaction as outcome measures, Contingent Reward augmented the influence of transformational leadership dimensions rather than the other way round. Similarly, Wang et al. (2011) reported that transactional leadership augmented transformational leadership when predicting individual-level task performance. Again, these results demonstrate that transformational leadership might not always be more important than transactional leadership, but that in some circumstances both leadership styles are required. In further support of this notion Pillai and Meindl (1998) explored the effectiveness of leadership in resolving crisis situations. They found that the link of transformational leadership with crisis resolution became non-significant when transactional leadership was added to their regression model. The authors suggest that in crisis situations transformational and transactional leadership might be equally strongly related to solving the crisis and hence no augmentation of one style over the other was found. The finding is particularly pertinent for the present research as crisis situations have some resemblance to safety-critical conditions in the sense that threat is imminent and failure has severe consequences.

Overall, the support for the augmentation hypothesis is not without inconsistencies, which indicates that the relationship between transformational and transactional leadership might be more complex than initially proposed. For certain types of outcomes (e.g., safety compliance) transactional leadership might be most influential
rather than transformational leadership (Clarke, 2013). Further, under certain conditions (e.g., crisis and safety-critical contexts) transformational and transactional leadership might be of comparable relevance for leader effectiveness. In summary, the empirical findings on the augmentation hypothesis have shown that the relationship between transformational and transactional leadership warrants further investigation in particular with different types of outcomes and in different types of context.

3.3 Transformational-Transactional Leadership Framework and Other Leadership Theories

In the course of the shift to the ‘neo-charismatic’ (Antonakis & House, 2002) genre of leadership, a number of similar conceptualisations were developed in parallel (e.g., Bass, 1985; Conger & Kanungo, 1987). Although Bass’s (1985) transformational-transactional leadership framework is the currently dominating leadership model within the literature, the theory’s overlap with other conceptualisations has been discussed. This section does not aim to provide a full account of theories that can be subsumed under the charismatic leadership label or to solve the debate as to whether these are equivalents to Bass’s (1985) theory. Instead the purpose of this section is to address the overlap between Bass’s (1985) model and alternative charismatic leadership theories. In particular three theories have been identified as overlapping with Bass’s (1985) transformational-transactional leadership framework: Conger and Kanungo’s (1987) charismatic leadership theory, the leader-member-exchange model (Graen, 1976) and the two-factor model of Initiating Structure and Consideration by the Ohio State studies (e.g., Fleishman, 1953). Each of these models is discussed below in relation to the transformational-transactional leadership framework.

3.3.1 Transactional-transformational leadership and charismatic leadership theory

Within the leadership literature some confusion exists as to what extent transformational leadership can be distinguished from Conger and Kanungo’s (1987, 1998) construct of charismatic leadership (Bryman, 1992; Rowold & Heinitz, 2007; Yukl, 2010). Whilst some have declared that the two terms can be used
interchangeably, others have argued that they are sufficiently distinct to justify their separation. Both theories focus on emotional ties between leaders and followers, and emphasise similar leadership elements such as inspiration and vision (Rowold & Heinitz, 2007; Sashkin, 2004). Bass (1985; Bass & Avolio, 1994) argued that charisma only forms one component of transformational leadership, but is not a sufficient characterisation for transformational leadership, which includes additional activities. In an empirical comparison, Rowold and Heinitz (2007) assessed the convergent and divergent validity of Bass’s (1985) transformational-transactional leadership and Conger and Kanungo’s (1987, 1998) charismatic leadership framework. The study reported a strong, significant correlation at $r = .88$ between transformational leadership as measured through the Multifactor Leadership Questionnaire (MLQ, Avolio & Bass, 1995) and charismatic leadership as measured through the Conger-Kanungo scale. Further, the results showed that charismatic and transformational leadership explained unique, albeit small, amounts of variance in subjective performance measures, but did not explain unique variance in objective performance measures. The authors conclude that whilst evidence for a strong overlap between the two constructs was found, they “both […] capture their own piece of charisma” (Rowold & Heinitz, 2007, p. 130). An important finding in Rowold and Heinitz’s (2007) study was that transactional leadership as measured through the MLQ showed a weaker relationship with charismatic leadership at $r = .52$. This indicates that transactional leadership is related to, but distinct from charismatic leadership and is, as such not captured within the dimensions of Conger and Kanungo’s (1998) charismatic leadership theory.

### 3.3.2 Transformational-transactional leadership and leader-member exchange

The construct of leader-member exchange (LMX) refers to the quality of the relationship between a leader and a follower (Graen, 1976; Graen & Uhl-Bien, 1995). LMX is conceptualised within a strong dyadic focus of the interactions between a leader and an individual member. In the literature, some ambiguity exists as to how LMX differs from transformational leadership, with the two terms sometimes used with little differentiation (Howell & Hall-Merenda, 1999; Piccolo & Colquitt, 2006). It can be asserted that LMX is more concerned with the overall quality of the leader-follower relationship and focuses less on specific leadership practices. This distinction is evident in research that has investigated leader-member exchange and
transformational leadership simultaneously. Studies have reported that LMX acts as a mediator in the link between transformational leadership and outcomes (Wang, Law, Hackett, Wang, & Chen, 2005) or some research has identified LMX as a moderator of transformational leadership (Howell & Hall-Merenda, 1999). Moreover, whilst it has been argued that LMX contains both transformational as well as transactional leadership aspects (Graen & Uhl-Bein, 1995), its structure lacks clarity with debate as to whether LMX is uni-dimensional or multidimensional (Liden & Maslyn, 1998).

3.3.3 Transformational-transactional leadership and the Ohio State studies

A third leadership model that has been suggested to overlap with Bass’s (1985) framework of transformational-transactional leadership, is the two-factor model of Initiating Structure and Consideration posited by the Ohio State studies (e.g., Fleishman, 1953; Stogdill, 1950). It has been pointed out that Consideration has similarities with transformational leadership, especially with regards to the dimension of Individualised Consideration (Judge et al., 2004; Piccolo, Bono, Heinitz, Rowold, Duehr, & Judge, 2012). It can also be argued that Initiating Structure has similarities with transactional leadership, although this overlap has been considered less in the literature. Studies that have included both models, transformational-transactional leadership and the Ohio State two-factor model, have reported high correlations between transformational leadership and Consideration as well as with Initiating Structure (Keller, 2006; Neubert, Kacmar, Carlson, Chonko, & Roberts, 2008; Piccolo et al., 2012; Seltzer & Bass, 1990). Whilst these relationships indicate overlap between the leadership constructs, Piccolo et al. (2012) showed that a factor-model where each leadership construct was specified as a separate factor emerged as best fitting. Thus, transformational-transactional leadership are closely related to Initiating Structure and Consideration, but overall it has been found that their conceptual distinctness can be justified (Piccolo et al., 2012). Thus, the Ohio State studies’ two-factor model presents an alternative to the transformational-transactional leadership model.
3.4 Outcomes of Transformational and Transactional Leadership

Bass’s (1985) transformational-transactional leadership model and its operationalisation through the MLQ, sparked a vast volume of empirical work on transformational leadership. In a content analysis of the articles published in the Leadership Quarterly journal between the years 1990 to 1999, Lowe and Gardner (2001) reported that neo-charismatic theories were the most commonly used theoretical foundation and almost a third of publications were on transformational leadership. Interestingly, in a content review of the papers published in the same journal during the last decade between the years 2000 and 2009, Gardner, Lowe, Moss, Mahoney, and Cogliser (2010) found that neo-charismatic theories still remained the most dominant framework for leadership studies, although their relative proportion decreased. This signals that interest in transformational-transactional leadership continues, although it is suggested below that conceptual and empirical advancements are needed for a more fine grained understanding of transformational-transactional leadership. Several meta-analytical studies have demonstrated that transformational leadership is positively associated with employee performance and satisfaction (Dumdum et al., 2002; Judge & Piccolo, 2004, Lowe et al., 1996; Wang et al., 2011). Wang et al. (2011) reported in their meta-analysis that transformational leadership was positively related to performance at the individual-, team- and organisational-level. In addition, copious primary studies have linked transformational leadership to an array of different outcomes including attitudinal outcomes such as organisational citizenship behaviours (e.g., Podsakoff, MacKenzie, Moorman, & Fetter, 1990), organisational commitment (e.g., Bono & Judge, 2003), follower mood (Bono & Ilies, 2006), and psychological well-being (Arnold, Turner, & Barling, 2007).

Empirical research on transactional leadership is less extensive. As noted above research has produced mixed findings regarding its link with outcome criteria. A number of studies have shown positive relationships between transactional leadership and performance (e.g., Howell & Hall-Merenda, 1999; Judge & Piccolo, 2004; Veccio et al., 2008; Wang et al., 2011) as well as satisfaction measures (e.g., Judge & Piccolo, 2004; Veccio et al., 2008; Walumbwa, Wu, & Orwa, 2008). However, other studies have reported negative links between transactional leadership and performance (e.g., Howell & Avolio, 1993) and affective outcomes, such as such as social support.
(Breevaart, Bakker, Hetland, Demerouti, Olsen, & Espevik, 2013) and emotional exhaustion (Stordeur, D’Hoore, & Vandenberghe, 2001). Moreover, some studies have found that transactional leadership is unrelated to leader outcomes such as work engagement (Breevaart et al., 2013), or innovative behaviour (Pieterse, Van Knippenberg, Schippers, & Stam, 2010). Thus, empirical evidence regarding the effectiveness of transactional leadership is inconsistent.

With regards to workplace safety, research has produced empirical evidence for a positive link between transformational leadership and safety outcomes such as safety climate (Barling et al., 2002; Christian, Bradley, Wallace, & Burke, 2009; Clarke, 2013), safety performance (Barling et al., 2002; Kelloway et al., 2006) and safety citizenship behaviour (Conchie & Donald, 2009). Thus, generally, studies have established a positive relationship between transformational leadership and occupational safety. Transactional leadership has received considerably less attention in the literature, although some studies have demonstrated support for a positive effect of transactional leadership on workplace safety (Clarke, 2013; Clarke & Ward, 2006; Lu & Yang, 2010; Zohar, 2002a).

Thus, as mentioned above, Bass’s (1985) framework dominates the current leadership literature, with a large proportion of empirical work being based on the model. Especially within the safety domain, research on leadership has heavily relied on transformational-transactional leadership theory (e.g., Barling et al., 2002). Therefore, using transformational-transactional leadership framework as the guiding theory for the research, allows for more explicit integration and comparison of the present work with existing research in the wider leadership literature and the realm of safety leadership. In addition, it was noted above that the full-range leadership model (Bass, 1985; Avolio, 1999) explicitly addresses transformational, transactional and passive forms of leadership in its conceptualisation.

The model presented in Figure 1, proposes that both transformational and transactional leadership are positively related to outcome criteria in contexts where safety is critical. The role of leadership for workplace safety overall and the empirical research investigating the influence on safety of transformational-transactional leadership specifically is reviewed in more detail in the second half of this chapter. In chapter
four, theoretical and empirical research that relates to the model’s proposition that contextual attributes such as the salience of safety impact on the relationship between leadership and safety, is reviewed.

3.5 The Role of Leadership for Occupational Safety

In chapter two, it was shown that a long tradition of research has demonstrated that leaders are a crucial source of influence for employee behaviours and attitudes (e.g., Podsakoff et al., 1996a, 1996b; Walumbwa, Avolio, & Zhu, 2008). Transferred to the domain of safety, this notion suggests that leaders are influential in shaping workplace safety. With a shift in the focus of safety research from a technical-engineering focus towards organisational and human contributions to safety, leadership started to emerge as a central antecedent of employee safety attitudes and behaviour (Dwyer & Raferty, 1991; Shannon, Mayr, & Haines, 1997; Zohar, 1980). The following sections review the role of leadership for workplace safety. First, an overview of the broader link between leadership and safety is provided, followed by a review of research that has investigated the influence of transformational, transactional and passive leadership on different safety outcomes. Lastly, it is discussed whether studies on safety leadership should use safety-specific leadership measures or facet-free operationalisations of leadership.

Early studies on safety leadership established the general role of leadership for safety (i.e., generic leadership involvement), which led to research exploring the influence of specific styles of leadership on safety (e.g., Andriessen, 1978). Simard and Marchand (1994) reported that supervisor involvement was positively linked to reductions in accident rates and further confirmed the role of supervisor participation for safety in their later studies (Simard & Marchand, 1995, 1997). Other studies also provided supporting evidence for leadership behaviour and leaders’ attitudes as an antecedent to safety and linked leaders’ attitudes towards safety, to employees’ safety perceptions, safety behaviours and accident rates (Parker, Axtell, & Turner, 2001; Thompson, Hilton, & Witt, 1998; Tomás, Melia, & Oliver, 1999; Zohar, 2000). Thus, this early body of research on the role of leadership in safety made a substantial contribution by highlighting that organisations could enhance safety through their leaders. Propelled
by this support for leadership as a determinant of safety, research started exploring more specific leadership behaviours and their influence on safety.

3.6 Transformational Leadership and Safety

Spurred by the positive findings in the wider organisational literature on transformational leadership’s effectiveness, research in the safety domain examined the benefits of transformational leadership for safety-related outcomes. Numerous empirical studies demonstrated that transformational leadership practices positively impact on workplace safety and have been associated with outcomes such as employee safety behaviour (e.g., Barling et al., 2002; Clarke & Flitcroft, 2008; Flin & Slaven, 1996; Kelloway et al., 2006), safety initiative (O’Dea & Flin, 2000), safety communication (Conchie, Taylor, & Donald, 2012) and safety incident rates such as frequency of minor injury (Barling et al., 2002; Kelloway et al., 2006; Zohar, 2002a).

In one of the first investigations on the influence of transformational leadership on safety, Barling et al. (2002) showed in two studies that safety-specific transformational leadership is positively associated with subordinates’ safety climate perceptions. The concept of safety climate refers to employees’ shared perception about the priority of safety over other organisational targets (Cox & Flin, 1998; Griffin & Neal, 2004; Zohar, 2000). The construct has been identified as an important mechanism through which leaders indirectly influence safety performance and is outlined further in section 3.8. Barling et al. (2002) found that a favourable safety climate is linked to lower levels of safety-related events and occupational injuries. The authors concluded that safety-specific transformational leadership affects safety behaviour through increasing employee perceptions of the value of safety. More specifically, they conceptualised rationales for how each of the transformational leadership dimensions can enhance safety (these are summarised in Table 2). In a longitudinal study, Clarke and Flitcroft (2008) provided empirical evidence for a lagged effect of transformational leadership on employees’ safety perceptions. Their findings in particular identified Inspirational Motivation as an effective leader tactic to enhance the perceived value of safety. Conchie, Taylor, and Donald (2012) linked safety-specific transformational leadership to employees’ readiness to voice their concerns about safety. In an intervention study, Mullen and Kelloway (2009) showed that training managers in safety-specific
transformational leadership led to an increase in leaders’ positive safety attitudes and their subordinates’ safety climate perceptions. Moreover, several meta-analytical studies have confirmed a positive relationship between transformational leadership practices and safety climate and performance (Christian et al., 2009; Clarke, 2013).

In addition, studies have shown positive relationships between leader-member exchange and safety outcomes (Hofmann & Morgeson, 1999; Hofmann, Morgeson, & Gerras, 2003; Yagil & Luria, 2010). As noted earlier, leader-member-exchange overlaps with transformational leadership style in aspects such as its focus on relationship-oriented interactions and its emphasis on followers’ individual needs. It has been indicated that high-quality leader-member exchange facilitates open safety communication (Hoffmann & Morgeson, 1999; Kath, Marks, & Ranney, 2010) and positively influences safety citizenship behaviour (Hofmann et al., 2003). Thus, these studies lend further support to the proposition that leadership behaviours, that correspond to transformational leadership practices, are effective in enhancing workplace safety.
Table 2. Influence of transformational leadership dimensions on safety as conceptualised by Barling et al. (2002).

<table>
<thead>
<tr>
<th>Transformational leadership dimension</th>
<th>Influence on workplace safety as conceptualised by Barling et al. (2002)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idealised Influence</td>
<td>Leaders who are high in Idealised Influence become accepted role models, who impart safety as a core value through their personal commitment and behaviour.</td>
</tr>
<tr>
<td>Inspirational Motivation</td>
<td>Leaders high in Inspirational Motivation encourage employees to achieve higher levels of safety.</td>
</tr>
<tr>
<td>Intellectual Stimulation</td>
<td>Intellectually stimulating leaders help employees to think about how long-held assumptions on safety can be overcome.</td>
</tr>
<tr>
<td>Individualised Consideration</td>
<td>Leaders who demonstrate Individualised Consideration transmit real concern about their employees’ safety at work.</td>
</tr>
</tbody>
</table>

More recently, some research has considered that whilst transformational leadership overall appears positively related to safety, some elements of it might have a negative influence on certain safety outcomes. Inness, Turner, Barling, and Stride (2010) failed to find a positive association between transformational leadership and employee safety compliance in a sample of 159 participants from a range of industries. They asserted that leaders who frequently engage in transformational leadership might provide employees with greater latitude in how they interpret and implement safety rules and regulations. In a meta-analysis, Clarke (2013) reported that transformational leadership was not directly related to safety compliance and suggested that some sub-dimensions of transformational leadership might be less effective in enhancing safety (although transformational leadership had a positive, indirect effect through safety climate). For example, intellectual stimulation might indirectly increase deviations from safety procedures and risk-taking, as it encourages employees to try out new
approaches (Clarke, 2013). The vast majority of studies have assessed global transformational leadership and its link with safety and not addressed the separate influence of the individual facets of transformational leadership (Innes et al., 2010). Hoffmeister, Gibbons, Johnson, Konstantin, Cigularov, and Chen (2014) tested the relationship between individual transformational dimensions and safety climate, safety compliance and safety participation in a sample of construction workers. Using relative weights analysis, their results revealed that the individual facets did not account for equal amounts of the total variance explained. The authors discovered that Idealised Influence tended to explain greater amounts of variance across the three safety outcomes, whereas Individualised Consideration tended to explain the smallest amount of variance. For Inspirational Motivation and Intellectual Stimulation links appeared to differ for the three respective safety outcome measures. For example, Intellectual Stimulation appeared to be more important for safety climate but less so for safety compliance and safety participation. Overall, the results indicate that different facets of transformational leadership might affect different aspects of workplace safety.

3.7 Transactional Leadership and Safety

Whilst numerous studies have explored the relevance of transformational leadership to safety, much less attention has been paid to transactional leadership and its role in safety. This mirrors research in the wider organisational literature where the emphasis also has largely been on transformational leadership (Griffin & Talati, 2011).

Conceptually, it has been asserted that active transactional leadership has the potential to enhance safety. Antonakis et al. (2003) noted that transactional leadership behaviours such as monitoring, clarifying objectives and correcting mistakes might be beneficial for occupational safety as they reduce equivocality of competing demands, such as safety and production, and provide an avenue to clarify the priority of safe working. Yet, empirical investigations of the effects of transactional leadership on safety perceptions and behaviours are rare. A small number of studies have explored leadership behaviours that correspond to Bass’s (1985) conceptualisation of transactional leadership, although these were often not explicitly founded on Bass’s
(1985) leadership framework. One of the very early studies in the field of safety leadership by Butler and Jones (1978) investigated structuring leadership behaviours, which bear some resemblance to transactional practices (Judge et al., 2004; Piccolo et al., 2012). Butler and Jones (1979) showed in a sample of US Navy personnel that structuring leadership behaviours were positively linked to safety, but were more effective in moderate hazard conditions, where hazards were present but not extreme, than in highly hazardous environments. In an intervention study, Zohar (2002a) showed that leader behaviours of monitoring safety performance as well as rewarding and recognising safe working, resulted in lower injury rates, increased safety compliance (i.e., earplug use) and more positive safety climate perception. Although, the study was not explicitly conducted using the framework of Bass’s (1985) transformational-transactional leadership, leader actions such as monitoring performance and providing feedback can be related to the transactional facet of Management-By-Exception-Active and behaviours such as providing reward and recognition are aligned with the Contingent Reward dimension. Clarke and Ward (2006) assessed the effect of a set of four leadership tactics on safety climate and safety participation. Two leadership tactics were directive practices, Rational Persuasion and Coalition, which correspond with transactional leadership (Clarke & Ward, 2006). They discovered that both leadership practices were positively related to safety climate and safety participation. Coalition had a direct effect on safety participation and Rational Persuasion showed an indirect effect through safety climate as well as a direct effect on safety participation. Moreover, the findings revealed that Rational Persuasion was the strongest predictor of safety participation, denoting that transactional leadership behaviours are an effective pathway through which leaders can directly and indirectly (through safety climate) enhance employees’ efforts for workplace safety. Other studies have reported a positive relationship with safety for leader practices such as safety controlling (Wu, Chang, Shu, Chen, & Wang, 2011) and senior managers’ implementation of safety policy (Lu & Yang, 2010), which again have some resemblance to transactional leadership. Together this body of research indicates that for safety-related outcomes, transactional leadership might constitute an effective leadership practice.

In the light of the mixed evidence for transactional leadership in the wider organisational literature, these findings are particularly interesting. Some studies have
reported negative and others positive associations between transactional leadership and organisational outcomes (non-safety-related), whereas in the safety literature links between transactional leadership and safety-specific outcomes tend to be positive (albeit not always as strong as effects for transformational leadership, see Judge & Piccolo, 2004). This difference between safety-focused and non-context-specific research, implies that transactional leadership might be relevant for certain outcomes such as workplace safety but not others. The present research’s proposition that transactional leadership is particularly relevant in safety-critical contexts is considered in detail in chapter four.

Clarke (2013) corroborated in her aforementioned meta-analysis a positive influence of transactional leadership on workplace safety, and reported that both transformational and active transactional leadership were related to safety outcomes. More precisely, the results showed that transformational and active transactional leadership both had a positive, indirect effect on safety performance through safety climate. Interestingly, transformational leadership had a direct effect on safety participation, but not compliance, whereas vice versa transactional leadership had a direct effect on safety compliance but not safety participation. The organisational literature has generally attributed within-role performance to transactional leadership and extra role behaviours to transformational leadership, however few studies have empirically tested this assumption. Clarke’s (2013) results support the notion that transformational leadership and transactional leadership affect different aspects of workplace safety. Other studies have also confirmed that transformational leadership is more strongly related to safety participation (Christian et al., 2009) and some studies reported that transformational leadership had no effect on compliance (Mullen & Kelloway, 2009; Inness et al., 2010).

In the wider organisational literature, within-role task performance is often discussed as a secondary outcome, whereas contextual performance is emphasised as a more worthwhile leader criterion. Applied to the field of safety, safety compliance has often been paralleled to task performance and safety participation to contextual performance (Griffin & Neal, 2000). However, it can be argued that, whilst task performance might be secondary to contextual performance, in safety-critical contexts, compliance is of great importance and is a pivotal objective (Griffin & Hu, 2013).
compliance might be secondary in non-safety-critical contexts, it is a key aspect of performance in safety-critical contexts and of comparable relevance to safety participation. Drawing on this argument, Griffin and Hu (2013) point out that transactional leadership might play a prominent role in safety. They demonstrated that safety inspiring leader behaviours, which can be aligned with transformational leadership, are significantly related to safety participation, but not safety compliance. Safety monitoring leader practices, which resemble transactional leadership, were significantly linked to safety compliance, but not participation (Griffin & Hu, 2013). The findings lend further support to the idea that transformational and transactional leadership influence different components of safety, and underscore the role of transactional leadership based on the importance of compliance in safety-critical contexts. The present research further advances this strand of research by investigating the relationship of transactional leadership, as defined by Bass’s (1985) framework, to safety compliance and safety participation, and testing whether transactional leadership plays a more prominent role if safety is salient than in contexts where safety is less key. This objective relates to the moderating role of safety salience on the relationship between leadership and effectiveness criteria, which is depicted in the proposed model in Figure 1.

3.8 Leadership and Safety Climate

3.8.1 The construct of safety climate

Studies have investigated the pathways through which leadership affects safety and repeatedly identified safety climate as a mechanism through which leaders influence safety behaviours and more indirectly accident rates (Barling et al., 2002; Clarke, 2013; Clarke & Ward, 2006; O’Dea & Flin, 2001; Kelloway et al., 2006; Zohar, 2002b; Zohar & Tenne-Gazit, 2008).

The concept of safety climate gained popularity as part of the shift towards organisational and human contributions to accidents (Flin, Mearns, & O’Connor, 2000). It developed as a specific facet of universal organisational climate (James & James, 1989; Schneider, 1975). Schneider (1975) criticised that a global organisational
climate is too generic, as organisations’ policies and practices relate to specific dimensions such as safety, which tend to be prioritised to differing degrees. Safety climate perceptions therefore are based on true priorities, describing the value of safety relative to other demands such as productivity or cost (Shannon & Norman, 2009; Zohar, 2008, 2010; Zohar & Tenne-Gazit, 2008). Therefore, it functions as “a frame of reference for guiding appropriate and adaptive task behaviours” (Zohar, 1980, p. 96). Drawing on social learning theory (Bandura, 1977), it is theorised that leaders convey the organisational value of safety through their repeated interactions and communications with their subordinates and hence shape perceptions of safety climate (Zohar & Tenne-Gazit, 2008).

Safety climate is closely related to the concept of safety culture and there has been a considerable amount of debate how these two constructs, culture and climate, are distinguished from each other (Clarke, 2000; Cox & Flin, 1998; Denison, 1996; Guldenmund, 2000; Mearns & Flin, 1999; Mearns, Flin, & Gordon, 1998). Often research now adopts the viewpoint that safety climate presents a “snapshot of the state of safety providing an indicator of the underlying safety culture of a work group, plant or organisation” (Flin et al., 2000, p. 178).

The construct of safety climate has been conceptualised as multidimensional and a variety of different factors emerged as composites of safety climate (Flin et al., 2000). Synthesising this array of dimensions, Flin et al. (2000) reviewed eighteen safety climate scales and identified six most common themes, referring to (1) management, (2) safety system, (3) risk, (4) work pressure, (5) competence and (6) procedures/rules. Safety climate can be conceptualised at the individual, group and organisational level (Zohar, 2000). At the individual-level, safety climate refers to workers’ individual views about the value of safety. However, it has been emphasised that the concept of climate refers to a convergence of perceptions and shared attitudes (Zohar, 2000). Hence, safety climate can be conceptualised at higher-unit levels such as an organisational-, site- or group-level. It has been shown that the value placed on safety can vary considerably between work groups, so that an organisational-level assessment has been claimed as too crude (Hofmann et al., 2003; Hofmann & Stetzer, 1996, 1998; Zohar, 2000). Instead, group-level or site-level safety climate has been highlighted as more appropriate (Hofmann & Stetzer, 1996, 1998; Zohar, 2000).
3.8.2 Leadership and safety climate: Empirical research

A substantial body of research has linked safety climate to different safety-related outcomes including lower injury and safety incident rates (Barling et al., 2002; Clarke, 2006, 2013; Christian et al., 2009; Dedobbeleer & Béland, 1991; Hofmann & Stetzer, 1996; Mearns, Whitaker, & Flin, 2003; Zohar, 1980, 2000), injury severity (Johnson, 2007) and compliance with safety rules and participation in safety activities (Clarke, 2006; Neal & Griffin, 2006; Neal, Griffin, & Hart, 2000). This robust evidence across different industries underscores safety climate as an important antecedent of safety behaviour and safety incidents (Nahrgang et al., 2011; Clarke, 2006). It is therefore conceptualised as a ‘leading indicator’ of safety as it represents a proactive measure giving insight into the state workplace safety before failure occurs (Mearns & Flin, 1999; Payne, Bergman, Beus, Rodriguez, & Hennig, 2009; Yule, Flin, & Murdy, 2007).

The findings that safety climate presents a powerful proactive indicator of safety performance and ultimately accident rates, led to increased interest in how organisations can establish a strong, positive safety climate. A number of studies have identified leadership as an important antecedent of safety climate (Barling et al., 2002; Clarke, 2010, 2013; O’Dea & Flin, 2001; Kelloway et al., 2006; Martínez-Córcoles, Gracia, Tomás, & Peiró, 2011). Moreover, empirical research shows that leadership influences safety climate which in turn impacts on safety behaviour and more indirectly on safety incident frequencies (Barling et al., 2002; DeJoy, Schaffer, Wilson, Vandenberg, & Butts, 2004). In a social learning process, employees interpret the organisational- or group-level value of safety (i.e., safety climate) from their observations and interactions with their leader (Dragoni, 2005; Zohar, 2000). In turn, employees then use their safety climate perceptions as a guidance for their own safety behaviour. Thus, this body of research established safety climate as a key mechanism through which leaders affect employees’ safety behaviour.

1 Whilst safety climate continues to be viewed as a leading indicator, research has shown that it simultaneously represents a lagging indicator (Clarke, 2006; Payne et al., 2009). This describes a self-reinforcing circle, where past safety incidents influence safety climate, which in turn has an impact on the occurrence of future safety events.
3.9 Passive Leadership and Safety

Passive leadership includes laissez-faire leadership and Management-By-Exception-Passive, which have been empirically combined into one, single factor (Den Hartog et al., 1997; Heinitz et al., 2005; Garman et al., 2003). Within the leadership literature, passive leadership is generally viewed as a destructive, ineffective form of leadership. Yet only a small number of studies has empirically investigated this assumption, especially with regards to safety-related outcomes (Kelloway et al., 2006; Mullen, Kelloway, & Teed, 2011). Kelloway et al. (2006) demonstrated that safety-specific passive leadership does not have a neutral relationship with workplace safety, but has a detrimental effect on safety outcomes that goes beyond the absence of safety-specific transformational leadership. The finding underlines that a leader does not have to explicitly encourage unsafe practices, but the sheer absence of active safety leadership has a negative effect on safety (even if a leader does not necessarily approve unsafe behaviour or compromises safety). The study demonstrates that there is “no neutral position when it comes to workplace safety” (Kelloway et al., 2006, p. 83). Moreover, Mullen et al. (2011) investigated the effect of inconsistent leadership, where leaders engage in transformational but also display passive behaviour, on safety. Their results showed that the positive link between safety-specific transformational leadership was attenuated through passive leadership. This finding denotes that leaders’ positive effects on safety can be cancelled out again if they engage in passive leadership. Overall, the study stressed the importance of consistently engaging in active safety leadership (Mullen et al., 2009). Zohar (2002b) related laissez-faire leadership to reduced levels of safety climate and demonstrated that leaders who adopt a passive leadership style negatively influence employee safety attitudes and behaviour even if upper management supports the priority of safety. This highlights the importance of active safety leadership at the front-line level of leadership.

The research presented in the current research further extends the work on the influence of passive leadership on workplace safety, by assessing it alongside transformational-transactional leadership (see Figure 1). Additionally, the research explores whether the magnitude of negative effects of passive leadership differ between safety-critical and non-safety-critical contexts. The current literature has considered passive leadership behaviours as ineffective, but has not addressed whether
certain conditions are particularly vulnerable to the detrimental impact of passive leadership. This argument on the contextualisation of passive leadership is presented in detail in chapter four.

3.10 Safety-Specific Leadership versus Generic Leadership

Studies that have examined safety leadership have either adopted a safety-specific perspective on leadership or a more general leadership perspective (Dahl & Olsen, 2013; Hofmann & Morgeson, 1999; Kelloway et al., 2006). This difference is usually manifested in the type of leadership operationalisation that research employs. Safety-specific measures assess leadership behaviours such as transformational leadership style specifically directed towards safety (Barling et al., 2002). In contrast, facet-free measures of leadership assess leaders’ behaviour more generally without a specific focus on safety-related actions such as the Multifactor Leadership Questionnaire (Avolio & Bass, 1995). Several authors have debated whether research should adopt safety-specific leadership measures or facet-free ones, when exploring the role of leadership in workplace safety (Dahl & Olsen, 2013; Kelloway et al., 2006; Zohar, 2002a).

Proponents of a safety-specific perspective have contended that leaders might use a leadership style such as transformational leadership with regards to production goals, but not in matters relating to safety. Therefore safety-specific measurement might be adequate, as leaders who are regarded as transformational in some work domains, might not adopt a transformational leadership style with regards to safety specific concerns (Conchie & Donald, 2009; Kelloway et al., 2006; Zohar, 2002a).

On the other hand, it can be argued that leaders’ interactions with followers are infrequently exclusively focused on safety matters. In their day-to-day working communication with subordinates, leaders are more likely to address a conglomerate of different matters, amongst which safety presents one aspect (Inness et al., 2010). Research has demonstrated that good safety leadership extends beyond an exclusive focus on safety (Inness et al., 2010; Dahl & Olsen, 2013; O’Dea & Flin, 2001). Thus, generalised measurement of leadership style might be more proximal to leader-follower interactions in the real world. This notion is further supported by studies that
have identified significant, positive relationships between leadership behaviour and safety outcomes using facet-free leadership measures (e.g., Inness et al., 2010).

Based on these findings, the current research opted for a generic measurement of leadership practices. This decision was motivated by the aforementioned arguments as well as the need for a leadership tool that was applicable in both, safety-critical as well as non-safety-critical contexts. A scale that assesses leadership behaviours specifically directed towards safety would have lacked applicability in non-safety-critical contexts.

Further information on the Multifactor Leadership Questionnaire (Avolio & Bass, 1995), which was used to measure transformational and transactional leadership, is provided in chapter six.

3.11 Chapter Summary

The first half of this chapter outlined Bass’s (1985) transformational-transactional leadership framework as the guiding theory for the research presented in this thesis. In summary, a large body of research has demonstrated positive effects of transformational leadership on various outcome measures, but that evidence for transactional leadership is inconsistent.

The second half of the chapter outlined that research has provided compelling evidence for the importance of leadership in shaping safety. It was discussed that, parallel to the wider organisational literature, research on safety leadership has mainly concentrated on the positive influence of transformational leadership, but paid less attention to the potential benefits of transactional leadership for safety. Yet, a small body of research has indicated that transactional leadership might be effective in enhancing safety, in particular with regards to safety compliance (e.g., Clarke, 2013; Clarke & Ward, 2006; Zohar, 2002a). Passive forms of leadership have been shown as deleterious for safety behaviour and attitudes and have been indirectly associated with increased injury rates (Kelloway et al., 2006). This review of the literature on transformational, transactional and passive leadership corresponds to the theoretical model proposed in Figure 1, where relationships between these three leadership styles and effectiveness criteria were proposed. Lastly, the chapter provided a rationale for the adoption of a facet-free measurement of leadership over a safety-specific operationalisation of leadership in the current research.
In the proposed model depicted in Figure 1, it is suggested that the level of safety salience within a context impacts on the effectiveness of transformational, transactional and passive leadership. In addition, the model displays that leader flexibility influences leadership criteria beyond transformational, transactional and passive leadership. The next chapter reviews theoretical and empirical research that refers to these proposed relationships. Within the area of leadership, requests for contextual approaches are growing and research has started to explore contextual boundaries of transformational-transactional leadership. Related to this contextualisation of leadership, is the construct of leader flexibility, which proposes that leaders need to be able to draw from a repertoire of behaviours and match their practices to the specific demands of a setting.
4 Contextualisation of Leadership

4.1 Chapter Overview

Transformational leadership has been associated with a range of leader outcomes including safety climate and safety performance. The empirical research on transactional leadership, in particular with regards to safety-related outcomes, is limited. Yet, Bass (1985) postulated in his augmentation hypothesis, that both transformational and transactional leadership style are required for effective leadership. Studies that have investigated the role of transactional leadership, have produced mixed findings with positive, negative and neutral effects reported in the literature. It has been suggested that this incoherence in results might be due to contextual attributes (Judge & Piccolo, 2004). Moreover, research that has investigated the effects of transformational leadership and passive leadership has often overlooked the context in which leaders operate (Antonakis & Liden, 2009; Pawar & Eastman, 1997; Rowold, 2011). Requests for greater consideration to context factors that might influence the leadership process have been repeatedly made, but resulted in little empirical research (Porter & McLaughlin, 2006; Rowold, 2011). This notion refers back to the lack of integration of behavioural and contingency perspectives, as discussed in chapter two.

This chapter addresses the recently growing requests for contextualisation of leadership. The extent to which salience of safety might constitute a contextual factor that impacts on followers’ and leaders’ perception, the frequency of use and the effectiveness of transformational and transactional leadership is discussed. Linked to the argument that leadership styles might vary in their effectiveness across different contexts, is the notion that leaders need to be able to identify contextual demands and adjust their leadership practices accordingly. The concept of leader flexibility has started to provoke interest within the leadership area and the emerging body of conceptual and empirical research on leader flexibility is addressed in this chapter.

Whilst in chapter three the influence of leadership styles on safety outcomes in general was discussed, this chapter reviews literature that focuses on the contextualisation of
leadership with particular emphasis on the role of leadership in safety-critical contexts versus non-safety-critical contexts.

The first half of the chapter reviews existing conceptual and empirical research that indicates that transactional (section 4.6), transformational (section 4.7) and passive leadership (section 4.8) are not context free and therefore warrant further research investigating the influence of contextual attributes. It discusses how certain leader outcomes, such as compliance, might differ in their importance for effectiveness dependent on the context (Rodriguez & Griffin, 2009). The second half of the chapter reviews research on contextual boundaries of transformational and transactional leadership with a particular focus on characteristics of safety-critical contexts. The chapter also discusses the role of passive leadership in safety-critical and non-safety-critical contexts. Lastly the competency of leader flexibility and its influence in safety-critical contexts is addressed.

4.2 Call for Context

Within the leadership literature concerns are growing that an approach, which aspires a universal way to lead, oversimplifies the leadership process. Calls are repeatedly raised that the investigation of leadership needs to pay greater attention to contextual attributes, which potentially influence the effectiveness of leadership behaviours (Antonakis & House, 2002; Antonakis et al., 2003; Liden & Antonakis, 2009; Podsakoff et al., 1996b; Rowold, 2011; Pawar & Eastman, 1997; Schriesheim, Wu, & Scandura, 2009; Zaccaro & Klimoski, 2001). Liden and Antonakis (2009) suggest that, “contexts vary; as such they are measurable and must be modelled when attempting to explain a particular aspect of the leadership puzzle” (p. 1587). Similarly, Rowold (2011) declares, “we are still far from having a thorough understanding of the effects of context factors and how they moderate the relationship between leadership behaviours and outcome criteria” (p. 631). He goes on to explain that an indiscriminate use of transformational leadership or any other leadership style is unrealistic, as leaders are likely to rely on a palette of different behaviours dependent on the requirements of a situation.
The request that leadership research needs to pay greater attention to contextual factors is coupled to three, interrelated issues that prevail in the current state of transactional-transformational leadership research. The first issue relates to transactional leadership and the inconsistencies in empirical research regarding its effectiveness. Existing research has produced mixed evidence for transactional leadership and it has been suggested that these differences in findings might be due to context (Judge & Piccolo, 2004). The second issue relates to the lack of categorisation of outcome variables and their importance across different contexts. Different outcomes of leadership might be more or less important in certain contexts. Lastly, it has been discussed that although research has linked transformational leadership to a range of outcomes it cannot be assumed that transformational leadership is context-free (Rowold, 2011). These three issues underline the argument that leadership research requires contextualisation, and are further explained in the following three sections.

### 4.2.1 Call for context: Transactional leadership

Overall research has produced ample evidence for benefits of transformational leadership and found support for Bass’s (1985) proposition that transformational leadership motivates employee behaviour beyond formal job descriptions. However, within this body of literature the focus might have been too fixed on voluntary efforts and inspirational and charismatic practices as their antecedents, whilst overlooking potential benefits of transactional leadership. As discussed earlier with regards to the augmentation hypothesis, it has been argued that transactional leadership behaviours are a necessary prerequisite in order for the use of transformational tactics to be successful (Howell & Avolio, 1993). Without the direction from transactional leadership, transformational leadership efforts might be doomed (Avolio, 1999).

Empirical research, on transactional leadership has produced inconsistent results (Judge & Piccolo, 2004). As stated above studies have reported positive relationships (e.g., Howell & Hall-Merenda, 1999; Judge & Piccolo, 2004; Wang et al., 2011) as well as negative relationships with leader effectiveness criteria (e.g., Breevaart et al., 2013; Stordeur et al., 2001). Judge and Piccolo’s (2004) meta-analysis suggested that these inconsistencies in findings on the effectiveness of transactional leadership are attributable to differences in context. The results showed that overall Contingent
Reward and Management-By-Exception-Active both had positive links with performance and satisfaction outcomes, but that the magnitude and direction of associations varied considerably across the primary studies included. Further support for the notion that the effectiveness of transactional leadership might be dependent on contextual factors comes from a meta-analysis by Griffin and Talati (2011). They explored the relationship between Management-By-Exception-Active with employee extra effort and employees’ satisfaction with their leader. The study revealed that the mean level of Management-By-Exception-Active in a sample moderated the correlation between active Management-By-Exception-Active as displayed by individual leaders and outcomes such as employees’ extra effort and satisfaction with leadership. Under conditions where the average level of Management-By-Exception-Active within a sample was high, a stronger relationship with leader satisfaction and extra effort was found. A lower mean level of Management-By-Exception-Active on the other hand, attenuated the link between Management-By-Exception-Active behaviours and leadership outcomes. The authors explained that high mean levels of Management-By-Exception-Active signify that these leader behaviours are accepted and valued in the respective organisational culture. The moderation effect therefore can be explained, since under conditions where Management-By-Exception-Active practices are favourably perceived, their application will have a stronger impact on outcome variables (Griffin & Talati, 2011).

As stated earlier, an unexpected, novel finding in Wang et al.’s (2011) meta-analysis was that Contingent Reward augmented transformational leadership when predicting individual-level task performance. This suggests that in “certain conditions transactional leadership might be more predictive of outcomes than transformational leadership” (Lowe, Avolio, & Dumdum, 2013, p. 74). Unfortunately, Wang et al. (2011) had to exclude the transactional sub-dimension Management-By-Exception-Active as too few primary studies have investigated its link with performance to include it in a meta-analysis. This omission is representative of the lack of attention that has been paid to transactional leadership practices within the leadership domain.

Within the literature, transactional leadership is commonly depicted as an ineffective leadership style (Griffin & Talati, 2011; Rodriguez & Griffin, 2009; Yukl, 2007). In relation to their meta-analytical findings, Griffin and Talati (2011) argue that the prevailing, negative views of transactional leadership is not congruent with Bass’s
(1985) theorisation of transactional and transformational leadership as complementary behaviours, with effective leaders using both styles. The traditional allocation of Management-By-Exception-Passive to transactional leadership might have blurred perceptions of the effectiveness of transactional leadership. However, as demonstrated by numerous factor analytical studies, Management-By-Exception-Passive tends to merge with laissez-faire leadership not transactional leadership (Avolio, Bass, & Jung, 1999; Heinitz et al., 2005; Garman et al., 2003). Moreover, Griffin and Talati (2011) pointed out that Management-By-Exception-Active is often discussed as a negative, controlling, intrusive or manipulative leadership tactic. However, this skewed view overlooks that, leaders’ actions such as monitoring performance and proactively correcting mistakes might have important relevance in certain contexts. Waldman, Ramirez, House, and Puranam (2001) comment that transactional leadership can offer important strategic direction in conditions of uncertainty. In a similar vein, it has been commented that transformational leadership style alone is of limited use in settings where high reliability and error prevention are pivotal objectives (Klein, Ziegert, Knight, & Xiao, 2006; Rodriguez & Griffin, 2009).

4.2.2 Call for context: Leadership outcomes

It has been criticised that when discussing effectiveness of leadership styles, leader outcomes have been investigated in a relatively crude fashion with little systematic, differentiation between types of outcomes (Lowe et al., 2013). Discussions on the criterion-problem in the leadership literature have been accompanied by exhortation that often research does not sufficiently consider what it is that is affected by leadership (Van Knippenberg & Sitkin, 2013). Research has indicated that transactional leadership might be more important for certain outcomes than for others. Based on his notion that transformational leadership motivates employees ‘beyond expectations’, Bass (1985) proposed that transactional leadership is important for task performance whereas transformational leadership is effective for contextual performance. Several studies have lent empirical support for this proposition, including meta-analytical evidence (Wang et al., 2011). Attached to this assumption, the wider organisational literature often views outcomes that are attributed to transformational leadership as more desirable, compared to outcomes attributed to transactional leadership. For example, contextual performance (which is more strongly
associated with transformational leadership) is generally discussed as a superior outcome to task performance (which is more strongly related to transactional leadership). Whilst this hierarchy might hold in a broad perspective of leadership, when assessing context-specific outcomes this ranking of outcomes might not be applicable. In other words, the same type of outcome might differ in its importance across contexts. Based on Borman and Motowildo’s (1997) distinction of task and contextual performance, Griffin and Neal (2000, 2004) developed a safety-specific analogy of performance. They proposed safety compliance with rules and regulations as a correspondent to task performance and safety participation as a correspondent to contextual performance. In safety-critical contexts, compliance with rules and regulations and prevention of failure might be more relevant than in non-safety critical contexts. In the domain of safety, Clarke (2013) showed meta-analytically that transformational leadership was directly related to safety participation but did not have a direct effect on compliance. Active transactional leadership was directly related to safety compliance but not directly to participation. The finding indicates that leaders who engage in active transactional leadership practices can directly affect employees’ compliance with safety rules. Combined with the increased importance of compliance, this elevates the relevance of active transactional leadership in safety-critical contexts. Thus, depending on what constitutes high performance and what are prime goals within a context, certain leadership styles might be more or less appropriate. The argument further underscores the need for a contextualised approach to the transformational-transactional leadership model.

4.2.3 Call for context: Transformational leadership

The lack of consideration of contextual boundary conditions does not just apply to transactional leadership, but also to investigations of transformational leadership (Avolio & Yammarino, 2013; Liden & Antonakis, 2009; Pawar & Eastman, 1997; Rowold, 2011). Rowold (2011) maintained that the field of leadership is too concentrated on attempting to find one, universally effective leadership style. Instead he suggests that in real-world situations, leaders are more likely to draw on a spectrum of leadership behaviours. This criticism addresses the predominate focus on transformational over transactional leadership as well as the lack of consideration of contextual attributes that might play a role in the effectiveness of leadership styles. In
the tenth anniversary edition of the influential compendium *Transformational and Charismatic Leadership: The Road Ahead*, Avolio and Yammarino (2013) lay out a future research agenda for the realm of transformational-transactional leadership. They list the conceptual and empirical accounting for context as a central issue that is currently under-developed. Similarly, theory evolution can be categorised into different stages and it has been expressed that to advance transformational-transactional theory, it needs to progress more firmly into the stage of evaluation and augmentation where theories are critically reviewed with a focus on identifying underlying mechanisms and contextual conditions (Antonakis et al., 2003; Hunt, 1999).

### 4.3 Contextual Approaches to Transformational-Transactional Leadership

Repeated calls to explicate context factors for a more accurate understanding of leadership, demonstrate that the issue is increasingly recognised. However, despite these appeals to address contextual boundaries, empirical and conceptual developments are rare. Referring to the lack of contextualisation in leadership research, Porter and McLaughlin (2006) state, “…the situation would seem to be like the weather: many talking about it, but very few doing much about it insofar as empirical research is concerned” (p. 559).

During the prime of traditional contextual theories such as Fiedler’s (1964) contingency theory, Kerr and Jermier’s (1978) substitute for leadership theory and, House and Mitchell’s (1974; House, 1971) path-goal theory, empirical attempts were made to find evidence for the theories’ postulates. As discussed earlier however, overall support for the theories was very mixed. With the onset of transformational-charismatic leadership theories and the shortage of clear, robust empirical support for traditional contingency theories, interest in context factors drastically subsided (Liden & Antonakis, 2009). Recently though, interest in boundary conditions of leadership has started to re-emerge (Avolio, Walumbwa, & Weber, 2009; Zaccarato & Klimoski, 2001; Lowe et al., 1996). Some research has begun to explore conditional factors of transformational leadership (Antonakis et al., 2003; Lowe et al., 1996; Keegan & Den
Studies that have investigated moderators of transformational leadership have often focused on follower characteristics (e.g., Edwards & Gill, 2012; Epitropaki & Martin, 2005; Pieterse et al., 2010; Zhu et al., 2009) or characteristics of the follower-leader relationship such as social distance (Cole, Bruch & Shamir, 2009) and degree of leader-member-exchange (Piccolo & Colquitt, 2006). However, fewer studies have investigated work context characteristics per se. Purvanova and Bono (2009) showed that transformational leadership had a stronger association with team performance in virtual settings compared to face-to-face interactions. Lowe et al. (1996) included type of organisation (public versus private) as a contextual variable in their meta-analysis and found that employees in public organisations compared to private organisations rated their leaders higher on transformational leadership and Management-by-Exception (the study did not differentiate between the active and passive form). Vaccaro, Jansen, Van Den Bosch, and Volberda (2012) investigated the influence of organisational size as a contextual moderator and found that transformational leadership had a more positive relationship with innovation in large organisations whereas transactional leadership was more effective for innovation if organisations’ size was small. Tyssen, Wald, and Heidenreich (in press) tested project complexity as a contextual moderator on the effectiveness of transformational-transactional leadership. The study showed that both transformational and transactional leadership had a stronger, more positive impact on employee commitment if project complexity was high. Together these studies indicate that transformational as well as transactional leadership are not context-free, but that boundary conditions for their effectiveness exist.

Parallel to the argument that transformational and transactional leadership style are likely to be more or less effective under certain conditions, it has been suggested that passive leadership is also impacted upon by context factors (Den Hartog et al., 1997). Research investigating the contingencies of passive leadership generally postulate that passive leadership is an ineffective leadership style, but that certain conditions enhance the detrimental effect or might be able to compensate for a leader’s passive behaviour (Den Hartog et al., 1997).
The results from the studies discussed in the section above are important as they indicate that contextual factors play a role in the occurrence and effectiveness of transformational, transactional as well as passive leadership. It was previously noted that research investigating conditional factors of leadership has often considered mutable variables, such as characteristics of the leader-follower relationship (e.g., perceived support or trust in leader), but has placed less emphasis on static context factors. In a discussion of contingency theories, Kilman (1983) states the importance of assessing the interplay between ‘uncontrollable factors’ and ‘controllable factors’ for performance outcomes. Leaders can adjust and choose how they behave in their interactions with followers making this a controllable variable, whereas certain environmental elements are not readily mutable. Vaccaro et al.’s (2012) study on organisation size and Lowe et al.’s (1996) research on type of organisation constitute examples of the importance of assessing factors that are inherent to a context. Overall, there is a paucity of research on contextual influences on leadership styles, and studies that have investigated this with regards to both transformational as well as transactional leadership are particularly scant. Yet, as argued above, contingency variables might be essential to overcome existing contradictions concerning the effectiveness of transactional leadership.

4.4 Leadership Contextualisation and Theory Integration

In contrast to traditional contingency theories, more recent research such as the studies reviewed in the section above, often constitute hybrid conceptualisations of the leadership style and contingency approach to leadership. That is they combined a potential context factor such as organisational size (Vaccaro et al., 2012) with an established leadership framework such as Bass’s (1985) transformational-transactional leadership model. Yukl (2010) criticised the behavioural categories of substitutes for leadership theory (Kerr & Jermier, 1978), by suggesting that they are too broadly defined. Thus, such hybrid conceptualisations offer a way to overcome this shortcoming. It has been suggested that empirical evidence for traditional contingency theories (e.g., Fiedler, 1967; House & Mitchell, 1974; Kerr & Jermier, 1978) failed to flourish because the theories’ propositions were too rigid and centred on contingency factors
that were theoretical, abstract constructs, lacking real-world value (Villa et al. 2003). In support of this criticism, contingency research that was carried out with a focus on a particular setting such as medical critical care teams has been able to find support for contextual moderators (e.g., Yun, Faraj, & Sims, 2005; Künzle et al., 2010). Thus, whilst empirical support for specific propositions of traditional contingency theories was weak (Avolio et al., 2009; Dionne et al., 2002; Podsakoff, MacKenzie, Ahearne, & Bommer, 1995; Podsakoff et al., 1996a), the studies reviewed above show support for the overall idea that leadership is not independent of context. Thus, despite the limited empirical support for traditional contingency theories, this signifies that consideration of the context in which leadership is enacted, is important for a more precise understanding of the leadership process. Some studies have argued that work contexts, which are inherently hazardous, pose particular challenges for leaders. Companies can manage hazards to minimise the risk stemming from these, but cannot eliminate the salience of safety as such within the work context. In the following section salience of safety is discussed as a potential context factor of leadership effectiveness.

4.5 Salience of Safety as a Context Factor

As reviewed above leadership has been identified as an important antecedent of occupational safety. Both transformational and transactional leadership have been positively associated with a variety of safety outcomes (e.g., Clarke, 2013). However, little research has explored how leaders in safety-critical contexts can address the specific demands of an environment where salience of safety is high and contrasted it to non-safety-critical contexts. The following provides a discussion of how perceptions, occurrence and effectiveness of transactional, transformational and passive leadership might differ between safety-critical contexts and non-safety critical contexts.

4.5.1 Safety-Critical Contexts

Safety-critical contexts refer to inherently hazardous work environments where errors, violations, deviations from standards and other failures can have severe consequences, making safety highly salient. This includes contexts where employees are frequently
exposed to hazards as part of their routine job, increasing the risk for harm to themselves, as well as contexts where workers’ behaviour has implications for the safety of others. Examples of the former are mining sites, offshore oil installations or construction sites, which are inherently hazardous and where work activities can result in serious harm to workers. Examples of the latter are health care settings and pharmaceutical or food manufacturing, where the behaviour and actions of individuals working in the respective environments have a substantial influence on the safety of others, whilst risks to the workers themselves might be relatively low. Of course not uncommonly, contexts comprise both, risk for workers’ own safety as well as risk for others. For example, employees handling machinery in food manufacturing are exposed to hazards that carry risks for their own physical safety and their actions also have implications for the safety of others through issues such as food hygiene. On oil installations, failure can cause serious harm to a worker him/herself, and also has the potential to result in severe harm for others on the worksite and within the wider public. Although, for purposes of clarity, this thesis refers at points to comparisons between safety-critical contexts and non-safety-critical contexts, it is important to clarify that salience of safety is not viewed as a dichotomy but as a nuanced characteristic.

4.6 Transactional Leadership in Safety-Critical Contexts

It has been argued that solely focusing on transformational leadership as an effective leadership style, does not match the complexities that leaders are confronted with in their daily routine (Rowold, 2011), and that under certain conditions transactional leadership might play an important role (Griffin & Talati, 2011; Rodriguez & Griffin, 2009; Whittington, Coker, Goodwin, Ickes, & Murray, 2009). Safety-critical contexts are characterised by a low tolerance for failure, as mistakes and errors, if not corrected, can have severe consequences. It has been suggested that this imperative for reliability and compliance might particularly call for transactional leadership (Antonakis et al., 2003; Griffin & Talati, 2011; Hannah, Uhl-Bien, Avolio, & Cavaretta, 2009; Rodriguez & Griffin, 2009). Management-By-Exception-Active, which has been consistently identified as a transactional leadership dimension, refers to proactively monitoring performance, anticipating errors and correcting mistakes or deficiencies, before they occur. In safety-critical contexts these leadership behaviours might have
particular relevance, as they are congruent with the prime objectives of safety-critical contexts. Rodriguez and Griffin (2009) explain that exceptions from normal work procedures can refer to a breadth of issues such as errors, violations, deviations from standards, risk taking and early warning indicators in a wider sense. They go on to argue that employees are not always able or willing to detect their own errors or failures, but that it is crucial in safety-critical contexts that these are detected and corrected as errors can otherwise result in serious harm. Therefore leaders’ active management of such exceptions might play a pivotal role in safety-critical contexts. Through the continuous monitoring of work performance, leaders acquire the necessary information to anticipate negative events and are able to proactively intervene before these can result in an accident (Garman et al., 2003; Griffin & Hu, 2013; Rodriguez & Griffin, 2009; Yule & Flin, 2004). Thus, it can be proposed that engaging in Management-By-Exception-Active practices enable leaders to discover and prevent events that otherwise could lead to harm, and have a beneficial effect on workplace safety (Griffin & Talati, 2011). As discussed in chapter three, empirical work on the link between transactional leadership and safety is limited, but some studies have indicated a positive effect for practices that correspond to transactional leadership style (e.g., Clarke, 2013; Clarke & Ward, 2006). Some studies have specifically explored performance monitoring and reported that leaders who frequently engage in monitoring employee performance were perceived as more effective with regards to workplace safety as they are more likely to provide feedback (Agnew & Flin, 2013; Luria & Morag, 2012; Mattila, Hyttinen, & Rantanen, 1994). In safety-critical contexts, employees often experience tension between safety and other organisational goals such as speed or cost (Stride, Turner, Hershcovis, Reich, Clegg, & Murphy, 2013; Zohar, 2000, 2010). This conflict between safety and other, disparate targets is likely to create ambiguity for employees as to which goals should be prioritised (Zohar, 2000, 2010). Based on social learning theory (Bandura, 1977) and the concept of social-sense-making (Blumer, 1969; Weick, 1995), employees draw upon their leader’s behaviour to make sense of such an ambiguous work environment. It can be suggested that active monitoring of performance and intervention as soon as problems arise, reduces this ambiguity and creates an unequivocal environment, which imparts the priority of safety over competing objectives. In accordance with this, Whittington et al. (2009) state that, “leaders who lack a foundation of transactional leadership are often likely to leave their employees
expectations unclear, which results in an ill-defined sense of direction and ambiguous task assignments” (p. 1863). Safety-critical contexts, which are characterised through increased ambiguity, therefore might require greater amounts of Management-By-Exception-Active behaviours compared to contexts where safety is less salient and employees are less frequently faced with opposing objectives. In support of this proposition, Dahl and Olsen (2013) showed that leadership involvement had a positive effect on safety compliance through increasing role clarity. Others have also argued that if uncertainty within a work environment is high, followers have a stronger preference for directive leadership forms than if uncertainty is low (Schriesheim et al., 1994; Rast, Hogg, & Giessner, 2012). Rast et al. (2012) demonstrated that if employees were uncertain about their role and identity, they favoured an autocratic leadership style, but were less accepting of it when their self-uncertainty was low. In a medical setting, Yun et al., (2005), showed that directive leadership compared to empowering leadership was associated with better health care performance if a patient was severely injured and suggest that this effect is due to increased risk and uncertainty. In a recent study, Agnew and Flin (2013) conducted a mixed-method study on senior nurses’ leadership tactics. Interview results revealed that nurses most frequently engaged in monitoring and supporting practices in demanding situations. Together, these findings denote that high-stakes situations where uncertainty is high, require greater amounts of task-oriented, directive leadership.

Contingent Reward\(^2\) practices allow leaders to transmit an unequivocal message to employees about which behaviours take priority and are rewarded. Goal-setting and recognition of achievement, which are core elements of Contingent Reward, might therefore provide the necessary structure to further minimise ambiguity within safety-critical contexts and underline the priority of safety over other goals. For example, Zohar (2002a) showed in observational research that reinforcement of safety through reward, positively influenced safety behaviour such as correct usage of personal protective equipment. Other research, although not with a safety-specific focus, has also concluded that behaviours such as assigning tasks and clarifying expectations,

\(^2\) Bass (1985) proposed Contingent Reward as a transactional leadership dimension. However, a number of studies have demonstrated that Contingent Reward converges with transformational leadership. Yet, to avoid confusion and in line with Bass’s (1985) original model, Contingent Reward is discussed under transactional leadership in this part of the thesis.
which correspond to Contingent Reward, reduce role ambiguity and uncertainty (Gray-Toft & Anderson, 1985).

Due to this alignment between the substance of transactional leadership style and the demands and objectives in safety-critical contexts, it is argued that transactional leadership is perceived as more favourable, used more frequently by leaders and has a more positive link with leader outcomes if safety is salient.

Whilst it was outlined above that transactional leadership practices might play a particularly important role in safety-critical contexts, it can be suggested that in non-safety-critical contexts, these leadership tactics might have no effect or might even be detrimental to leader outcomes (Antonakis et al., 2003). In particular, Management-By-Exception-Active might be valued and effective in contexts where safety is highly salient, but might be an unsuitable leadership practice if safety is less key. If employees are not routinely exposed to hazards, the likelihood for injury is low and the consequences of errors and mistakes are less severe, then continuous monitoring and vigilant rectification of standard deviations might be perceived as too controlling and have a hampering effect on outcomes such as performance and satisfaction (Antonakis et al., 2003). For example, Morgeson (2005) demonstrated that if normal working procedures were disrupted, active leadership intervention was beneficial and effective. Yet, if work processes were proceeding normally without disruption, the same level of leadership intervention was ineffective. Safety-critical contexts with high levels of hazard exposure, might somewhat resemble crisis or emergency situations as there is a continuous, persistent need to prevent accidents and injuries. Additionally, safety-critical contexts might be characterised through higher frequencies of non-routine events as even small disruptions can be critical and have the potential for serious harm. In line with Morgeson’s (2005) finding, others have also theorised that under crisis conditions or critical events, directive leadership becomes more important (Wofford & Goodwin, 1994). Beyond that, research has indicated that high levels of leadership direction can even have adverse effects for performance in non-critical, more predictable situations (Künzle et al., 2010). Applied to the domain of safety, it can be suggested that in safety-critical contexts, where deviations and non-routine events can have severe outcomes, leader activities such as performance monitoring, proactively correcting mistakes and clarifying priorities are effective, but are too intrusive in non-safety-critical contexts. In contexts where a certain degree of risk-taking is even
desired for performance, transactional leadership might be a destructive leadership form (Ford, 1996; Liu, Liu, & Zeng, 2011). For example, it has been argued that clearly defined objectives can be obstructive of creativity, which is facilitated through ill-structured goals (Herrmann & Felfe, 2013; Mumford, Mobley, Uhlman, Reiter-Palmon, & Doares, 1991). Thus, depending on the level of salience and the goals that leaders pursue, the structure and clarity that transactional leadership provides might be less apt in contexts where safety is not salient.

### 4.6.1 Implicit leadership theories in safety-critical contexts

Antonakis et al. (2003) suggested that employees who work in safety-critical contexts might value and desire the direction and structure from transactional leadership and are therefore more receptive to these practices. Similarly, they argue that leaders engage more frequently in transactional leadership to meet the requirements of safety-critical contexts. In contrast if safety is less of concern, employees might evaluate transactional leadership less favourably and leaders might exert transactional leadership less often (Antonakis et al., 2003). Thus, leaders’ and followers’ perceptions of transactional leadership style might differ between safety-critical contexts and settings where safety is less salient. This variation in leaders’ and followers’ evaluation of transactional leadership style in dependence of the level of safety salience, can be explained on the basis of implicit leadership theories (Lord & Emrich, 2001; Rodriguez & Griffin, 2009). Implicit leadership theories describe individuals’ prototypical expectations about leadership behaviour (Epitropaki & Martin, 2004, 2005; Lord, Foti, & De Vader, 1984; Offermann, Kennedy, & Wirtz, 1994; Philips & Lord, 1981). They refer to mental schemas or stereotypes about traits and behaviours that constitute effective leadership. Followers as well as leaders use their implicit theories about leadership as a cognitive base to guide their own behaviour and make sense of others’ behaviour within the leadership process (Giessner, Van Knippenberg, & Sleebos, 2009).

It has been recognised that these cognitive assumptions about leadership are dynamic, with contextual factors determining to some extent which leadership practices are evaluated as favourable and effective (Lord, Hannah, & Jennings, 2011; Offermann et al., 1994; Yagil, 1998). Thus, the leadership behaviours that are perceived as
stereotypically effective might vary dependent on attributes such as the level of safety salience within a work context. Based on the postulation that transactional leadership practices correspond with the demands and characteristics of safety-critical contexts, it can be argued that if safety is salient, leaders’ and followers’ implicit leadership theories will include transactional leadership practices. Referring to this potential influence of safety on perceptions of leadership styles, Rodriguez and Griffin (2009) comment that, “…enactment of Management-By-Exception appears not only to be essential but also expected in certain professions, organisational cultures, or environments” (pp. 95-96).

Moreover, leaders are likely to adjust their own behaviour in accordance with their implicit perceptions about what constitutes effective leadership in a certain context (Wofford, Goodwin, & Whittington, 1998), and it can therefore be argued that the occurrence of transactional leadership is higher in safety-critical contexts compared to non-safety-critical contexts. In addition, individuals’ increased receptivity to these behaviours, are likely to amplify their impact on leadership outcomes (Dinh & Lord, 2012). Consequently, it can be proposed that transactional leadership style is more strongly related to safety and facet-free outcomes if the salience of safety is high. This corresponds to the model displayed in Figure 1 (see chapter two, p. 39), where the level of safety salience is proposed as a moderator of the relationship between transactional leadership and leader effectiveness criteria.

### 4.7 Transformational Leadership in Safety-Critical Contexts

The argument that transactional leadership is particularly relevant in safety-critical contexts, does not imply that transformational leadership is not required if safety is highly salient. Bass (1985) conceptualised transformational and transactional leadership as complementary leadership styles that do not exclude each other. In safety-critical contexts higher levels of transformational leadership might also be required compared to settings where concern for safety is relatively low. It was shown above that numerous studies have demonstrated positive links between transformational leadership and safety outcomes. These findings indicate that transformational leadership constitutes an effective leadership practice in settings
where safety is salient. Leaders operating in safety-critical contexts might use transactional leadership and transformational leadership in conjunction to address the specific demands of the environment. For example, a leader may ensure that safety rules and procedures are followed by actively monitoring safety performance, offering incentives for safety compliance (transactional leadership) and creating enthusiasm for safety matters through transformational tactics such as inspirational appeals and idealised influence. In support of this, Clarke’s (2013) aforementioned meta-analysis showed that transformational leadership was directly related to safety participation and transactional leadership was directly related to safety compliance. This finding demonstrates that within safety-critical contexts, both transactional leadership and transformational leadership are required as they address somewhat different requirements of the context.

A multitude of studies have positively associated transformational leadership with non-safety-specific outcomes across different settings (e.g., Dumdum et al., 2002; Judge & Piccolo, 2004; Lowe et al., 1996; Wang et al., 2011). This body of research suggests that transformational leadership constitutes an effective leadership behaviour in safety-critical contexts as well as contexts where safety is less key. However, it can be suggested that in safety-critical contexts increased levels of transformational leadership are required compared to non-safety-critical contexts. In line with contingency views, studies have shown that under situations of uncertainty or urgency, greater amounts of active leadership are required (Künzle et al., 2010). These findings denote that employees might be more influenced through their leaders’ behaviour in situations where consequences are potentially serious and where a higher degree of ambiguity exists. Accordingly, it can be argued that in safety-critical contexts, where employees are faced with a diversity of competing objectives (e.g., safety versus production), subordinates might look increasingly towards their leaders’ behaviour for guidance and therefore call for greater amounts of leadership. However, whilst some research has shown that an increased amount of active leadership is important in critical conditions (Künzle et al., 2010; Morgeson, 2005), few studies have tested this specifically for transformational leadership style. Therefore, the current research investigates whether high levels of transformational leadership are more strongly related to leader outcomes in safety-critical conditions compared to non-safety-critical conditions. This aim of the research relates to the moderator role of safety salience on
the relationship between transformational leadership and leader effectiveness criteria that was proposed in the model presented in chapter two (see Figure 1, p. 39).

4.7.1 Prevention and promotion focus in safety-critical contexts

On a conceptual level, Rodriguez and Griffin (2009) interpret the roles of transformational and transactional leadership in safety-critical contexts on the basis of regulatory focus theory (Higgins, 1997). Regulatory focus theory postulates that actions are guided by either a prevention focus or a promotion focus. A prevention focus elicits behaviours that are oriented towards avoidance of loss. A promotion focus on the other hand regulates behaviour towards gain and accretion. Within the literature, transformational leadership has been linked to a promotion regulatory focus and transactional leadership to a prevention regulatory focus (Brockner & Higgins, 2001; Kark & Van Dijk, 2007; Rodriguez & Griffin, 2009). Moreover, environmental cues determine whether a promotion or prevention regulatory focus is most active (Kark & Van Dijk, 2007). With regards to workplace safety, Rodriguez and Griffin (2009) theorise that a prevention focus, which corresponds with transactional leadership, is a powerful tactic for error prevention whereas a promotion focus, which corresponds with transformational leadership, stimulates error learning. As it is crucial within safety-critical contexts that problems are addressed as soon as they occur and to avoid failure, a prevention focus might be more strongly activated in safety-critical contexts compared to non-safety-critical contexts. In support of this argument, research has linked a prevention regulatory focus to increased safety performance (Wallace, Johnson, & Frazier, 2009). This suggestion that the cues of safety-critical contexts activate an increased prevention focus, matches the argument presented above that transactional leadership style is more effective and desired in safety-critical contexts compared to settings where safety is less salient. Moreover, Rodriguez and Griffin (2009) assert that whilst prevention of errors is pivotal in safety-critical contexts, beyond this it is important that errors are utilised as a learning opportunity. They suggest that transformational leadership can offer the required support to create errors into learning opportunities through practices such as intellectual stimulation or idealised influence.

The notion that prevention as well as learning, and therefore transactional as well as transformational leadership are key for workplace safety, is in accordance with work
on high-reliability organisations. High-reliability organisations describe organisations that despite operating in high-risk environments with the potential for far-reaching consequences achieve excellent levels of safety performance (Roberts & Bea, 2001; Weick & Sutcliffe, 2007). Examples of high-reliability organisations are nuclear power plants or aircraft carriers. Research has identified characterising features of high-reliability organisations that are thought to be central for their high levels of safety and reliability (Weick & Sutcliffe, 2007). These characteristics include amongst several others, the ‘effective anticipation of failure’ (Weick & Sutcliffe, 2007), which includes attention to even minor errors, role clarity and monitoring (Roberts & Bea, 2001) as well as a continuous ‘learning orientation’, which includes open safety communication (Wick & Sutcliffe, 2007). Moreover, Hopkins (2009) suggested a process of ‘mindful leadership’ as critical for high reliability, which again includes aspects that correspond to transformational leadership, such as engagement of front-line staff as well as transactional aspects, such as Management-By-Exception and proactive checks of procedures. Thus, identification of these features for high reliability in hazardous environments further alludes to the equal importance of both transactional and transformational actions.

### 4.7.2 The co-occurrence of transformational and transactional leadership in safety-critical contexts

It was articulated that safety-critical contexts present leaders with a diversity of competing demands. To address this variety of objectives, leaders might adopt more often a combination of transformational and transactional leadership in their interactions with followers (Antonakis et al., 2003). In non-safety-critical contexts, demands might be more uniform and less opposed, so that leaders can use mainly one style of leadership. In support of this notion, Antonakis et al. (2003) demonstrated that the strength of correlation between transformational leadership and transactional leadership practices varied across contexts including environmental risk. They reported that in some settings, transformational and transactional leadership were highly correlated, but co-varied much less in other contexts. This indicates that the co-occurrence of transformational and transactional leadership style might be a function of contextual factors. However, the authors did not report further under which conditions transformational and transactional leadership are adopted more often
together. Moreover, Rodriguez and Griffin’s (2009) notion that safety-critical contexts require a prevention and promotion focus, can be related to the co-occurrence of transformational and transactional leadership. Transformational leadership was associated with a promotion focus and transactional leadership with a prevention focus (Kark & Van Dijk, 2007). In safety-critical contexts, both prevention and promotion are central behavioural objectives, and therefore leaders might use transformational and transactional leadership in equal measure. In non-safety-critical contexts, the focus might be more towards a promotion regulatory focus and error prevention might be less relevant. Thus, under such conditions leaders might emphasise transformational leadership more and rely less frequently on transactional leadership to exert influence on subordinates. For example in contexts where errors do not have the potential for catastrophic outcomes, the focus might be more persistently on promoting gain. Subsequently, leaders might use transformational leadership style more often by itself. Therefore, it is argued that transformational and transactional leadership occur more often together in safety-critical contexts compared to non-safety critical settings.

4.8 Passive Leadership in Safety-Critical Contexts

Passive leadership is often described as the ‘absence of leadership’ (Bass & Avolio, 1994; Avolio, 1999) and comprises two dimensions in the full-range leadership model (Bass & Avolio, 1994), laissez-faire leadership and Management-By-Exception-Passive (Den Hartog et al., 1997; Garman et al., 2003). Laissez-faire leadership refers to the avoidance of decision making, disregard of responsibilities and being absent when needed (Avolio, 1999; Bass & Riggio, 2006). Management-By-Exception-Passive refers to the delay of taking action until after problems have occurred (Hater & Bass, 1988; Bass & Riggio, 2006). As discussed in chapter three, prior research has demonstrated that passive leadership is negatively related to organisational outcomes (Judge & Piccolo, 2004; Wang et al., 2011) as well as safety outcomes (Kelloway et al., 2006)

Similar to the argument that transformational and transactional leadership are not equally effective across different contexts, it can be proposed that passive leadership
might be particularly detrimental under certain conditions (Rafferty, Restubog, & Jimmieson, 2010). However, research which has empirically investigated conditions that might exacerbate negative effects of passive leadership is scant (Kelloway et al., 2006). In the wider organisational literature, a small number of studies have provided support that conditional factors moderate the effects of destructive leadership behaviour (Avolio, Howell, & Sosik, 1999; Fay, Lührman, & Kohl, 2002). In the domain of safety, Luria (2008) reported that low group cohesion amplified the negative effect of passive leadership on safety climate. The results also showed that strong group cohesion attenuated the detrimental impact of passive leadership, although leadership was still negatively related to safety climate. Zohar (2002a) showed that laissez-faire leadership at the supervisory level was negatively related to safety climate even if higher management assigned safety a high priority. These studies underscore the need for leader direction and support for workplace safety. The present research extends this notion and argues that passive leadership has a stronger negative effect on leader outcomes in safety-critical contexts compared to non-safety-critical contexts.

4.8.1 Passive leadership in safety-critical versus non-safety-critical contexts

It was outlined above that research has indicated that active leadership is particularly required in uncertain and urgent situations. Conversely, it can be argued that passive leadership might be particularly detrimental in safety-critical contexts. If there is an increased need for leadership involvement, but leaders avoid decision-making and do not seek to offer direction and support, the discrepancy between the required amount of leadership and enacted leadership is enlarged. Research has linked passive leadership to increased role ambiguity and role conflict (Skogstad, Einarsen, Torsheim, Aasland, & Hetland, 2007). On the basis that safety-critical contexts are characterised by increased uncertainty and opposing goals (Stride et al., 2013; Zohar, 2000), passive leaders failing to address these contextual demands might be particularly damaging in such settings. Also, with regards to Management-By-Exception-Passive it can be suggested that in safety-critical contexts, this practice is less likely to have any mending effect, whilst in non-safety-critical contexts some reparation might be possible through Management-By-Exception-Passive. Management-By-Exception-Passive refers to leaders taking action only after a problem or error has occurred. In safety-critical contexts, where errors can have
immediate, serious implications, it might be more difficult to rectify these. In other non-safety-critical settings there might be more latitude to correct errors after the event. For example, in a customer service setting, where a customer is dissatisfied due to receiving the wrong goods, the situation offers ways to compensate after the actual mistake was made. In a safety-critical context, incorrect usage of safety equipment whilst working at height, could lead to severe harm without any scope to rectify the results of the mistake. Thus, in both scenarios Management-By-Exception-Passive constitutes a suboptimal leadership style, but its effects are particularly deleterious in the safety-critical setting.

Overall, research has demonstrated the negative effect of passive leadership on safety outcomes (Kelloway et al., 2006). Therefore, it is proposed that passive leadership is more negatively related to leader outcomes in safety-critical contexts compared to non-safety-critical contexts due to increased demands for leader involvement. This proposition refers to the moderation effect of safety salience on the relationship between passive leadership and outcome criteria, which is proposed in the model presented in chapter two (see Figure 1, p.39).

4.9 Leader Flexibility

Within the organisational literature, the idea that leaders have to be flexible, adaptive or responsive in their leadership practices has increasingly been recognized (Kaiser, 2010; Klein, Ziegert, Knight, & Xiao, 2006; Lord et al., 2011; Michel, Lyons, & Cho, 2011; Yukl, 2010; Zaccaro, Gilbert, Thor, & Mumford, 1991). The present research combines the idea of leader flexibility with Bass’s (1985) transformational-transactional leadership model and discusses its role in safety-critical and non-safety-critical contexts.

The notion of leader flexibility is based on the argument that the environment in which leadership takes place does not remain stable, but that leaders need to respond and adapt their behaviour to the ever changing situational demands around them (Zaccaro et al., 1991b; Yukl & Lepsinger, 2004; Yukl, 2010). Leader flexibility refers to leaders’ competency to identify situational cues and select from a range of leader
behaviours the most appropriate leadership style accordingly (Hooijberg, 1996; Yukl & Lepsinger, 2004). Zaccaro et al. (1991) state that effective leaders must “ascertain the demands, requirements, and affordances in organisational problem scenarios and tailor their response accordingly” (p. 317). Denison et al. (1995) proposed that, “effective leaders are those who have the cognitive and behavioural complexity to respond appropriately to a wide range of situations that may in fact require contrary and opposing behaviours” (p. 526). Thus, whilst for traditional contingency theories the focus was on specifying particular contextual characteristics, for leader flexibility the focus lies on leaders’ competency to adapt to any given context or situation. Yukl and Lepsinger (2004) developed a model of flexible leadership, where they proposed that leader flexibility involves at the first step correctly diagnosing contextual cues and as a second step selecting an appropriate leadership behaviour and proficiently adopting this leadership style. This distinction is based on Denison et al.’s (1995) concept of behavioural complexity in leadership. They distinguish between behavioural repertoire and behavioural differentiation. The former refers to a leader’s ability to engage in a breadth of leadership practices and the latter describes the capacity to execute these adaptively with regard to contextual contingencies. Hooijberg (1996) notes that it is not simply sufficient to perform a variety of leadership practices, but that leaders need to utilise these in correspondence with contextual circumstances. Similarly, Zaccaro et al. (1991b) discuss that effective leadership requires social perceptiveness and behavioural flexibility. Yukl (2010) discusses flexible leadership as a trait-like quality rather than specific leadership behaviour. Others have also discussed behavioural flexibility with regards to leader individual differences and described leader flexibility as trait-driven (Dinh & Lord, 2012; Zaccaro et al., 1991b).

The present study extends this proposition using Denison et al.’s (1995) differentiation between behavioural repertoire and behavioural differentiation. It was theorised that transformational-transactional leadership style provides a behavioural repertoire and leader flexibility constitutes the component of behavioural differentiation, which can be conceptualised as a competency rather than a style. Drawing on the argument that both, a repertoire of leadership styles and the competency to display these in synchronisation with situational demands, are required for effective leadership (Denison et al., 1995; Yukl & Lepsinger, 2004), it is proposed that leader flexibility has an effect beyond transformational and transactional leadership. This reflects theorisations that have discussed leader flexibility as a meta-competency that extends
beyond individual leadership behaviours (Norton, 2010; Kaplan & Kaiser, 2003). Although the notion of leader flexibility is not new, it has started to receive more consideration due to the growing criticism of universal leadership theories such as transformational-transactional leadership (Klein et al., 2006; Künzle et al., 2010; Yukl, 2010; Yukl & Mashud, 2010). Therefore the construct of leader flexibility is still in an emerging phase and requires further theoretical development to improve its conceptual clarity. The present research advances the understanding of leader flexibility by combining it with established theories such as the transformational-transactional leadership framework and tenets from contingency conceptualisations.

4.9.1 Leader flexibility in safety-critical contexts

Although the idea of leader flexibility has been repeatedly recognised in the literature (Kaiser & Overfield, 2010; Northouse, 2013; Norton, 2010; Yukl, 2008, 2010; Zaccaro & Kimoski, 2001) very few studies have operationalised and empirically explored the construct and hardly any research has been conducted on leader flexibility in the domain of workplace safety. The notion that if safety is salient, leaders need to be particularly sensitive towards contextual cues so that they can adapt their behaviour accordingly, is indicated by research on situational awareness in safety-critical contexts (Fioratou, Flin, Gavin, & Patey, 2010; Sneddon, Mearns, & Flin, 2006, 2013). Situational awareness refers to individuals’ perception of elements in their environment and comprehension of their current and future impact (Endsley, 1995) and has been highlighted as a critical factor for accident prevention (Sneddon et al., 2006, 2013). For example, Sneddon et al. (2013) reported that lower levels of situational awareness were associated with increased unsafe behaviour in a sample of offshore drilling crews. These studies, although not focused on leadership as such, highlight the need for cognitive comprehension of contextual factors for safe working. This cognisance of context, enables leaders to act accordingly and respond with the most suitable leadership behaviour.

Leader flexibility has been related to other constructs such as self-monitoring, which refers to an individual’s sensitivity to social cues and adapting their behaviour accordingly (Snyder, 1974; Zaccaro et al., 1991a). The construct is distinct from leader flexibility as it is more concerned with adjusting behaviour to serve self-status and
self-interest than to meet situational demands. Also, self-monitoring has rarely been discussed in the field of leadership (Zaccaro et al., 1991a). Nevertheless, the empirical evidence on self-monitoring provides support for the relevance of leader flexibility, especially in light of the lack of empirical work on leader flexibility itself. Some studies have positively linked self-monitoring to leader emergence (Day & Schleicher, 2006) and task-relevant leader behaviours (Zaccaro et al., 1991a). These studies indicate that the ability to adjust behaviour appears as beneficial for leadership. With regards to safety-critical contexts, it has been theorised that self-awareness, referring to leaders’ awareness of “what constitutes their strengths and limitations within the organisational context” (p. 57), enables leaders to increase their influence on follower safety commitment and safety climate (Eid, Mearns, Larsson, Laberg, & Johnsen, 2012). These studies on constructs related to leader flexibility, lend support for the proposition, that leader flexibility is critical if safety is salient.

In addition, the importance of leader flexibility in safety-critical contexts can be linked to the need for both transformational and transactional leadership if safety is salient. It was discussed that transactional as well as transformational leadership are needed to maximise a leader’s impact on performance. Bass (1985; Bass & Riggio, 2006) postulated that effective leaders use transformational as well as transactional leadership. In addition it was pointed out earlier that transformational leadership and transactional leadership appear to influence different aspects of performance (Clarke, 2013; Griffin & Hu, 2013; Wang et al., 2011). Transformational leadership has been associated with safety participation and contextual performance and transactional leadership associated with safety compliance and task performance (Clarke, 2013; Griffin & Hu, 2013; Wang et al., 2011). These findings can be linked to the idea of leader flexibility. A leader has to identify whether the prime objective in a situation is compliance or safety participation and adjust the emphasis of their behaviour accordingly. In situations where compliance is of utmost importance, a leader might display more transactional leadership practices to address this situation-based goal. In situations where risk is less imminent, and both compliance and participation are of comparable importance, a leader might use a more balanced combination of transformational and transactional leadership. Thus, leaders need to assess the demands of a situation and respond to these by deciding whether a more transformational or transactional form of leadership is likely to be successful (i.e.,
leader flexibility). Therefore, the present research proposes that leader flexibility is effective over and above the display of transformational and transactional leadership. This proposition relates to the model in Figure 1 (see p. 39), which shows a link between leader flexibility and leader effectiveness criteria whilst controlling for transformational, transactional and passive leadership (see chapter two, p. 39).

Dinh and Lord (2012) suggest that leadership flexibility is more important in equivocal situations where behavioural scripts are not strictly defined. Meyer et al. (2009) showed that conscientiousness as a leader trait is of particular importance in so called weak contexts, which lack distinct behavioural guidelines. It can be argued that safety-critical work environments portray a weak context. As outlined before, contextual ambiguity is increased in safety-critical work conditions as leaders are confronted with competing objectives (Zohar, 2010). As a consequence, there is greater scope in interpreting and responding to the diverse and opposing situational requests (Denison et al., 1995; Hannah et al., 2009). It can therefore be proposed that leader flexibility plays a more prominent role in safety-critical contexts, where leaders have to integrate safety with opposing demands. This proposition is in line with theorisations that have drawn on Quinn’s (1988) competing values theory, and argued that behavioural flexibility provides the capacity to respond to contradictions in leaders’ work environment (Denison et al., 1995; Lawrence, Lenk, & Quinn, 2009; Yukl & Lepsinger, 2004). Yukl and Lepsinger (2004) explain that through behavioural flexibility, leaders “may balance competing demands and reconcile trade-offs among different performance determinants” (p. 203). Similarly, Kaiser and Overfield (2010) have described leader flexibility as “a mastery of opposites” (p. 105). Thus, as leaders operating in safety-critical contexts are frequently challenged with competing objectives, leader flexibility might be a particularly important aspect for leadership effectiveness. In less safety-critical contexts, leaders might less often encounter situations where demands strongly conflict with each other, so that leader flexibility is less crucial for effectiveness. Leaders in safety-critical contexts are required to adapt their leadership style to the specific situation at hand. Thus, the present research argues that leader flexibility might have greater relevance in safety-critical contexts compared to non-safety-critical settings. This corresponds to the proposed moderator role of safety salience on the link between leader flexibility and outcome criteria as shown in the model in Figure 1.
4.10 Chapter Summary

The existing leadership literature has been criticised for ignoring the impact of contextual factors for the role of leadership styles. It has been suggested that in their day-to-day interactions leaders do not use one, single style of leadership to influence followers but adopt a variety of leadership behaviours to match the requirements of the contextual demands (Hooijberg, 1996; Yukl & Mashud, 2010). Moreover different types of outcomes such as compliance with rules and procedures might not be equally critical in different contexts.

This chapter presented a rationale for salience of safety as a context factor that influences the followers’ and leaders’ perceptions about the value of transformational and transactional leadership and the extent to which leaders employ these two styles. It was articulated that safety-critical contexts demand a greater amount of active leadership due to increased ambiguity, opposing demands and the persistent need to prevent failure that has the potential for severe consequences. In comparison, in non-safety-critical contexts leaders and employees might be less often faced with the challenge of integrating contrasting goals, high levels of uncertainty and urgent situations with imminent danger. Consequently it was argued that both transformational and transactional leadership are particularly relevant in safety-critical contexts, but might be less important in non-safety critical contexts. Implicit leadership theories and prevention and promotion regulation focus were outlined as theoretical backgrounds that support the argument for safety salience as a contextual factor that affects leadership style. The concept of leader flexibility is connected to the notion that leaders adjust their behaviour in response to contextual requirement. Leader flexibility was discussed as a meta-competency that extends beyond the use of individual leadership practices such as transformational-transactional leadership (Norton, 2010). As safety-critical contexts are characterised by a variety of demands, leaders might be required more frequently to switch between different styles and adjust their behaviour. Thus, it was proposed that leader flexibility might carry increased weight in safety-critical contexts compared to non-safety critical contexts. Based on the literature reviewed in the present chapter and the two foregoing chapters, the next chapter summarises how the present research programme extends existing research and states the research’s objectives and propositions.
5 Research Objectives

5.1 Chapter Overview

The research presented in this thesis makes several advances on existing research in the wider leadership literature as well as the occupational safety literature. These advancements are summarised in the first section of this chapter. Subsequently, the main research objectives are presented with a brief outline of how these are addressed in the empirical part of the research.

5.2 Advances on Existing Research

The research aims to explore whether the salience of safety within a work environment influences the perceived effectiveness and the frequency of occurrence of transformational, transactional and passive leadership as well as their relationship with leader outcomes. In addition, the research explores whether leader flexibility is effective beyond transformational and transactional leadership and is particularly relevant in safety-critical contexts. The studies in this thesis aim to advance existing leadership and safety research in a number of ways. Whilst Bass’s (1985) transformational-transactional leadership framework provides a theoretical basis for many leadership studies, research has often solely focused on transformational leadership and not investigated transactional leadership. Moreover, research that has investigated the effectiveness of transactional leadership has produced mixed findings. Thus, the present research aims to make a contribution by investigating transactional leadership and its effectiveness for performance and other leader outcomes.

Criticism is mounting that an approach that aspires to universality of one leadership style as the best way to lead, is too simplified (Antonakis & House, 2002; Podsakoff et al., 1996b; Rowold, 2011). Instead, it is suggested that the effectiveness of leadership practices is likely to be a function of contextual factors. An indiscriminate use of transformational leadership is unrealistic as leaders are likely to rely on a palette of different behaviours dependent on the requirements of a situation (Rowold, 2011). For example, it has been suggested that accounting for context, might offer insight into
the compound findings that have been reported with regards to the effectiveness of transactional leadership (Judge & Piccolo, 2003; Antonakis & House, 2002). Transactional leadership might be effective and valued in certain work contexts, but irrelevant or even destructive in others. However, despite these appeals to address contextual boundaries, which might modify the effect of transformational-transactional leadership on outcome variables, few studies have addressed this notion.

The present research advances existing leadership literature by investigating whether salience of safety influences perceptions, occurrence and effectiveness of transactional leadership. This is an important contribution to the wider leadership literature, as using safety salience as a concrete example, offers a more refined understanding of leadership that pays attention to the context in which leaders operate. Moreover, the investigation of salience of safety as a context factor advances the safety leadership literature. Commonly, studies exploring safety leadership have used the wider organisational literature as an orientation point. However, safety-critical contexts are characterised through specific demands and attributes that are distinct from non-safety-critical contexts. Thus, a comparison allows a more precise understanding of leadership for workplace safety and enables research to make more accurate recommendations for leaders in safety-critical contexts.

Leadership research has mainly focused on exploring individual leadership practices and their influence on performance and other outcomes. However, this approach overlooks that to be effective, leaders not only need to display active leadership, but also need to respond in ways that are most fitted to the context. Theorisations on the concept of leader flexibility have proposed that leaders need to be able to draw on a repertoire of behaviours and have the capacity to identify the requirements of a situation to select the most appropriate behaviour (Yukl & Lepsinger, 2004). Yet, few studies have explored the idea of leader flexibility empirically. The present studies advance existing research by investigating leader flexibility and its relationship with leader outcomes in safety-critical and non-safety-critical contexts.

Overall, the research takes an original approach as it merges behavioural, trait and contingency views of leadership, which have largely been explored separately in the existing leadership literature. Transformational-transactional leadership is integrated
with a contingency approach (i.e., salience of safety as a context factor) and extended through leader flexibility, which represents a trait view of leadership.

5.3 Main Research Objectives

5.3.1 Research objective 1:

To explore whether salience of safety affects the perceived effectiveness and frequency of occurrence of transformational and transactional leadership styles

Drawing on implicit leadership theories, it was proposed that followers’ and leaders’ perceptions of leadership behaviours are not independent from the context in which these evaluations are made (Lord & Emrich, 2001). Depending on the most crucial demands and goals within a work environment, individuals perceive different leadership styles as more or less effective. A leadership behaviour that is evaluated as effective in one context, might be perceived as less effective in a different setting. Empirical work has indicated that under conditions of crisis, urgency and uncertainty, employees viewed directive, instrumental leadership behaviours, which correspond with transactional leadership, as more favourable and are used more frequently by leaders in this context (Künzle et al., 2010). Safety-critical contexts are characterised through opposing goals, such as safety and cost, creating increased ambiguity over the priority of competing goals. Based on social learning theory (Bandura, 1977), it was proposed that to make sense of such an equivocal work environment, employees value direction and guiding leadership behaviours (i.e., transactional leadership). In non-safety-critical contexts, where demands are less contrasting and failure does not pose the same level of danger, transactional leadership practices might be perceived as too controlling and therefore be evaluated as less effective and employed less often by leaders.

In addition, research has suggested that under demanding conditions, not just increased levels of directive leadership, greater amounts of leadership involvement overall are required to achieve high performance levels. Thus, employees might also desire greater amounts of transformational leadership. Therefore, the following two propositions are made (see Figure 2):
Proposition 1: In safety-critical contexts individuals perceive transactional and transformational leadership as more effective compared to individuals in non-safety-critical contexts.
Proposition 2: In safety-critical contexts leaders on average use greater amounts of transactional and transformational leadership compared to leaders in non-safety-critical contexts.

The two propositions are empirically explored in study 1. Study 1 assesses perceived effectiveness of transformational and transactional leadership from the leaders’ perspective across different levels of safety salience within subordinates’ work environment.

5.3.2 Research objective 2:
To explore the co-occurrence of transformational and transactional leadership

Empirical evidence has indicated that different leadership styles are associated with different types of outcomes. A number of studies have indicated that transformational leadership is more strongly associated with contextual performance and safety participation, whereas transactional leadership is more strongly related to task performance and safety compliance (Clarke, 2013; Wang et al., 2011). However, what has often been overlooked is that these different types of outcomes might vary in their relevance for performance across different contexts. It has been argued that in safety-critical contexts compliance with rules and regulations is a pivotal objective to prevent failure, but might not have the same gravity in non-safety-critical contexts where errors have less severe consequences. Contextual performance on the other hand is likely to be aspired to in both safety-critical and non-safety-critical contexts. It can therefore be argued that in safety-critical contexts leaders are more likely to use both transformational and transactional leadership behaviours to address the objective of participation as well as compliance. In non-safety-critical contexts where leaders seek contextual performance with less emphasis on compliance, leaders adopt transformational leadership practices but might engage less often in transactional leadership practices. It can therefore be expected that the co-occurrence of transformational leadership, i.e., the extent to which leaders use both styles together,
varies between safety-critical and non-safety-critical contexts. Thus, the following proposition is made (see Figure 2):

Proposition 3: Transformational and transactional leadership are used more frequently together in safety-critical contexts compared to non-safety-critical contexts.

Figure 2. *Schematic representation of proposition one to proposition three.*

The strength of relationship between transformational and transactional leadership across different levels of safety salience is explored in study 1, where leaders who operate in different contexts with varying degrees of safety salience, reported to what extent they engage in transformational and transactional leadership. The co-occurrence of the two leadership styles is assessed through the magnitude of covariance between transformational and transactional leadership based on Antonakis et al.’s (2003) investigations.
5.3.3 Research objective 3:

To explore whether salience of safety impacts on the relationship between leadership style and leader outcomes

The competition between safety and other organisational targets creates ambiguity and tension for employees as to which goals predominate (Zohar, 2000, 2010). In addition, even minor errors and mistakes can have substantial consequences if safety is salient. Leadership behaviours such as actively monitoring performance, vigilantly checking for deviations and errors and offering incentives for safe working might therefore be needed to reduce the environmental uncertainty and prevent failure. Thus, in safety-critical contexts transactional leadership is expected to be more strongly related to performance outcomes. In non-safety-critical contexts, prevention of error is less pivotal and uncertainty might be lower as demands are not as strongly in opposition. In addition, it was argued that employees perceive transactional leadership as intrusive when safety salience is low and are therefore less receptive towards these leadership practices. Hence, it is expected that transactional leadership is less strongly related to performance in non-safety-critical contexts.

In addition, promotion of learning opportunities from errors, creating enthusiasm and motivation for safety are required to further enhance workplace safety. Also, research has asserted that employees are more receptive towards leadership in situations of crisis and ambiguity, and draw more strongly on their leader’s behaviour for support (Morgeson, 2005; Pillai & Meindl, 1998). It can therefore be argued that in safety-critical contexts transformational leadership is related more strongly to performance compared to non-safety-critical contexts. Reversing the notion that active leadership is particularly relevant in safety-critical contexts, it can be suggested that passive leadership is particularly detrimental if salience of safety is high. Passive leaders are less likely to clarify priorities and detect and correct any errors before these can result in failure. Given that such omissions can have particularly deleterious consequences in safety-critical contexts, it is expected that passive leadership is more negatively associated with performance in safety-critical contexts. Thus, the following propositions are made (see Figure 3).
Proposition 4: Transactional leadership is positively associated with favourable leader outcomes (Proposition 4a) and this relationship is stronger in safety-critical contexts compared to non-safety-critical contexts (Proposition 4b).

Proposition 5: Transformational leadership is positively associated with favourable leader outcomes (Proposition 5a) and this relationship is stronger in safety-critical contexts compared to non-safety-critical contexts (Proposition 5b).

Proposition 6: Passive leadership is negatively associated with favourable leader outcomes (Proposition 6a) and this relationship is stronger in safety-critical contexts compared to non-safety-critical contexts (Proposition 6b).

Propositions 3 and 4 are explored in study 1. Study 2 includes passive leadership and investigates each of the above three propositions. In both studies, salience of safety is assessed through ratings of injury likelihood, hazard exposure and impact on safety of others. A different criterion set is used in the two studies based on the respective study contexts, but both studies include generalised outcome criteria as well as safety-specific outcome measures. In study 1, salience of safety is assessed as a moderator of the relationship between transformational, transactional leadership with safety incidents (i.e., safety-specific criterion) as well as with team performance and leader self-efficacy (i.e., facet-free criteria). In study 2, salience of safety is assessed as a moderator of the relationship between transformational, transactional and passive leadership with safety performance and safety climate (i.e., safety-specific criteria) as well as job performance, job satisfaction and satisfaction with leader (i.e., facet-free criteria).

5.3.4 Research objective 4:

To explore the role of leader flexibility beyond transformational-transactional leadership and investigate whether salience of safety impacts on the relationship between leader flexibility and leader outcomes

Leaders draw on a palette of different leadership behaviours in their follower interactions (Rowold, 2011). The concept of leader flexibility suggests that to maximise their influence, leaders must interpret the situational requirements and match their behaviours accordingly (Yukl & Lepsinger, 2004). Thus, in addition to
displaying transformational and transactional leadership, these styles need to be fitted to the setting at hand. It is therefore expected that leader flexibility impacts on outcome criteria beyond transformational and transactional leadership. Additionally, it was argued that the competency of leader flexibility might be particularly relevant in safety-critical contexts where a variety of targets need to be addressed and compliance and participation are of comparable importance. Therefore, leaders might be required to switch between different leadership styles more frequently than in non-safety-critical contexts. Thus, the following two propositions are made:

Proposition 7: Leader flexibility is positively related to favourable leader outcomes (Proposition 7a) and this relationship is stronger in safety-critical contexts compared to non-safety critical contexts (Proposition 7b).

In Figure 3, a schematic representation of propositions four to seven is displayed.

The propositions are empirically explored in study 1 as well as study 2. In study 1, the relationship between leader flexibility and safety incidents, team performance and leader self-efficacy was explored. In study 2, the relationship between leader flexibility and safety performance, safety climate, job satisfaction and satisfaction with leader was investigated. In each study, salience of safety was explored as a moderator of the respective relationships.

5.4 Chapter Summary

This chapter summarised how the present research advances existing research and stated four main research objectives. For each research objective, specific propositions were stated, which are to be empirically investigated in the two studies. The next chapter presents the general methodology for the two studies, addressing philosophical assumptions, ethical considerations and measurement decisions that guided the empirical research.
Figure 3. Schematic representation of proposition four (P 4a/b) to proposition seven (P 7a/b).
6 Methodology

6.1 Chapter Overview

In this chapter the methodological approach for the research is presented. Creswell’s (2003) model on research design (adapted from Crotty, 1998) was used as a guiding framework to structure this discussion (see Figure 4). Creswell (2008) parcels research practice into three interrelated, grounding elements: (1) philosophical assumptions, (2) general strategies of inquiry to the research problem and (3) specific methods such as measurement instruments and data collection procedures. He asserts that in combination, these elements shape the course of a research study. In the framework, the three components form a sequential chain, connecting decisions in the research process. Hence, philosophical assumptions provide a foundation for decisions on the strategies of inquiry, which in turn give rise to specific methods.

This chapter discusses the methodological issues that span across both studies and focuses in particular on the first two elements of the model (i.e., philosophical assumptions and general methods of inquiry). Specific measurement tools and data collection procedures are outlined in the individual method sections of the respective study chapters. First, the philosophical assumptions that underpinned the research programme are presented. This is followed by an outline of the general methods of inquiry, including an account of survey methodology and ethical considerations. The last section of the chapter discusses the Multifactor Leadership Questionnaire (MLQ), which was used in study 1 as well as study 2 to measure transformational-transactional leadership. This structure was chosen to minimise repetition and to present an account of the overarching research methodology adopted in the research programme.
6.2 Philosophical Assumptions

The aim of this section is to present the epistemological assumptions underlining the methodological choices in the present research. The purpose is not a discussion of philosophical realms, but to functionally consider how a post-positivistic view has influenced the research. When selecting specific research methods, philosophical assumptions about the nature of knowledge and conceptualisations of reality are made. Kuhn (1970) introduced the concept of a paradigm to describe the consensual beliefs amongst a research community about what scientific knowledge is and what constitutes scientific methods. Johnson and Duberley (2000) note that philosophical underpinnings should not remain implicit, but should be explicitly recognised. They state that consciously addressing philosophical assumptions is necessary for a critical understanding of the questions asked about a research topic, the methods used to explore it and for interpretation of the findings produced.
6.2.1 Post-positivism in the present research

The process of the current research programme was framed by assumptions of the post-positivistic paradigm. The research topics that were investigated mainly spanned across the fields of psychology and management research. Both disciplines have historical traditions in the positivistic paradigm, trying to apply natural science methods to the investigation of human behaviour and social phenomena (Gergen, 2001; Johnson & Duberley, 2000). The principles of positivism have received substantial criticism and led to post-positivistic movements that are more moderate in their claims about the certainty and objectivity of scientific knowledge, but retain some of the core positivistic features (Crotty, 1998). The implications and manifestation of adapting a post-positivistic outlook are evident throughout the different stages of the present research process.

The present research objectives were concerned with estimating degrees of relationships and causal links between the explored constructs. Thus, the focus was on patterns of relationships rather than describing peoples’ individualistic experience and opinions of leadership or workplace safety. The wider problem of leadership in safety-critical work environments was reduced to discrete ideas and formulated into falsifiable hypotheses, which were tested using statistical analysis. At the core of this hypothetico-deductive approach, is testing whether the null-hypothesis can be rejected, whilst acknowledging that this does not mean with certainty that the initial, alternative hypothesis is true. Thus, the post-positivistic concepts of falsification and verisimilitude were echoed in the formulation of the research propositions and the methods of data analysis.

Surveys were used as the method of inquiry to collect data and statistical analyses were conducted to test the hypotheses. It is recognised in post-positivism that the researcher’s subjectivity cannot be entirely isolated from the research process, but there is an essential commitment to strive for objectivity (Robson, 2002). One of the advantages of surveys is, that these can be constructed in a standardised format. Further, the questionnaires in the present studies were designed to produce numerical data. Arguably, numerical information can be analysed and interpreted in a more objective fashion compared to information produced by other data collection methods.
such as observation or interviews. Thus, in line with post-positivistic thinking, the issue of objectivity was salient in the selection of measurements and construction of the data collection process.

Babbie (2012) points out that research methods are connected to certain philosophical commitments, but that this relationship is not deterministic. Babbie (2012) comments that “research methods are much more free-floating in terms of epistemology and ontology” (p. 443). Similarly, Robson (2002) asserts that research does not have to be guided by only one philosophical stance. A tradition of ‘paradigm-wars’ in social sciences has too often made researchers believe that they need to commit themselves to a single philosophical approach and its associated methods (Robson, 2002). A more pragmatic view however can be adopted that argues that philosophical assumptions and methodologies should be flexibly applied to best serve the specific research questions at hand (Bryman, 2004; Reichardt & Rallis, 1994). In line with this view, the post-positivistic approach and objectivist ontological viewpoint were not adopted as firm positions that tightly dictated the process of the current research, but presented malleable underpinnings that partially steered the methodological choices made. Thus, the methods in this research were framed by certain philosophical assumptions, but were also the product of practical decisions. The researcher’s previous experience in conducting survey research and statistical analysis as well as a background in Psychology impacted on the design of the research.

### 6.3 Survey Method

A self-completed questionnaire was used in both studies as the method of inquiry. Taking less of an epistemological viewpoint and more of an applied angle, the purpose of this section is to demonstrate how the survey method fitted the aims of the current research. As with all methods, surveys are characterised by certain advantages and disadvantages. In the following, strengths and limitations of surveys are reviewed.
6.3.1 Strengths of survey research

A core research objective was to explore whether the level of safety salience within a work context impacts on the leadership process. This included examination of several leadership variables, contextual variables and effectiveness criteria. Thus, information on a relatively large set of variables was collected. Obtaining large amounts of data in an efficient manner is often cited as a principal advantage of the survey method (Fowler, 2009; Creswell, 2003; Gray, 2009).

Moreover, issues such as reliability, validity, objectivity and generalisability were important quality criteria for this research, underpinned by its post-positivistic philosophical viewpoint. Surveys are often recommended as the method of inquiry to suitably address these research criteria (Babbie, 2012). Reliability can be achieved by presenting participants with standardised questionnaire content. Construct validity can be met by using established scales, and being able to collect data from a large number of participants that represents the population as closely as possible and facilitates generalizability of results. With reference to objectivity, Babbie (2012) explains that standardised questionnaire items offer uniform definition of constructs to all participants. People are likely to have different mental representations of ambiguous constructs such as leadership or job performance. By using standardised questionnaire items, a consistent construct conceptualisation is provided to all participants. Nevertheless, it has been acknowledged that respondents’ individual understanding of constructs cannot be fully eliminated. Even when using standardised items, participants’ subjective interpretation of item meaning will remain reflected in their response (Belson, 1981; Bryman, 2004).

A further strength of the survey method is that it offers anonymity in the absence of an interviewer to participants, which can help to elicit more accurate responses. This is relevant for the present research, as some of the variables assessed, such as accident frequencies or ratings of one’s manager’s behaviour might be susceptible to social desirability bias. Moreover, using the survey method facilitated comparability of the present studies with existing research in the leadership and safety arena. Behavioural surveys have been the most common research method in leadership studies. Thus, choosing the survey method carried the benefit of methodological comparability with
previous research in the field. Lastly, practical circumstances such as low cost of
surveys, time efficiency and being able to access employees working in distant
locations (e.g., participants in study 2 worked on oil installations in South East Asia)
played a further role in choosing the survey method. This meant that sufficient time
and resources were available to conduct two separate studies. Together the two studies
enabled a more comprehensive investigation of the research topic.

6.3.2 Limitations of survey research

Surveys have been criticised for being too limited to mirror the complexities of real
life and social situations. Babbie (2012) notes that questionnaire items often represent
“the least common denominator in assessing people’s attitudes” (p. 287) and are too
superficial to grasp the full depth of a topic. Choosing multidimensional scales and
paying attention to item wording can help to offset this shortcoming. In addition,
advancements in statistical techniques such as multilevel modelling and taking into
account interaction effects, allows for a more sophisticated analysis of survey data
(Babbie, 2012).

A further limitation of surveys is that they have restricted flexibility. The content of a
survey is pre-set with no opportunity to extract additional information or inquire
further (Robson, 2002). Although this criticism is valid, it might be somewhat less
relevant to the current research. The studies conducted in the present research
programme can be categorised as more explanatory rather than exploratory pieces of
work, as the research built on and advanced existing studies and theoretical
frameworks. This meant that it was possible and expedient to pre-determine what kind
of information the research wanted to collect from participants.

6.4 Ethical Considerations

The empirical research was conducted in accordance with the ethics guidelines of the
British Psychological Society (British Psychological Society [BPS] Code of Human
Research Ethics, 2010). The University of Manchester Ethics Committee granted
ethical approval for the undertaken research.
Ethical issues were comparable between the two studies. Both studies included administration of online or pen-and-paper questionnaires, targeted comparable groups of participants and focused on similar research topics. The key ethical issues that were identified for the two studies are discussed below.

6.4.1 Informed consent and confidentiality

All potential participants were provided with an information sheet accompanying the questionnaire. In the online version of the questionnaire this information was displayed to participants as the first page for the survey link and was also included in the email invitation, so that participants had access to the information after the survey link was closed. Informed consent is not a single, individual act, but much rather a continuous matter that may change (Iphofen, 2009). To enact this, participants were made aware in the information sheet that withdrawal of participation was possible without having to provide a reason and participants were provided with the researchers contact details.

In study 1, no identifiable information was collected from participants. Hence, anonymity could be provided to participants. In study 2, which used a two-source data procedure, employees’ responses were matched with ratings from their leader. This meant that to allow matching, participants’ anonymity was compromised. This was explained prior to participation in the information sheet, which stated that each questionnaire was issued with a code for matching purposes only. In the online version of the questionnaire, participants were informed in the invitation email that the link to the survey is personalised to allow matching of their responses with their leader’s answers. Only the researcher had access to the documents with the key to the matching codes and personalised links. Any information that could identify participants (i.e., match code, survey link, IP address for online respondents) was deleted after the matching process to anonymise the data.

The sample of both studies consisted of adults who had the capacity to give consent. Nevertheless, Iphofen (2009) notes that despite having the ability to understand the voluntary nature of taking part, participants can sometimes feel coerced into consenting. For instance the importance for the researcher to obtain the data may
transpire during the recruitment process and instil a sense of obligation within participants. In study 2, the researcher briefed the company representatives of the participating organisations on this issue. Instructions were given to take care that no undue influence was exerted to persuade employees to take part in the research.

Based on the type of data collected and the relatively low extent of engagement that was required from participants, it was decided that a signed consent form was not necessary for the studies. Also, the formality of a separate signed consent sheet can be alienating to potential participants and the signature on a consent form would compromise anonymity (Iphofen, 2009). As some of the sections in the questionnaire were on participants’ views of their leaders, having to provide a signature might elicit fears of being identifiable and reluctance to provide honest answers or to participate at all. In sum, a consent form can make participants more likely to refuse participation not due to the study itself but due to the consent form (De Vaus, 2002; Singer 1993). The BPS (BPS Code of Human Research Ethics, 2010) also recognises that the procedure for consent should be proportionate to the research topic and design. Implied consent is acceptable if questions are relatively non-sensitive. Thus, in the current studies completing the questionnaire implied consent.

Participants were informed that all information collected would be treated with strictest confidentiality. Participants who completed hard-copy questionnaires were provided with a sealable envelope to place the questionnaire in after completion. Paper questionnaires are stored in a secure place. Online questionnaire responses and the electronic data files are password secured. No information from individual questionnaires is reported in this thesis and will not be reported elsewhere. The participating organisations have received a summary report of the findings, but no information from individual participants is passed on.

### 6.5 Multifactor Leadership Questionnaire

In this section the Multifactor Leadership Questionnaire (MLQ, Avolio & Bass, 1995) that was used to measure transformational and transactional leadership, is discussed. All other measures are described in the method section of the respective study.
In both studies transformational and transactional leadership were measured using the MLQ. Despite the extensive popularity of the transactional-transformational leadership theory, only few measures of the constructs exist. Among these, the Multifactor Leadership Questionnaire is the most widely used measure to assess transformational-transactional leadership style (Bryman, 1992; Hinkin & Schriesheim, 2008; Lowe et al., 1996; Seltzer & Bass, 1990; Tejeda, Scandura, & Pillai, 2001). The MLQ was initially developed by Bass (1985) as a tool to empirically investigate his transformational-transactional leadership theory. Since its introduction the instrument has undergone a number of revisions to address conceptual and empirical criticisms. Studies have identified a number of recurring issues surrounding the MLQ in particular with regards to the Management-By-Exception and Contingent Reward scales. A debate on the instrument’s psychometric qualities is ongoing within the literature. In the following the main developments and areas of critique of the MLQ are reviewed. Subsequently, the application of the MLQ in the present two studies is outlined in section 6.5.4.

6.5.1 Factor structure of the MLQ

One continuing area of debate is on the factorial structure of the MLQ (Edward et al., 2012; Knippenberg & Sitkin, 2013). For the primary version of the MLQ, Bass (1985) proposed a six-factor structure that was outlined in the literature review in chapter three. Based on conceptual and empirical developments, a number of modifications have been made to the MLQ since its introduction. The transformational sub-dimension labelled ‘charisma’ in early versions of the MLQ was renamed as Idealised Influence. Further, the dimension of Idealised Influence was divided into Idealised Influence- Attributions and Idealised Influence - Behaviours (Avolio, 1999; Bass & Avolio, 1993, 1994). The former refers to the extent to which charismatic characteristics are attributed to the leader, whereas the latter refers to the display of charisma in the leader’s actual behaviour (Bass & Avolio, 1993, 1994). Suggestions have been made that measuring the exhibition of leadership should be solely made through behavioural items (Hunt, 1991). However justifying the attributions items, Avolio, Bass, and Jung (1999) assert that ‘being charismatic’ is difficult to assess purely through behaviour. As outlined in the literature review, the dimension of
Management-By-Exception was split into a passive and active form (Hater & Bass, 1988). Management-By-Exception-Passive refers to taking corrective action only after errors or problems have occurred, whereas Management-By-Exception-Active refers to the active monitoring of performance and intervention to prevent any errors or problems (Hater & Bass, 1988). Thus, the most recent version of the MLQ (MLQ, 5x Short, Avolio & Bass, 1995) measures three broad factors (transformational, transactional and laissez-faire leadership), which can be classified into nine lower-order factors. According to the scale authors, five dimensions measure transformational leadership (Idealised Influence-Attributed, Idealised Influence-Behaviour, Inspirational Motivation, Individualised Consideration and Intellectual Stimulation), three dimensions measure transactional leadership (Contingent Reward, Management-By-Exception-Passive and Management-By-Exception-Active) and laissez-faire leadership forms a single factor (see Figure 5).

Avolio and Bass (1995) have found empirical support for this nine-factor structure. They compared various factor solutions ranging from a one-factor model to a nine-factor model and reported that the nine-factor structure, as described above provided the best fit. Additional studies have also replicated the nine-factor structure as tenable, although some studies reported that modifications such as reducing the item set, were necessary in order to achieve model fit (Antonakis et al., 2003; Tejeda et al., 2001).

However, other studies have found that alternative factor solutions showed better fit than Avolio and Bass’s (1996) suggested structure of the MLQ. Generally studies have confirmed a three-factor structure at the higher-order level, but differences exist regarding the lower-order dimensions (Den Hartog et al., 1997; Edward et al., 2006). Several studies have produced evidence for an alternative factor structure that aligns Contingent Reward with transformational leadership rather than transactional leadership, and groups Management-By-Exception-Passive with laissez-faire leadership rather than transactional leadership (e.g., Heinitz et al., 2005). This alternative factor structure is displayed in Figure 6. The controversies around the two sub-dimensions of Contingent Reward and Management-By-Exception-Passive are outlined further below.
6.5.2 Management-By-Exception

Bass (1985; Bass & Riggio, 2006) conceptualised Management-By-Exception-Passive and Management-By-Exception-Active both as transactional leadership components. However, it has been repeatedly suggested that Management-By-Exception-Passive shares a theoretical basis with the laissez-faire leadership dimension rather than transactional leadership, as both tap into passivity and avoidance of leadership (Den Hartog et al., 1997; Garman et al., 2003; Heinitz et al., 2005).

Empirically, the overlap between Management-By-Exception-Passive and laissez-faire leadership has been indicated through consistently high, positive correlations between the two constructs (Hinkin & Schriesheim, 2008, Den Hartog et al., 1997). Using four different samples, Tejeda et al. (2001) reported inter-correlations between Management-By-Exception-Passive and laissez-faire leadership ranging from $r = .76$
to $r = .83$. Also, factor analytical findings have suggested that Management-By-Exception-Passive and laissez-faire leadership can be collapsed into a common higher-order factor (e.g., Avolio et al., 1999; Den Hartog et al., 1997; Edwards et al., 2012; Heinitz et al., 2005). Further, Management-By-Exception-Passive and laissez-faire leadership have shown similar relationships with criterion variables (Judge & Piccolo, 2004). Dumdum et al. (2002) found in their meta-analysis that both Management-By-Exception-Passive and laissez-faire leadership were negatively related to leader effectiveness and satisfaction with leader.

Bass and Hater (1988) explained the distinction between Management-By-Exception-Passive and laissez-faire leadership by stating “passive management-by-exception is not the same as laissez-faire leadership. The status quo is guarded and respected in passive management-by-exception; the status quo is ignored by the laissez-faire leader who essentially avoids decision making and supervisory responsibilities” (p. 697). Similarly, Yammarino, Spangler, and Bass (1993) argue that laissez-faire leadership “goes even beyond Management-By-Exception-Passive and is a ‘do nothing’ approach” (p. 84). Whilst this conceptual separation of Management-By-Exception-Passive and laissez-faire leadership might be plausible, evidence suggests that it is empirically not tenable (Hinkin & Schriesheim, 2008). Hinkin and Schriesheim (2008) propose that the wording of the Management-By-Exception-Passive and laissez-faire items might not sufficiently represent this difference. They empirically investigated the overlap between Management-By-Exception-Passive and laissez-faire leadership. In the study, participants received definitions of the Management-By-Exception-Passive and laissez-faire construct and were asked to assign the respective MLQ items to either of the two leadership dimension. Hinkin and Schriesheim’s (2008) results showed that many of the Management-By-Exception-Passive items were misclassified as laissez-faire items, suggesting that raters of leadership find it difficult to distinguish between these two forms of passive leadership.

In the literature, transactional leadership has often emerged as a less strong predictor of effectiveness criteria than transformational leadership (Griffin & Talati, 2011; Judge & Piccolo, 2004). The combining of active leadership (Management-By-Exception-Active and Contingent Reward) with Management-By-Exception-Passive into one higher-order factor of transactional leadership, might have influenced these
findings. Some studies have shown that Contingent Reward and Management-By-Exception-Active are positively related to leadership outcome variables such as job performance and leader effectiveness (Howell & Hall-Merenda, 1999; Griffin & Talati, 2011), whereas Management-By-Exception-Passive is typically negatively correlated with performance outcomes (Howell & Hall-Merenda, 1999). Thus, when linking the global factor of transactional leadership with outcome variables, the negative relationship of Management-By-Exception-Passive with outcome measures might attenuate the overall correlation (Griffin & Talati, 2011).

In sum, evidence shows a strong correlation between Management-By-Exception-Passive and laissez-faire leadership, similar relationship to criterion variables and has found support for a common higher-order factor, combining Management-By-Exception-Active and laissez-faire dimensions.

6.5.3 Contingent Reward

In the MLQ, Contingent Reward is specified as a component of transactional leadership (Avolio & Bass, 1995). However, it has been suggested that Contingent Reward forms a dimension of transformational leadership rather than transactional leadership (Garman et al., 2003). Contingent Reward refers to leaders providing rewards to subordinates in exchange for the fulfilment of tasks and responsibilities. It describes the social exchange between subordinate work efforts in return for some form of benefits (e.g., pay, prestige). Conceptually, it can be argued that Contingent Reward forms the core dimension of transactional leadership, as it is directly concerned with the transaction of rewards in recognition of task completion (Van Knippenberg & Sitkin, 2013). However, empirically several studies have shown that Contingent Reward loads on a common factor together with the transformational leadership dimensions rather than with transactional leadership (Edward, 2012; Heinritz et al., 2005; Vandenberghhe et al., 2002) and several studies have reported high, positive correlations between Contingent Reward and transformational leadership (Bycio et al., 1995; Den Hartog et al., 1997; Judge & Piccolo, 2004; Lowe et al., 1996; Tejeda et al., 2001). Den Hartog et al. (1997) concluded from their results that Contingent Reward correlates equally highly with transformational leadership as it does with the transactional leadership sub-dimensions. Overall, the findings discussed
above indicate that Contingent Reward might align with transformational rather than transactional leadership.

6.5.4 **MLQ in the present research**

Despite the issues discussed above around the MLQ’s psychometric properties, it was identified as the most suitable instrument to assess transformational and transactional leadership in the present research.

An advantage of the MLQ is that it measures transformational as well as transactional leadership. Alternative leadership questionnaires either entirely exclude transactional leader practices from their scales (e.g., Carless, Wearing, & Mann, 2000; Rafferty & Griffin, 2004) or only offer very narrow assessment of transactional leadership by only including Contingent Reward items, but not Management-By-Exception-Active items (e.g., Podsakoff et al., 1990; Alimo-Metcalfe & Alban-Metcalfe, 2001). Further, the vast majority of research conducted on the transformational-transactional leadership framework has used the MLQ as its operationalisation of the model. Thus, for comparative reasons the MLQ was chosen as a suitable measure that allows integrating the findings from this research into the existing body of leadership.

The MLQ version 5x-Short (Avolio & Bass, 1995) was used in the present research. The scale consisted of thirty-six items. Three additional items were developed to assess Management-By-Exception-Active (see section 6.5.5 on modifications below). Thus, the questionnaire consisted of thirty-nine items of which seven items assessed Management-By-Exception-Active and the other dimensions were measured through four items respectively (i.e., Idealised Influence–Attributed, Idealised Influence–Behaviour, Intellectual Stimulation, Inspirational Motivation, Individualised Consideration, Contingent Reward, Management-By-Exception-Passive and laissez-faire leadership respectively).

In study 1, managers rated their leadership style on the MLQ self-report version, which uses first person singular. In study 2, employees rated their immediate superior’s leadership style and item wording was changed accordingly. Due to copyright reasons, the full instrument cannot be presented in this thesis. Sample items are “My team
leader talks optimistically about the future” (Inspirational Motivation), “My team leader talks enthusiastically about what needs to be accomplished” (Idealised Influence–Attributed), “My team leader expresses satisfaction when I meet expectations” (Contingent Reward), “My team leader deals with any mistakes and problems as soon as he/she becomes aware of them” (Management-By-Exception-Active) and “My team leader is absent when needed.” (laissez-faire leadership). All items were accompanied by a five-point response scale, ranging from one “not at all” to five “frequently, if not always”.

6.5.5 Modifications

Although the common practice of modifying the MLQ has been criticised as a cause for inconsistency of previous research outcomes, some modifications were regarded necessary. These changes to the instrument were in response to previous research findings on improving the MLQ’s psychometric quality, and to ensure the instrument’s appropriateness for the current research settings.

Ten items were modified to change the wording from American English to British English, or to enhance clarity of item content following recommendations by Tejeda et al. (2001) and Podsakoff et al. (1990). Care was taken not to digress from the item meaning or to compromise the measure’s validity. Modifications were checked by two experienced researchers.

As mentioned above, three new items were developed for the Management-By-Exception-Active subscale. Several studies have shown that this scale has poor internal consistency (Bass et al., 2003; Tejeda et al., 2001; Hinkin & Schriesheim, 2008). Also, it has been criticised that the MLQ measures transactional leadership in an unnecessarily negative way, depicting it as controlling and manipulative (Antonakis et al., 2003; Rodriguez & Griffin, 2009; Yukl, 2010). Thus, the purpose of the three new items was to increase scale length in an effort to enhance reliability, and to include items that describe Management-By-Exception-Active behaviours without any negative connotations. The three additional items are “My team leader detects problems before they can become serious”, “My team leader always looks out for any
issues that might occur before things can go wrong”, “My team leader pays attention to irregularities and deviations from standards”.

Based on the conflicting findings regarding the dimensionality of the MLQ and to test whether the developed items load together with the other transactional leadership items, confirmatory factor analysis of the MLQ was conducted in both studies.

6.6 Chapter Summary

In this chapter the methodological issues that spanned across both studies were outlined. It was discussed that post-positivistic assumptions provided the epistemological foundations for the research programme. Strengths and limitations of survey methodology were addressed, and it was outlined why a survey approach was selected to investigate the current research objectives. Moreover, ethical issues such as informed consent and confidentiality were addressed. In the last part of the chapter, the Multifactor Leadership Questionnaire was discussed, as it presents one of the key measurement tools in the research and was used in study 1 and study 2.
7 Study 1

7.1 Chapter Overview

This chapter presents the empirical research that was conducted in study 1 to test the research objectives in a sample of leaders who work in different occupational settings with varying degrees of safety salience. The study aimed to explore whether salience of safety within subordinates’ work contexts has an influence on the perceived effectiveness of transformational and transactional leadership, and to what extent leaders engage in the two leadership styles and use these in conjunction with each other. Three aspects of safety salience were rated by leaders (i.e., subordinates’ exposure to hazards, the likelihood for injury within subordinates’ work contexts, and the impact of subordinates’ work on safety of others).

It has been argued that safety-critical contexts are characterised thorough increased uncertainty due to opposing demands, and require compliance as well as contextual performance to prevent failure and promote learning opportunities from mistakes. Based on this notion it was hypothesised that in safety-critical contexts compared to non-safety-critical contexts: (1) leaders view transformational and transactional leadership as more effective, (2) adopt these practices more frequently and (3) are more likely to use the two leadership styles in conjunction compared to leaders in non-safety-critical contexts. Moreover, the study investigated team performance, leader self-efficacy and safety incidents as three leader effectiveness criteria. It was tested whether transformational and transactional leadership are more strongly related these three outcomes under conditions where safety is salient, compared to low levels of safety salience. Lastly, the role of leader flexibility was explored, testing whether this competency extends the effectiveness of transformational and transactional leadership and whether leader flexibility is particularly relevant in safety-critical contexts.

To test these hypotheses, a questionnaire study in a sample of 538 participants who all worked in roles with leadership responsibilities was conducted. The method section in this chapter outlines the procedure of the questionnaire study and provides details on
the sample and measurement instruments. Results from the analysis are presented in section 7.5 and findings are discussed in section 7.6.

7.2 Introduction

In the present study the research objectives were empirically explored from the leaders’ perspectives in a sample of managers and supervisors who work in contexts with differing degrees of safety salience. The overall aim was to investigate the role of safety salience for leaders’ perceptions and usage of transformational and transactional leadership practices and for the relationship of transformational and transactional leadership with three dependent variables (i.e., (1) team performance, (2) leader self-efficacy, and (3) safety incident rate).

It was tested whether the level of safety salience affects leaders’ perceived effectiveness of transformational and transactional leadership and the extent to which leaders adopt transformational and transactional leadership practices. Moreover, the relationship of transformational and transactional leadership to the three leader effectiveness criteria was assessed, and it was tested whether these are moderated by safety salience. Lastly, the construct of leader flexibility was explored. It was tested whether leader flexibility has an influence on the criterion measures over and above transformational and transactional leadership and whether its relationship with the assessed dependent variables was moderated by safety salience.

The three criteria for leader effectiveness (i.e., team performance, leader self-efficacy and safety incident rate) were chosen as they were appropriate for assessing the research aims from the leaders’ perspective and had applicability in contexts were safety is highly salient as well as in contexts were safety is less salient. Leaders rated their team’s global performance and self-reported their level of self-efficacy. Self-efficacy has been defined as “people’s judgment of their capabilities to organise and execute course of action required to attain designated types of performance” (p. 391, Bandura, 1986). Applied to leadership, self-efficacy describes leaders’ self-estimate that they can successfully exert the behaviours required for their leadership tasks (Paglis & Green, 2002).
Together these three measures address leader effectiveness with regards to performance of the subordinates (i.e., team performance) as well as of the leader (i.e., leader self-efficacy). As a safety-specific criterion, the study included number of safety incidents. This measure was selected because it is safety-specific, and also has applicability for leaders whose subordinates work in non-safety critical contexts. Using alternative safety-specific measures such as items on employee safety performance behaviour (e.g., whether employees comply with safety procedures), might have lacked meaning for participants whose subordinates work in settings where safety is not salient. Yet, both leaders in safety-critical and non-safety-critical contexts can provide meaningful responses on number of safety incidents.

In the literature review it was outlined that the term salience of safety within a work context is used to describe risk for harm to workers themselves as well as risk for harm to others. This was reflected in the operationalisations of safety salience. Three different types of measurement were used to assess safety salience:

1. Hazard exposure: Leaders rated to what extent their subordinates are exposed to hazards as part of their routine job roles.
2. Injury likelihood: Leaders rated the likelihood for their subordinates to be injured as a result of their work.
3. Impact on safety of others: Leaders rated to what extent their subordinates’ work impacts on the safety of others.

These three types of measurement were explored as distinct contextual characteristics. The term safety salience is used when referring to the three measures together.

### 7.3 Hypotheses

In the following sections the rationales for each of the study hypotheses are outlined. These correspond to the research objectives and propositions that were presented in chapter five. A schematic representation of the hypotheses is shown in Figure 7 (hypotheses 1 to 5) and in Figure 8 (hypotheses 6 to 10).
Leaders’ perceived effectiveness and occurrence of transformational and transactional leadership

The present study examined whether leaders’ perceptions of the effectiveness of transactional and transformational leadership are dependent on the level of safety salience within their subordinates’ work environment. It was asserted in chapter four that perceptions of leadership styles differ depending on the work context in which these are exerted. Leadership behaviours that are perceived as highly effective in one context might be perceived as less effective in a different work setting. Empirical research has indicated that in demanding situations or under conditions of crisis, more directive, task-oriented leadership behaviours are evaluated as more favourable and displayed more frequently by leaders (Pillai & Meindl, 1998; Künzle et al., 1995). Moreover, research has suggested that in situations of uncertainty and crisis, higher leader involvement is beneficial for performance (Morgeson, 2005). In safety-critical contexts even minor events can be critical as failure can have severe consequences and have therefore some resemblance to crisis and demanding situations. Thus, it was proposed that safety-critical contexts call for an increased amount of active leadership. Moreover, it was explained that safety-critical contexts are characterised through uncertainty about the priority of competing goals (Stride et al., 2013; Zohar, 2010). Safety can stand in direct opposition to other organisational targets such as productivity and cost. Drawing on social learning theory (Bandura, 1977), it was argued that to make sense of the equivocality in safety-critical contexts, subordinates rely more on their leader’s behaviour. In non-safety-critical contexts employees are less frequently faced with contrasting goals, and therefore might not require the same amount of direction and support as workers in safety-critical contexts. Therefore, it was expected that if safety is salient, leaders view transactional and transformational leadership as more effective and on average engage more in these two active leadership behaviours to address the demands of their safety-critical work context. The extent to which leaders engage in transformational and transactional leadership was assessed through mean levels of these two leadership styles. Hence, the following four hypotheses were proposed:

Hypothesis 1: Transactional leadership is perceived as more effective, if salience of safety is high compared to low levels of safety salience in subordinates’ work contexts
(the hypothesis was itemised into hypothesis 1a for hazard exposure, hypothesis 1b for injury likelihood, and hypothesis 1c for safety of others as the safety salience measure).

Hypothesis 2: Transformational leadership is perceived as more effective if salience of safety is high compared to low levels of safety salience in subordinates’ work contexts (the hypothesis was itemised into hypothesis 2a for hazard exposure, hypothesis 2b for injury likelihood, and hypothesis 2c for safety of others as the safety salience measure).

Hypothesis 3: Mean levels of transactional leadership are higher if participants rated the level of safety salience in their subordinates’ work environments as high, compared to low levels of safety salience (the hypothesis was itemised into hypothesis 3a for hazard exposure, hypothesis 3b for injury likelihood, and hypothesis 3c for safety of others as the safety salience measure).

Hypothesis 4: Mean levels of transformational leadership are higher if participants rated the level of safety salience in their subordinates’ work environments as high, compared to low levels of safety salience (the hypothesis was itemised into hypothesis 4a for hazard exposure, hypothesis 4b for injury likelihood, and hypothesis 4c for safety of others as the safety salience measure).

The co-occurrence of transformational and transactional leadership

The present study explored whether the extent to which leaders use transformational and transactional leadership in combination with each other, is dependent on the level of safety salience within their subordinates’ work environment. Research has suggested that different leadership styles are effective for different types of outcomes. Therefore transformational and transactional leadership might be used more or less in conjunction depending on the contextual demands. In the wider organisational literature research has demonstrated that transformational leadership is more strongly associated with contextual performance, whereas transactional leadership is more strongly related to task performance (Wang et al., 2011). Parallel to this finding, safety research has indicated that safety compliance is more strongly affected through transactional leadership, whereas safety participation is more strongly influenced through transformational leadership style (Clarke, 2013; Griffin & Hu, 2013). It was
argued that in safety-critical contexts both compliance with rules and safety participation are pivotal objectives and therefore transactional as well as transformational leadership is needed. Thus, in safety-critical contexts leaders might be more likely to use transformational and transactional leadership styles together, to exert influence with regards to compliance as well as participation. In non-safety-critical contexts, compliance might be a less critical objective and the emphasis might lie more strongly on contextual performance elements. Subsequently, leaders might display transformational leadership, but engage less in transactional leadership. Thus, it was argued that transformational and transactional leadership are used to a lesser extent in conjunction if safety is not salient. It was therefore expected that the co-occurrence of transformational and transactional leadership varies in proportion to the level of safety salience within a work context and the following was hypothesised:

Hypothesis 5: Transformational and transactional leadership are more strongly related to each other if safety salience is rated as high than if salience of safety is rated as low (the hypothesis was itemised into hypothesis 5a for hazard exposure, hypothesis 5b for injury likelihood and hypothesis 5c for impact on safety of others as type of safety salience).

Safety salience as a moderator of the relationship between leadership style and effectiveness criteria

The present research tested whether level of safety salience within a work context moderates the relationship of transformational and transactional leadership to the three investigated outcome variables. Empirical research on the effectiveness of transactional leadership style has produced mixed evidence with some studies reporting a positive effect of transactional leadership on leader outcomes and others reporting a negative or zero influence for the effectiveness of transactional leadership (Judge & Piccolo, 2004). It has been suggested that these diverse findings on the impact of transactional leadership might be due to differences in context. Transactional leadership might be effective and valued in certain work contexts, but irrelevant or even destructive in others (Antonakis et al., 2003). In safety-critical contexts, where there is little margin for error and competing demands create ambiguity, leadership behaviours such as actively monitoring and vigilantly checking for errors and clarifying priorities (i.e., transactional leadership) might be effective. However, in
non-safety critical contexts where prevention of mistakes is not as critical, these behaviours might be ineffective. Thus, it was expected that if safety is salient, transactional leadership is more strongly related to the study’s effectiveness criteria (i.e., team performance, leader self-efficacy, safety incidents), than in non-safety-critical contexts. It has been stressed that leaders in safety-critical contexts need to ensure prevention of failure and equally need to promote learning opportunities from errors and stimulate enthusiasm for safety issues. Thus, it can be proposed that to achieve safety promotion, leaders need to engage in high levels of transformational leadership. Also, it was stated above, that higher leader involvement has been shown to be effective in situations of uncertainty and urgency (Künzle et al., 2010). This denotes that under such critical conditions employees look particularly towards their leaders’ behaviour for support and direction. Based on this notion, it was expected that transformational leadership is more strongly related to outcomes in safety-critical contexts than in non-safety-critical contexts. Therefore the following hypotheses were proposed:

Hypothesis 6: Transformational and transactional leadership are both related to team performance (hypothesis 6a), leader self-efficacy (hypothesis 6b) and safety incidents (hypothesis 6c) whilst controlling for each other.

Hypothesis 7: The relationship between transactional leadership with team performance, leader self-efficacy and safety incidents is stronger if safety salience is rated as high, compared to low safety salience levels (the hypothesis was itemised into hypothesis 7a for hazard exposure, hypothesis 7b for injury likelihood, hypothesis 7c for safety of others as safety salience measure).

Hypothesis 8: The relationship between transformational leadership with team performance, leader self-efficacy and safety incidents is stronger when safety salience is rated as high, compared to low safety salience levels (the hypothesis was itemised into hypothesis 8a for hazard exposure, hypothesis 8b for injury likelihood, hypothesis 8c for safety of others as safety salience measure).
Leader flexibility

The present study investigated whether leader flexibility is effective beyond transformational-transactional leadership and whether safety salience moderates its relationship with the three investigated leadership criteria. It has been pointed out that leaders are likely to use a compound of different leadership behaviours in their day-to-day interactions with subordinates (Rowold, 2011; Yukl & Lepsinger, 2004). This notion can be linked to the criticism that existing leadership research has focused too unilaterally on transformational leadership, without investigation of how leaders switch between different practices. To maximise their influence on performance outcomes, leaders need to match their behaviour to the specific requirements of a situation at hand. Leader flexibility refers to the competency to interpret situational demands and to adjust behaviour accordingly (Yukl & Lepsinger, 2004). It was therefore expected that leader flexibility, as a leader trait, has an influence over and above transformational and transactional leadership behaviour. Moreover, based on the argument presented above, that in safety-critical contexts compliance as well as participation are equally important for performance, it can be suggested that leader flexibility is of particular relevance if safety is salient, as leaders need to adjust their behaviour more frequently to meet both of these performance aspects. In non-safety-critical contexts the emphasis might lie more strongly on contextual performance, so that leaders are less frequently required to adjust their leadership style. Thus, the following hypotheses were proposed:

Hypothesis 9: Leader flexibility is positively related to team performance (hypothesis 9a), leader self-efficacy (hypothesis 9b) and lower safety incident rates (hypothesis 9c) whilst controlling for transformational and transactional leadership style.

Hypothesis 10: The relationship between leader flexibility with team performance, leader self-efficacy and safety-incidents is stronger, if safety is rated as salient than if safety salience levels are rated as low (the hypothesis was itemised into hypothesis 10a for hazard exposure, hypothesis 10b for injury likelihood and hypothesis 10c for impact on safety of others as the safety salience measure).
Figure 7. Schematic representation of study 1 hypotheses 1 to 5.

Figure 8. Schematic representation of study 1 hypotheses 6 to 9.
7.4 Method

To test the hypotheses presented above, a cross-sectional questionnaire study with participants who have leader responsibilities and work in a range of occupational settings, with varying degrees of safety salience, was conducted. The sections below outline the study sample and measurement tools that were used in the study.

7.4.1 Sample

The sample consisted of two sub-groups. The survey was distributed to students and alumni of a Master of Business Administration (MBA) programme at The University of Manchester. The second sub-sample consisted of managers who are members of a UK body for safety professionals. The study aimed to investigate the leadership-performance link from a leader’s perspectives in work contexts with varying levels of safety salience. Thus, it was necessary that all participants had leadership experience and that the sample consisted of leaders who work in safety-critical contexts as well as settings where safety is less salient. To meet these requirements, the safety professional sub-sample was selected in addition to the MBA sub-sample, to ensure that participants who work in safety-critical contexts as well as non-safety-critical contexts are represented in the sample.

798 participants completed the survey (573 MBA sub-sample; 225 safety professional sub-sample). However, 233 participants were eliminated prior to the analysis, as they indicated that they do not have any managerial responsibilities, or only had responsibilities for one subordinate (158 cases in the MBA sub-sample and 75 cases in the safety professional sub-sample).

To further ensure quality of responses, participants’ response times were checked. The online survey platform that was used for the data collection, records how long participants take to complete the survey. On average, participants completed the survey in $M = 28.65$ minutes, $SD = 11.54$ (MBA sub-sample $M = 28.81$, $SD = 11.83$; safety professional sub-sample $M = 28.31$, $SD = 10.92$). In the MBA sub-sample, fourteen participants took less than eleven minutes to complete the questionnaire,
which represents one and a half standard deviations below the mean. As it is unlikely that participants who answered the questions in such short time, sufficiently processed item content and survey instructions, it was decided to exclude their responses from the analysis. The remaining sample consisted of 551 managers (401 MBA students/alumni; 150 safety professionals).

Sample demographics are reported in Table 3 for the complete sample and separately for the two sub-samples. The reported sample demographics are based on 538 participants as an additional thirteen cases were deleted in the preliminary analysis (see section 7.5.1). On average participants had 13.58 years of management experience with the majority occupying a middle or senior management role. Participants were asked to report the industry they worked in, which showed twenty-five different industries within the sample (see Table 4). The three most frequent industries were (1) Construction, (2) IT and Communications and (3) Oil, Gas and Energy. Fourteen industries could be identified as safety-critical, although it is acknowledged that this does not necessarily mean that the participants’ subordinates work in safety-critical environments as part of their routine job.

Table 3. Sample demographics for complete sample and sub-samples

<table>
<thead>
<tr>
<th></th>
<th>Complete Sample (N = 538)</th>
<th>MBA Sample (N = 394)</th>
<th>Safety Professionals Sample (N =144)</th>
</tr>
</thead>
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<tr>
<td></td>
<td>M  SD</td>
<td>M  SD</td>
<td>M  SD</td>
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<td>37.41 6.69</td>
<td>48.69 9.36</td>
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<td>4.14 4.28</td>
<td>7.62 6.72</td>
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<td>8.44 10.44</td>
<td>17.08 9.95</td>
</tr>
<tr>
<td>Number of subordinates</td>
<td>12.96 13.95</td>
<td>10.93 11.92</td>
<td>17.97 9.82</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N Male</td>
<td>447 (83.4%)</td>
<td>314 (79.9%)</td>
<td>133 (93%)</td>
</tr>
<tr>
<td>N Female</td>
<td>89 (16.6%)</td>
<td>79 (20.1%)</td>
<td>10 (7%)</td>
</tr>
<tr>
<td>Leader Seniority</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N Supervisor (%)</td>
<td>109 (20.3%)</td>
<td>91 (23.1%)</td>
<td>18 (12.5%)</td>
</tr>
<tr>
<td>N Middle Manager (%)</td>
<td>231 (42.9%)</td>
<td>173 (43.9%)</td>
<td>58 (40.3%)</td>
</tr>
<tr>
<td>N Senior Manager (%)</td>
<td>198 (36.8%)</td>
<td>130 (33%)</td>
<td>68 (47.2%)</td>
</tr>
</tbody>
</table>

Note. Percentages are valid percentage; one participant did not report their age and job tenure and two participants did not report their gender.
Table 4. Industry frequencies for complete sample

<table>
<thead>
<tr>
<th>Industry Sector</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Potentially safety-critical context</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>71</td>
<td>13.7 %</td>
<td>✓</td>
</tr>
<tr>
<td>IT &amp; Communications</td>
<td>63</td>
<td>12.1 %</td>
<td></td>
</tr>
<tr>
<td>Oil, Gas &amp; Energy</td>
<td>62</td>
<td>11.9 %</td>
<td>✓</td>
</tr>
<tr>
<td>Finance/ Banking</td>
<td>57</td>
<td>11 %</td>
<td></td>
</tr>
<tr>
<td>Professional Services &amp; Consultancy</td>
<td>53</td>
<td>10.2 %</td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td>43</td>
<td>8.3 %</td>
<td>✓</td>
</tr>
<tr>
<td>Health Care</td>
<td>18</td>
<td>3.5 %</td>
<td>✓</td>
</tr>
<tr>
<td>Engineering</td>
<td>17</td>
<td>3.3 %</td>
<td>✓</td>
</tr>
<tr>
<td>Production &amp; Supply Chain</td>
<td>16</td>
<td>3.1 %</td>
<td></td>
</tr>
<tr>
<td>Government &amp; Public Sector</td>
<td>15</td>
<td>2.9 %</td>
<td></td>
</tr>
<tr>
<td>Retail &amp; Sales</td>
<td>14</td>
<td>2.7 %</td>
<td></td>
</tr>
<tr>
<td>Aviation &amp; Aerospace</td>
<td>13</td>
<td>2.5 %</td>
<td>✓</td>
</tr>
<tr>
<td>Education &amp; Research</td>
<td>12</td>
<td>2.3 %</td>
<td></td>
</tr>
<tr>
<td>Logistics</td>
<td>9</td>
<td>1.7 %</td>
<td>✓</td>
</tr>
<tr>
<td>Automobile</td>
<td>9</td>
<td>1.7 %</td>
<td>✓</td>
</tr>
<tr>
<td>Railway &amp; Transportation</td>
<td>7</td>
<td>1.3 %</td>
<td>✓</td>
</tr>
<tr>
<td>Armed Forces &amp; Fire Service</td>
<td>7</td>
<td>1.3 %</td>
<td>✓</td>
</tr>
<tr>
<td>Pharmaceutical</td>
<td>6</td>
<td>1.2 %</td>
<td>✓</td>
</tr>
<tr>
<td>Shipping</td>
<td>6</td>
<td>1.2 %</td>
<td>✓</td>
</tr>
<tr>
<td>Mining</td>
<td>5</td>
<td>1 %</td>
<td>✓</td>
</tr>
<tr>
<td>Media</td>
<td>4</td>
<td>0.8 %</td>
<td></td>
</tr>
<tr>
<td>Chemical</td>
<td>4</td>
<td>0.8 %</td>
<td>✓</td>
</tr>
<tr>
<td>Hospitality</td>
<td>4</td>
<td>0.8 %</td>
<td></td>
</tr>
<tr>
<td>Not for Profit</td>
<td>3</td>
<td>0.6 %</td>
<td></td>
</tr>
<tr>
<td>Textile</td>
<td>1</td>
<td>0.2 %</td>
<td></td>
</tr>
</tbody>
</table>

*Note. N = 538; 19 participants did not report their industry; percentages are valid percentage; ✓Industry categorised as potentially safety-critical for comparison of safety salience means (see Table 9).*

### 7.4.2 Procedure

The study used a cross-sectional, questionnaire-based design. Participants were invited to complete an online survey on ‘management and safety practices’. The procedure of the survey distribution was similar for the MBA and safety professional sub-sample and is outlined below.
For the MBA sub-sample, managers were invited via email between January 2013 and March 2013 to take part in the study. In addition, the link to the survey was posted on the MBA Alumni Group site on the social network Linked-In. Members of the safety professional body were invited to take part in the study through a post on the organisation’s Linked-In site with a link to the survey, in February and March 2013. In the email invitation/Linked-In post, participants were provided with a brief outline of the survey’s purpose and were informed that responses are confidential and anonymous. As an incentive for survey completion, all participants were offered to enter into a prize draw for a hundred-pound Amazon voucher. Two, four and seven weeks after the initial email invitation, a reminder email was sent to the MBA group. For the safety professionals group, a reminder post was issued on the Linked-In website two and four weeks after the initial survey invitation.

7.4.3 Materials

In the following sections the measures used in the study are described. A copy of the questionnaire is displayed in Appendix A.

7.4.3.1 Leadership variables

Transformational and transactional leadership style
Managers self-rated to what extent they engage in transformational and transactional leadership style using the Multifactor Leadership Questionnaire (MLQ version 5x-Short, Avolio & Bass, 1995). A small number of items were modified and three new items were developed as additions to the Management-By-Exception-Active sub-scale as described in the general methodology chapter (see section 6.5.5). A five-point response scale, ranging from one “not at all” to five “frequently, if not always”, accompanied items.

Perceived effectiveness of transformational-transactional leadership
Participants rated to what extent they perceived the behaviours described in the MLQ items to be effective for a manager. Items belonging to the same sub-scale of the MLQ (i.e., Contingent Reward, Management-By-Exception-Active, Idealised Influence -
Behaviour, Idealised Influence - Attributed, Intellectual Stimulation, Individual Consideration, Inspirational Motivation, Management-By-Exception-Passive and Laissez-Faire) were presented grouped together in blocks. Subsequent to each item block, participants were instructed to rate the effectiveness of the described behaviours (“For the job of manager, to what extent do you think the above practices are effective? Rate the effectiveness of the described practices in general, regardless whether you use these or not”). A five-point response format was used, ranging from one “very ineffective” to five “very effective”. A similar assessment of perceived leadership style effectiveness was employed by Ivey and Kline (2010).

Leader flexibility
Participants’ tendency to adapt their leadership behaviour was measured by seven items adapted from Kaiser (2010) and Kaiser, Lindberg and Craig (2007). Example items were “I fit my actions to the situation”, “I can adjust my management style” and “I respond to changes in the situation”. A five-point response format from one ”strongly disagree” to five “strongly agree” was used. The scale’s instructions explained to participants that the statements are to be interpreted with regards to their behaviour as a manager in their work setting.

7.4.3.2 Salience of safety
Three scales were included in the questionnaire to measure different aspects of safety salience: (1) exposure to hazards, (2) injury likelihood, (3) impact on safety of others. Leaders rated to what extent these three different aspects of safety salience are present within their subordinates’ work environments. The term salience of safety is used when referring to all three measures.

Injury likelihood
Participants rated the likelihood of injury for the employees that they manage on three items, which were adapted from Cox and Cheyne (2000; “I am rarely worried about an employee being injured”, “In the type of jobs of the employees that I manage, the chances of being involved in an accident are quite large” and “I am sure it is only a matter of time before an employee is involved in an accident”). The items were accompanied by a five-point response scale ranging from one “strongly disagree” to
five “strongly agree”. The first injury likelihood item was reversed scored, so that high scores represented higher perceived likelihood of injury.

Although some studies have conceptualised perceptions of risk for harm as an aspect of safety climate, research has shown that risk perceptions similar to the injury likelihood items used in the present study, constitute a distinct outcome (Brown & Holmes, 1986; Dedobbeleer & Béland, 1991; Yule et al., 2007) and have been studied as a contextual factor by prior research in safety-critical environments (Rundmo & Sjöberg, 1998).

Hazard exposure
Participants rated the frequency and the level of exposure to hazards on two items, which were adapted from DeJoy et al. (2004; exposure frequency item: “Rate how often the employees that you manage are exposed to potentially hazardous conditions”, hazard-level item: “Rate the level of hazards associated with the type of jobs of the employees you manage”). A five-point response scale was used for both items. Anchor points on the exposure frequency item ranged from one “never” to five “three to four times a week or more” and on the hazard-level item from one “very low hazard-level” to five “very high hazard-level”.

Impact on safety of others
Participants rated to what extent their subordinates’ work impacts on the safety of others on one item (“The work of the employees that I manage is likely to affect the safety of other people”), using a five-point response scale (one “strongly disagree” to five “strongly agree”). The item was adapted from Cox and Cheyne (2000).

7.4.3.3 Outcome criteria

Leader self-efficacy
Leader self-efficacy was assessed using Paglis and Green’s (2002) scale. Participants were asked to rate their level of confidence on eleven items with regards to different aspects of leadership influence such as gaining support from subordinates. A small number of items were modified to improve item clarity and ensure content
applicability for the current sample. Example items are: “I can provide guidance and advice even in ambiguous situations”, “I can gain the genuine support of my employees”, “I can figure out ways for overcoming resistance to change”. Participants were instructed to rate how effective they perceive themselves on a ten-point scale ranging from zero percentage to 100 percentages. Zero percentage represents “not at all confident”, fifty percent reflects “intermediate level of confidence” and 100 percent represents “completely confident”. Paglis and Green (2002) state that this type of percentage-increment response scale has been successfully used in prior research (Bandura & Wood, 1989; Locke, Frederick, Lee, & Bobko, 1984). Moreover, in their scale validation, Paglis and Green (2002) found good reliability, convergent, discriminant and criterion validity for the leader self-efficacy scale. Other research has also shown good measurement properties for the scale (Semadar, Robins, & Ferris, 2006).

In an effort to mitigate self-enhancement of self-efficacy ratings, respondents were presented with a prompt reminding them that the survey is anonymous and that the research values their honest responses, prior to completing the leader self-efficacy items.

**Team performance**

Participants assessed their team’s performance on five items developed by Conger, Kanungo, and Menon (2000). Managers were instructed to rate to what extent the following statements applied to the employees they manage: (1) “accomplish most of their tasks quickly and efficiently”, (2) “have high work performance”, (3) “set a high standard for work accomplishment”, (4) “achieve a high standard for task accomplishment” and (5) “almost always beat their targets”, using a five-point response scale (one “strongly disagree” to five “strongly agree”). Conger et al. (2000) commented that this broad measure focuses on generic team performance rather than on specific task domains. This makes the scale applicable to samples with participants from a variety of work contexts such as the present one. The scale has been used in previous leadership research, showing good psychometric quality (e.g., Cole, Walter, & Bruch, 2008; Nohe, Michaelis, Menges, Zhang, & Sonntag, 2013; Wang & Howell, 2010).
Safety incidents index

Participants were asked to report the number of work-related injury and near miss incidents that had occurred amongst the employees that they are responsible for, during the past twelve months. Using a twelve month period is common practice when assessing accident frequencies (e.g., Probst & Estrada, 2010; Nielsen, Rasmussen, Glassock, & Spangenberg, 2008).

Participants reported safety incident frequencies for six severity categories: (1) near miss incident, (2) first aid injury, (3) medical treatment injury, (4) restricted work injury, (5) lost time injury, (6) fatality. Respondents were shown a description of each incident category (see Table 5) and asked to only list every incident once (e.g., if an incident required medical treatment and resulted in lost time, it was to be reported only in the lost time category and not again in the medical treatment category). To take into account incident severity and number of employees (i.e., participants varied in their number of subordinates), a safety incident index was computed. For each participant, the total number of incidents was weighted for by severity. The response scale points were used for severity weighting:

Weighted safety incident sum = ((number of fatalities x 6) + (number of lost time accidents x 5) + (number of restricted work injuries x 4) + (number of medical treatment injuries x 3) + (number of first aid injuries x 2) + (number of near-miss incidents x 1)) / 6.

This weighted sum incident score, was then divided by the participant’s number of subordinates. The calculation of the safety incident index is shown below. In the following this index is referred to as ‘safety incidents’ variable.

\[
\text{Safety Incident Index} = \frac{\text{Severity weighted sum of incidents}}{\text{Number of subordinates}}
\]

Social desirability is often noted as a potential threat to the accuracy of self-report data. It has been remarked that for self-reported accidents rates this is less applicable, as people would be more likely to under report than to over report accident numbers (Probst & Brubaker, 2001; Probst & Estrada, 2010; Hoffmann & Stetzer, 1996). Thus,

Table 5. Safety incident severity categories

<table>
<thead>
<tr>
<th>Incident Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Near Miss</td>
<td>An incident that did not result in injury, but which in slightly different circumstances could have caused injury.</td>
</tr>
<tr>
<td>First Aid</td>
<td>An incident that resulted in an individual requiring first aid treatment (e.g., non-prescriptive medication, use of bandages, treatment of superficial burns).</td>
</tr>
<tr>
<td>Medical Treatment</td>
<td>An incident that resulted in an individual requiring medical treatment beyond the scope of first aid (e.g., stitches, prescription medication).</td>
</tr>
<tr>
<td>Restricted Work</td>
<td>An incident that resulted in an individual being unable to perform one or more of their routine functions or being temporarily assigned to another job (e.g., “light work”).</td>
</tr>
<tr>
<td>Lost Time</td>
<td>An incident that resulted in an individual being unfit or unable to work for the period of an entire work day/shift or longer.</td>
</tr>
<tr>
<td>Fatality</td>
<td>A fatality that directly resulted from a work-related injury irrespective of the length of time passed between the injury and death.</td>
</tr>
</tbody>
</table>

7.4.4 Analysis overview

Prior to testing the hypotheses, preliminary analyses were carried out. In the section below, an overview of the analysis and the statistical methods that were used to investigate the stated hypotheses is provided.

Preliminary analysis

- Statistical assumptions for the analysis were checked (i.e., normality, outliers and missing data)
- Descriptive statistics were computed for the complete sample and the two sub-samples (i.e., MBA and safety professional sub-sample).
- To test the factor structure of the MLQ and the factorial invariance of the MLQ between the two sub-samples, confirmatory factor analyses were performed.
Hypotheses testing

- Analysis of variance (ANOVA) was performed to assess whether perceived effectiveness ratings of transactional (hypothesis 1) and transformational leadership (hypothesis 2) varied between different levels of safety salience.
- ANOVA was performed to test whether mean levels of transactional (hypothesis 3) and transformational leadership (hypothesis 4) differed across the different safety saliences levels.
- The strength of the correlation between transformational and transactional leadership was compared across different levels of safety salience, to test whether co-occurrence of transformational and transactional leadership is higher in safety-critical contexts (hypothesis 5).
- Latent and manifest interaction modelling was used to test whether transactional and transformational leadership are related to the three outcome criteria (i.e., team performance, leader self-efficacy, safety incidents; hypothesis 6) and whether the relationship is moderated by safety salience (i.e., hazard exposure, injury likelihood, impact on safety of others; hypothesis 7 for transactional leadership and hypothesis 8 for transformational leadership).
- Regression analysis was performed to assess whether leader flexibility had an influence on team performance, leader self-efficacy and safety incidents over and above transformational and transactional leadership (hypothesis 9).
- Latent and manifest interaction modelling was conducted to test whether the relationship between leader flexibility and the three outcome criteria was moderated by safety salience measures (i.e., hazard exposure, injury likelihood, impact on safety others; hypothesis 10).

7.5 Results

In the following section the analysis and results from study 1 are presented. The steps from preliminary analyses are reported in section 7.5.1 and the findings from hypothesis testing are reported in section 7.5.3.
7.5.1 Preliminary analysis

Data screening
Prior to analysis, the minimum and maximum values were checked for plausibility and the data was inspected for missing values, outliers, normality and multicollinearity.

Missing values
As described above participants completed the questionnaire online. Within the online survey, a feature was integrated that did not allow participants to progress with the questionnaire unless all items had been answered. Consequently, none of the study variables had missing values\(^3\).

Testing for normality
To test for univariate normality Q-Q plots were inspected and z-scores for skewness and kurtosis were computed for all study variables. Skewness refers to the symmetry of a distribution. Positive skew indicates that scores are clustered at the lower end of the distribution. Negative skew indicates clustering of scores at the higher end and the distribution and tailing off towards lower scores. Kurtosis relates to the peakedness of a distribution. Negative kurtosis indicates a flat distribution and positive kurtosis indicates a peaked distribution.

Significant departure from normality was found for several variables (see Table 6). Management-by-Exception-Active, effectiveness ratings of Management-by-Exception-Active and of transformational leadership, team performance, team safety performance and leader self-efficacy were significantly negatively skewed. Passive leadership, injury likelihood, hazard exposure and safety incidents were significantly positively skewed.

These deviations from normality are plausible, as for Management-By-Exception-Active as well as for the performance outcome measures negative skewness it can be expected that only few teams have very poor performance levels and that few leaders do not engage in Management-By-Exception-Active at all. For the three safety

\(^3\) For demographics this feature was disenabled, which is why some cases had missing data on gender, age, tenure and industry as reported in the sample description (see section 7.4.1).
salience measures positive skewness is to some extent expected, as fewer people are likely to work in highly safety-critical environments. Similarly, the extreme deviation from normality for safety incident frequencies is plausible as accidents are rare events.

In structural equation modelling one important assumption is that data is multivariate normal. As checking for univariate normality flagged several of the study variables as non-normally distributed, it is likely that the assumption for multivariate normality is not met (univariate normality is a necessary pre-condition for multivariate normality).

One method to reduce the impact of non-normality is to carry out transformations. However, transformed variables can be difficult to interpret and are not necessarily interval scaled (Grayson, 2004). Based on these concerns, it was decided to only transform safety incidents as this variable showed extreme non-normality. Square-root transformation was applied, which is a strategy that has been frequently applied in safety research (Hofmann & Stetzer, 1996; Probst & Brubaker, 2001; Hayes, Perander, Smecko, & Trask, 1998). The transformed variable still showed significant kurtosis and skewness, but the magnitude of the deviation was substantially reduced.

The remaining study variables were not transformed due to the limitations of transformed variables as stated above. MPlus software (version 7.1, Muthén & Muthén, 2010) offers a robust version of maximum likelihood estimation (MLR), which is capable of calculating model fit when normality is violated (Bryne, 2012; Muthén & Muthén, 2010). Therefore, to mitigate bias from non-normality in the data, MLR estimation was used in the analysis conducted with Mplus. Also, using item parcels in structural equation models has been recommended as a technique to deal with departures from normality in small samples (Hall, Snell, & Foust, 1999; Hau & Marsh, 2004). For several of the latent factors, indicator items were grouped into parcels. This is further described in the respective parts of the analysis.
Table 6. Results for testing normality

<table>
<thead>
<tr>
<th>Variable</th>
<th>Skewness z-score</th>
<th>Kurtosis z-score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transformational Leadership</td>
<td>-0.63</td>
<td>-1.62</td>
</tr>
<tr>
<td>Management-By-Exception-Active</td>
<td>-3.14**</td>
<td>-0.96</td>
</tr>
<tr>
<td>Perceived Effectiveness of Transformational Leadership</td>
<td>-7.00***</td>
<td>14.33***</td>
</tr>
<tr>
<td>Perceived Effectiveness Management-By-Exception-Active</td>
<td>-6.91***</td>
<td>9.28***</td>
</tr>
<tr>
<td>Leader Flexibility</td>
<td>1.45</td>
<td>2.20*</td>
</tr>
<tr>
<td>Injury Likelihood</td>
<td>3.45***</td>
<td>-4.09***</td>
</tr>
<tr>
<td>Hazard Exposure</td>
<td>4.27***</td>
<td>-5.95***</td>
</tr>
<tr>
<td>Safety of Others</td>
<td>0.90</td>
<td>-7.24***</td>
</tr>
<tr>
<td>Team Performance</td>
<td>-4.91***</td>
<td>1.48</td>
</tr>
<tr>
<td>Leader Self Efficacy</td>
<td>-3.90***</td>
<td>-0.90</td>
</tr>
<tr>
<td>Safety Incidents</td>
<td>55.00***</td>
<td>245.67***</td>
</tr>
<tr>
<td>Safety Incidents (square-root-transformed)</td>
<td>20.63***</td>
<td>29.67***</td>
</tr>
</tbody>
</table>

*Note. *p < .05, **p < .01, ***p < .001.

Outliers

All study variables were screened for univariate outliers through computation of z-scores. This identified thirteen cases as significant outliers, which were deleted from the sample (seven cases in the MBA sub-sample and six cases in the safety professional sub-sample). This resulted in a final sample size of 538 participants (394 participants in the MBA sub-sample and 144 participants in the safety professional sub-sample).

To check for multivariate outliers Mahalanobis distance was computed. Multivariate outliers are cases that differ in a combination on two or more variable scores from the rest of the data (Tabachnick & Fidell, 2012). Three cases showed significant Mahalanobis distance at p < .001, indicating that these might be multivariate outliers. However, it has been warned that Mahalanobis distance is not entirely reliable in detecting multivariate outliers and conservative probability estimates should be used (Egan & Morgan, 1998; Tabachnick & Fidell, 2012). The three identified cases only just exceeded the critical value for p < .001. Thus, it was decided to remain the cases in the analysis.
Multicollinearity

Transformational leadership, Management-By-Exception-Active, leader flexibility and the three safety salience measures were checked for multicollinearity. Tolerance statistics ranged from .46 (hazard exposure) to .75 (for leader flexibility), which is above the recommended value of .20 (Menard, 1995). Variance Inflation Factors (VIF) ranged from 1.33 to 2.19. Commonly a value of 10 is recommended to identify problems of multicollinearity (Field, 2005). However, Bowerman and O’Connor (1990) suggest that an average VIF value above 1 indicates concern for multicollinearity. The average VIF in the present sample was 1.67. Hence, this more conservative assessment suggests that some multicollinearity might be evident. The possible bias of multicollinearity will be considered in the discussion of the results.

Confirmatory factor analyses

It was outlined in chapter six, that there is a continuing debate regarding the factor structure of the MLQ (e.g., Tejeda et al., 2001; Van Knippenberg & Sitkin, 2013). Thus, prior to hypothesis testing, confirmatory factor analysis (CFA) was conducted to assess the dimensionality of the MLQ. It has also been reported that the dimensionality of the MLQ differs between samples and is less robust in heterogeneous samples (Antonakis et al., 2003). It was also tested whether the MLQ factor structure is invariant between the MBA sub-sample and the safety professional sub-sample. The results from the CFA are reported in detail in Appendix B and results from invariance testing are reported in Appendix C. The section below provides a brief summary of the findings.

Confirmatory factor analysis revealed a factor structure as best fitting where transformational leadership consisted of its original dimensions as well as Contingent Reward. The CFA also showed that Management-By-Exception-Active formed a factor by itself. Thus, transformational leadership consisted of Idealised Influence (Attributed and Behaviour), Intellectual Stimulation, Inspirational Motivation, Idealised Influence and Contingent Rewards. Transactional leadership consisted solely of Management-By-Exception-Active. Therefore, in the following sections the term Management-By-Exception-Active instead of transactional leadership is used when reporting the results from the analysis. In Figure 9, the identified factor structure is schematically displayed. Although, the identified factor structure differed from the
scale authors’ suggested dimensionality, it is consistent with several other empirical investigations of the MLQ dimensionality, which have confirmed the same structure (Heinitz et al., 2005; Hinkin & Schriesheim, 2008).

The identified MLQ factor structure was tested for invariance between the MBA sub-sample and the safety professional sample. Overall, results indicated that factor variances and covariances were considered equal between the two sub-samples. Thus, the analysis suggested that the MLQ operates equivalently across the MBA and safety professional sample.

In addition the measurement model for leader flexibility, team performance and leader self-efficacy were examined prior to hypotheses testing (see Appendix D).

Figure 9. Transformational-transactional leadership factor structure in study 1.
7.5.2 Descriptive statistics

Correlations between the study variables, means, standard deviations and scale reliabilities are displayed in Table 7.

For leader flexibility an initial reliability analysis indicated poor internal consistency (\(\alpha = .60\)) and identified the reverse-scored item “I am set in my ways” as problematic. Confirmatory factor analysis showed that the item had a weak, positive factor loading (.05). All other items showed significant factor loadings above .58. Thus, it was decided to exclude the item from the scale. The internal consistency for this revised six-item scale was \(\alpha = .76\), indicating good reliability. All results reported in the analysis were derived with the reduced six-item leader flexibility scale.

All other scales showed good internal consistency, exceeding a value of .70, which is widely accepted as the recommended minimum value for good reliability.

As expected, transformational leadership and Management-By-Exception-Active were positively correlated with each other. Leader flexibility was significantly, positively related to transformational leadership and Management-By-Exception-Active.

Transformational leadership, Management-By-Exception-Active and leader flexibility were positively correlated with team performance and leader self-efficacy. The magnitude of the relationships were larger for transformational leadership than for Management-By-Exception-Active. None of the leadership variables (i.e., transformational leadership, Management-By-Exception-Active, leader flexibility) were significantly correlated with safety incidents.

The safety incident index was significantly, positively correlated with injury likelihood, hazard exposure and impact on safety of others. This indicated that the number of safety incidents was likely to be higher, if safety was salient in subordinates’ work context.
Table 7. Inter-correlations, means, standard deviations and reliability for study variables

<table>
<thead>
<tr>
<th></th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
<th>6.</th>
<th>7.</th>
<th>8.</th>
<th>9.</th>
<th>10.</th>
<th>Mean</th>
<th>SD</th>
<th>α</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Transformational Leadership</td>
<td></td>
<td></td>
<td></td>
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<td>4.13</td>
<td>.41</td>
<td>.90</td>
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<tr>
<td>2. MBEA</td>
<td>.51***</td>
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<tr>
<td>3. Leader Flexibility</td>
<td>.47***</td>
<td>.41***</td>
<td></td>
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</tr>
<tr>
<td>4. TF Perceived Effectiveness</td>
<td>.46***</td>
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<td>.21***</td>
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<td>.48</td>
<td>.76</td>
</tr>
<tr>
<td>5. MBEA Perceived Effectiveness</td>
<td>.24***</td>
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<td>.18***</td>
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</tr>
<tr>
<td>6. Hazard Exposure</td>
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<td>.04</td>
<td>.13***</td>
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<td></td>
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<td>.84</td>
</tr>
<tr>
<td>7. Injury Likelihood</td>
<td>.19***</td>
<td>.18***</td>
<td>.09*</td>
<td>.01</td>
<td>.08</td>
<td>.66***</td>
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<td></td>
<td></td>
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<td>2.27</td>
<td>1.01</td>
<td>.70</td>
</tr>
<tr>
<td>8. Safety of Others</td>
<td>.14**</td>
<td>.11**</td>
<td>.03</td>
<td>.06</td>
<td>.06</td>
<td>.58***</td>
<td>.52***</td>
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<td></td>
<td></td>
<td>2.78</td>
<td>1.52</td>
<td>-</td>
</tr>
<tr>
<td>9. Team Performance</td>
<td>.28***</td>
<td>.17***</td>
<td>.22***</td>
<td>.21***</td>
<td>.06</td>
<td>.04</td>
<td>-.05</td>
<td>-.03</td>
<td></td>
<td></td>
<td>3.65</td>
<td>.65</td>
<td>.84</td>
</tr>
<tr>
<td>10. Leader Self Efficacy</td>
<td>.47***</td>
<td>.37***</td>
<td>.32***</td>
<td>.26***</td>
<td>.15***</td>
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<td>.35***</td>
<td></td>
<td>9.02</td>
<td>1.06</td>
<td>.90</td>
</tr>
<tr>
<td>11. Safety Incidents</td>
<td>.04</td>
<td>.07</td>
<td>.04</td>
<td>-.04</td>
<td>-.02</td>
<td>.41***</td>
<td>.41***</td>
<td>.32***</td>
<td>-.07†</td>
<td>-.003</td>
<td>.68</td>
<td>1.01</td>
<td>-</td>
</tr>
</tbody>
</table>

Note. †p < .10, *p < .05, **p < .01, ***p < .001; MBEA = Management-By-Exception-Active, SD = standard deviation; α = Cronbach alpha reliability coefficient.
Levels of safety salience and safety incident occurrence

For an overview of the frequency of safety incidents and the level of safety salience within the study’s sample, some further descriptive analysis was performed.

The mean number of safety incidents for each severity category is shown in Table 8 for the complete sample and two sub-samples. Near miss incidents were most frequently reported with participants reporting on average that 3.25 near miss incidents took place amongst their subordinates during the past twelve months. The mean number of accidents was substantially higher in the safety professional sub-sample compared to the MBA sub-sample (apart from fatalities). This is to be expected as safety professionals reported significantly higher likelihood of injury and exposure to hazards compared to the MBA sub-sample (see Table 8). In Figure 10, the proportion of participants who reported at least one safety incident during the past twelve months is displayed for the different severity categories. Overall, the occurrence of safety incidents was relatively rare. Only 36% of participants reported at least one near miss incident and 33% reported at least one first aid accident. Frequencies were substantially higher in the safety professional sub-sample, compared to the MBA sub-sample. Again this is to be expected as, the participants in the safety professional sample are more likely to be responsible for employees who work in safety-critical job roles.

The level of safety salience was compared by industry as a ‘quasi-manipulation check’ for the measures of safety salience. As reported in Table 4 (p. 129), within the sample twenty-five different industries were reported. These were categorised into two types: potentially safety-critical industry and potentially non-safety-critical industry. For example, participants who reported themselves to work in construction were classified into the potentially safety-critical industry group and participants who reported themselves to work in finance/banking were classified into the potentially non-safety-critical industry group. The qualifier ‘potentially’ is used, as it is reasonable to assume that an individual who works in construction is more likely to be responsible for subordinates who work in hazardous contexts, than someone who works in banking, but this assumption is not certain. In Table 4 (p. 129), it was shown which industries were categorised as potentially safety-critical ones. To examine mean differences in the reported level of safety salience (i.e., injury likelihood, hazard exposure, safety of
others) between the safety-critical industry group and non-safety-critical industry group, t-tests were performed. Results from the t-tests showed that for all three measures of safety salience, mean values were significantly higher for the safety-critical industry group than for participants in the non-safety-critical industry group (see Table 9). This convergence between mean level of injury likelihood, hazard exposure and safety of others and categorisation of industry, indicated that the three measures adequately captured the degree of safety salience in participants’ work environment and were correctly interpreted by participants.

Table 8. Mean number of safety incidents in the past twelve months

<table>
<thead>
<tr>
<th>Incident Severity Type</th>
<th>Complete Sample Mean</th>
<th>SD</th>
<th>MBA Sub-Sample Mean</th>
<th>SD</th>
<th>Safety Professional Sub-Sample Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Near Miss Incident</td>
<td>3.25</td>
<td>7.91</td>
<td>1.48</td>
<td>4.92</td>
<td>8.18</td>
<td>11.68</td>
</tr>
<tr>
<td>First Aid</td>
<td>1.6</td>
<td>4.76</td>
<td>.65</td>
<td>1.84</td>
<td>4.38</td>
<td>8.12</td>
</tr>
<tr>
<td>Medical Treatment</td>
<td>.64</td>
<td>1.91</td>
<td>.39</td>
<td>1.36</td>
<td>1.35</td>
<td>2.81</td>
</tr>
<tr>
<td>Restricted Work</td>
<td>.39</td>
<td>1.4</td>
<td>.25</td>
<td>1.26</td>
<td>.78</td>
<td>1.69</td>
</tr>
<tr>
<td>Lost Time</td>
<td>.58</td>
<td>1.68</td>
<td>.41</td>
<td>1.42</td>
<td>1.05</td>
<td>2.18</td>
</tr>
<tr>
<td>Fatality</td>
<td>.02</td>
<td>.17</td>
<td>.03</td>
<td>.19</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*Note. For complete sample N = 538; for MBA sample N = 394; for safety professional sample N = 144.*
Figure 10. Frequencies of safety incidents.

Frequencies refer to number of participants who reported at least one incident in the respective category.
Table 9. Injury likelihood, hazard exposure and safety of others mean comparison by industry type

<table>
<thead>
<tr>
<th>Safety Salience Measure</th>
<th>Injury Likelihood</th>
<th>Hazard Exposure</th>
<th>Safety of Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry Type</td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Non-Safety-Critical</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>industries (N = 242)</td>
<td>1.90</td>
<td>0.89</td>
<td>1.83</td>
</tr>
<tr>
<td>Safety-Critical</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industries (N = 277)</td>
<td>2.57</td>
<td>1.00</td>
<td>2.90</td>
</tr>
<tr>
<td>t-value</td>
<td>-8.14***</td>
<td></td>
<td>-9.75***</td>
</tr>
</tbody>
</table>

Note. ***p < .001, categorisation of safety-critical/non-safety-critical industries is shown in Table 4.

7.5.3 Hypotheses testing

Perceived effectiveness of leadership styles by safety salience (hypotheses 1 and 2)

It was proposed that participants are more likely to perceive transactional (hypothesis 1) and transformational leadership (hypothesis 2) as effective, if safety is salient in their subordinates’ work environment as opposed to non-safety-critical environments. To test this hypothesis, participants’ perceived effectiveness ratings of transformational leadership and Management-By-Exception-Active were compared across different safety salience levels using analysis of variance (ANOVA). For the purpose of this comparison, the three safety salience measures (i.e., injury likelihood, hazard exposure and safety to others) were collapsed into categorical variables with cut points at the mean, one standard deviation below and one standard deviation above the mean. Thus, four groups were created for each safety salience variable (group 1 = very low safety salience, group 2 = low safety salience, group 3 = high safety salience, group 4 = very high safety salience). Inspection of the mean values showed that for perceived effectiveness of Management-By-Exception-Active, mean values were highest in the very high safety salience group for all three measures (see Table 10). For transformational leadership, effectiveness ratings also tended to be higher in the high safety salience groups, but the differences compared to the lower safety salience
groups were smaller compared to the effectiveness ratings of Management-By-Exception-Active.

Results from ANOVA showed that for perceived effectiveness of Management-By-Exception-Active, significant mean differences were found across hazard exposure and safety of others groups, but not for injury likelihood. Post-hoc tests revealed a significant difference between the very high hazard exposure and low hazard exposure group (Games-Howell $p = .002^4$), with the mean effectiveness ratings of Management-By-Exception-Active being higher in the very high hazard exposure group.

Comparison of the safety of others groups showed a significant difference between the very high and high group compared to the low level group (comparison between very high and low impact on safety of others groups: Gabriel $p = .001$, Hochberg $p = .001$; comparison between high and low impact on safety of others group: Gabriel $p = .05$, Hochberg $p = .06$). Based on these findings it can be stated that hypothesis 1a (hazard exposure) and hypothesis 1c (safety of others) were partially supported. Hypothesis 1b was not supported, as no significant difference in mean effectiveness ratings of Management-By-Exception was found across the injury likelihood groups (although the results were in the same direction as for hazard exposure and safety of others).

Overall, the trend of the results indicated that leaders, whose subordinates work in safety-critical contexts, perceived Management-By-Exception-Active as more effective, although mean differences were small, An unexpected finding was that perceived effectiveness of Management-By-Exception-Active was higher in the ‘very low’ impact on safety of others group compared to the ‘low’ impact on safety of others group. Thus, this result was in the opposite direction to what was hypothesised.

---

4 For the ANOVA comparing perceived effectiveness of Management-By-Exception-Active, Levene’s $F$ test was significant. This indicates that variances differed across the four hazard exposure groups. Therefore, Games-Howell post-hoc test is reported which is appropriate if variances are not equal. Stevens (1992) suggests that an ANOVA can be considered robust against differences in variance the largest standard deviation divided by the smallest standard deviation should not be greater than 1.5. The quotient in the present ANOVA was 1.2, which is below Steven’s (1992) recommended value. Also, Brown-Forsythe $F$ and Welch $F$ were requested, which are alternatives versions of the $F$-ratio when homogeneity of variance has been violated. Results show that Welch-$F$ (4.36 (3), $p < .01$) and Brown-Forsythe $F$ (4.17 (3), $p < .01$) were both significant.
For transformational leadership, mean effectiveness ratings were of similar magnitude across the four groups of the respective safety salience measure. ANOVA indicated a significant mean difference only for safety of others, but not across the hazard exposure and injury likelihood groups. Post-hoc tests showed a significant difference between the very high and the low impact on safety of others group, with the former showing higher mean effectiveness ratings for transformational leadership (Gabriel p = .04; Hochberg p = .06). Moreover, a significant mean difference at p = .07 was found between the low and high impact on safety of others group (Gabriel p = .07; Hochberg p = .07), which was also in the expected direction.

Thus, partial support was found for hypothesis 2c (impact on safety of others), but not for hypothesis 2a (hazard exposure) and hypothesis 2b (injury likelihood). The findings indicated that transformational leadership was perceived as comparably effective in low hazard exposure/injury likelihood as well as high hazard exposure/injury likelihood conditions. If the work of participants’ subordinates had a very high impact on the safety of others, participants rated transformational leadership as more effective than if the impact on safety of others was low.

The findings also indicated larger standard deviations for the effectiveness ratings of Management-By-Exception-Active compared to the effectiveness ratings of transformational leadership across all safety salience groups. This suggests that overall there might be more variability in how effective Management-By-Exception-Active is perceived, which is in line with the study’s propositions.
Table 10. Results from ANOVA and means for perceived effectiveness of transformational leadership and Management-By-Exception-Active by safety salience

<table>
<thead>
<tr>
<th>Safety Salience Measure</th>
<th>Hazard Exposure</th>
<th>Safety Salience Group</th>
<th>Injury Likelihood</th>
<th>Safety Others</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very low M</td>
<td>SD</td>
<td>Low M</td>
<td>High M</td>
</tr>
<tr>
<td>Perceived Effectiveness</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>MBEA</td>
<td></td>
<td></td>
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<tr>
<td>F (p)</td>
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<tr>
<td>Eta</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Levene’s F</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Perceived Effectiveness</td>
<td></td>
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</tr>
<tr>
<td>TF</td>
<td></td>
<td></td>
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<tr>
<td>F (p)</td>
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<td></td>
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<td></td>
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<tr>
<td>Eta</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Levene’s F</td>
<td></td>
<td></td>
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<tr>
<td>Note. Total N = 538, TF = transformational leadership, MBEA = Management-By-Exception-Active, degrees of freedom in ANOVA = 3, **p &lt; .01, Hazard Exposure: N very low = 168, N low = 126, N high = 104, N very high =140; Injury Likelihood: N very low = 102, N low = 163, N high = 150, N very high =123; Safety Others: N very low = 173, N low = 82, N high = 195, N very high = 88.</td>
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</tbody>
</table>
**Mean levels of transformational leadership and Management-By-Exception-Active by safety salience (hypotheses 3 and 4)**

It was hypothesised that mean levels of transactional (hypothesis 3) and transformational leadership (hypothesis 4) are higher if safety salience is rated as high compared to low levels of safety salience. Inter-correlations (see Table 7) showed that both transformational leadership and Management-By-Exception-Active were positively related to the three safety salience measures. The finding suggested that in safety-critical contexts, leaders are more likely to engage in transformational leadership and Management-By-Exception-Active. To further assess whether transformational leadership and Management-By-Exception-Active differ in dependence on the level of safety salience a series of ANOVAs were conducted.

Mean levels of transformational leadership and Management-By-Exception-Active were compared across the four safety salience groups for each respective measure of safety salience. The three safety salience measures were grouped into categorical variables as described above (group 1: very low safety salience to group 4: very high-safety salience). The groups’ mean values and results from the ANOVAs are displayed in Table 11.

In support of hypothesis 3, significant differences in the mean of Management-By-Exception-Active were found between the different levels of safety salience for each of the safety salience measures (i.e., hazard exposure, injury likelihood, impact on safety of others). For transformational leadership significant mean differences were found across the different levels of hazard exposure and across the levels of impact on safety of others, but not for injury likelihood as the safety salience measure. Thus, these findings were in support of hypothesis 4a (hazard exposure) and hypothesis 4c (impact on safety of others), but not for hypothesis 4b (injury likelihood).

For Management-By-Exception-Active inspection of the mean values showed the trend that leaders in higher safety salience groups tended to report higher levels of Management-By-Exception-Active. For hazard exposure as the safety salience measure, post-hoc tests showed that the mean value for Management-By-Exception-Active was significantly higher in the very high hazard exposure group compared to the other three, lower levels of hazard exposure (p < .001 for the three significant group
comparisons, Gabriel and Hochberg yielded the same result). Thus, this finding lent support for hypothesis 3a, indicating that on average leaders engage more in Management-By-Exception-Active if hazard exposure is very high compared to low hazard exposure settings.

For injury likelihood, post-hoc tests showed significant mean differences between the very high injury likelihood and very low injury likelihood group (p = .008 for Gabriel and Hochberg) and between the low and very high injury likelihood group (p = .001 for Gabriel and Hochberg). Thus, these results were in line with hypothesis 3b, although mean differences were not significant between all four levels of injury likelihood.

For safety of others, post-hoc tests showed a significant mean difference in Management-By-Exception-Active between the low and very high impact on safety of others group (p = .007 for Gabriel and Hochberg) and between the low and high impact on safety of others group (p = .02 for Gabriel and Hochberg). Thus, these results were in accordance with hypothesis 3c. Overall, mean levels of Management-By-Exception-Active were highest in higher safety salience groups for all three measures.

For transformational leadership, inspection of mean values across the different levels of safety salience also showed the pattern that mean levels of transformational leadership tended to be higher, if safety salience was rated as high.

For hazard exposure as the safety salience measure, post-hoc tests showed significant mean differences between the very low and very high as well as between the low and very high groups respectively (p = .001 for Gabriel and Hochberg). Thus, this finding lent support for hypothesis 4b, indicating that leaders tended to adopt transformational leadership practices more frequently if they rated their subordinates’ hazard exposure as high.

For safety of others, post-hoc tests yielded significant mean differences in transformational leadership between the very low and very high group (p = .02 for Gabriel and Hochberg) and between the low and very high impact on safety of others group (p = .001 for Gabriel and Hochberg). These findings were in accordance with hypothesis 4c, suggesting that leaders more frequently employed transformational leadership, if the work of their subordinates has a high impact on safety of others.
Overall, the comparison of mean levels of transformational leadership and Management-By-Exception-Active across different levels of safety salience indicated that on average leaders in safety-critical contexts tended to engage in both leadership styles more frequently than leaders in non-safety-critical contexts.

Co-occurrence of Management-By-Exception-Active and transformational by safety salience (hypothesis 5)

It was proposed that leaders in safety-critical contexts are more likely to use transformational and transactional leadership in conjunction to address the multiple contextual demands. As an indicator of the co-occurrence, i.e., the extent to which leaders use both styles, the correlation between transformational leadership and Management-By-Exception-Active was compared across different safety salience levels. Thus, hypothesis 5 stated that transformational leadership and Management-By-Exception-Active are more strongly correlated if safety salience is high compared to low levels of safety salience.

Hazard exposure, injury likelihood and impact on safety of others were collapsed into categorical variables using the same procedure as outlined above. Separate correlation coefficients between transformational leadership and Management-By-Exception-Active were computed for the four groups within each of the three safety salience measures (see Table 12).

Across hazard exposure, injury likelihood and impact on safety of others, transformational leadership and Management-By-Exception-Active showed the strongest relationship in the highest safety salience group. The largest difference between the correlation coefficients was found when participants were categorised by the perceived likelihood of injury.
Using z-transformations and taking group sample sizes into account, it was tested whether the strength of the correlation coefficients differed significantly between the safety salience groups (Cohen & Cohen, 1983). Results are displayed in Table 12.

Table 11. Results from ANOVA and means for transformational leadership and Management-By-Exception-Active by safety salience

<table>
<thead>
<tr>
<th>Safety Salience Measure</th>
<th>Very low</th>
<th>Safety Salience Group Low</th>
<th>Safety Salience Group High</th>
<th>Safety Salience Group Very high</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Hazard Exposure</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>MBEA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F (p)</td>
<td>3.95</td>
<td>.54</td>
<td>3.84</td>
<td>.53</td>
</tr>
<tr>
<td>Eta</td>
<td>20.10</td>
<td>(.001)</td>
<td>20.10</td>
<td>(.001)</td>
</tr>
<tr>
<td>Levene’s F</td>
<td>.22</td>
<td></td>
<td>.22</td>
<td></td>
</tr>
<tr>
<td>TF</td>
<td>4.08</td>
<td>.41</td>
<td>4.05</td>
<td>.41</td>
</tr>
<tr>
<td>F (p)</td>
<td>8.34</td>
<td>(.001)</td>
<td>8.34</td>
<td>(.001)</td>
</tr>
<tr>
<td>Eta</td>
<td>.05</td>
<td></td>
<td>.31</td>
<td></td>
</tr>
<tr>
<td>Levene’s F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injury Likelihood</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MBEA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F (p)</td>
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<td>.57</td>
<td>3.95</td>
<td>.57</td>
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<tr>
<td>Eta</td>
<td>5.67</td>
<td>(.001)</td>
<td>5.67</td>
<td>(.001)</td>
</tr>
<tr>
<td>Levene’s F</td>
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<td></td>
<td>.19</td>
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<tr>
<td>TF</td>
<td>4.11</td>
<td>.37</td>
<td>4.12</td>
<td>.43</td>
</tr>
<tr>
<td>F (p)</td>
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<td>(.18)</td>
<td>1.28</td>
<td>(.18)</td>
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<tr>
<td>Eta</td>
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<td>.01</td>
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</tr>
<tr>
<td>Levene’s F</td>
<td>.85</td>
<td></td>
<td>.85</td>
<td></td>
</tr>
<tr>
<td>Safety Others</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MBEA</td>
<td>4.02</td>
<td>.54</td>
<td>3.86</td>
<td>.57</td>
</tr>
<tr>
<td>F (p)</td>
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<td>(.007)</td>
<td>4.06</td>
<td>(.007)</td>
</tr>
<tr>
<td>Eta</td>
<td>.32</td>
<td></td>
<td>.32</td>
<td></td>
</tr>
<tr>
<td>Levene’s F</td>
<td>4.11</td>
<td>.40</td>
<td>4.01</td>
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</tr>
<tr>
<td>TF</td>
<td>4.11</td>
<td>.40</td>
<td>4.01</td>
<td>.39</td>
</tr>
<tr>
<td>F (p)</td>
<td>6.05</td>
<td>(.001)</td>
<td>6.05</td>
<td>(.001)</td>
</tr>
<tr>
<td>Eta</td>
<td>.03</td>
<td></td>
<td>.03</td>
<td></td>
</tr>
<tr>
<td>Levene’s F</td>
<td>.72</td>
<td></td>
<td>.72</td>
<td></td>
</tr>
</tbody>
</table>

*Note. Total N = 538; M = group mean value, SD = standard deviation; TF = transformational leadership; MBEA = Management-By-Exception-Active; degrees of freedom in ANOVA = 3; Hazard Exposure: N very low = 168, N low = 126, N high = 104, N very high = 140; Injury Likelihood: N very low = 102, N low = 163, N high = 150, N very high = 123; Safety Others: N very low = 173, N low = 82, N high = 195, N very high = 88.*
For hazard exposure, the strength of the correlation between the very high hazard exposure and low hazard exposure group differed significantly. For the other hazard exposure groups results showed the same trend (i.e., stronger correlation in the higher safety salience groups), but coefficients were not significantly different. Thus, in line with hypothesis 5a, transformational leadership and Management-By-Exception-Active were more strongly correlated if hazard exposure was high, although not all groups differed significantly, so that only partial support was evident.

For injury likelihood, the correlation between Management-By-Exception-Active and transformational leadership was significantly greater in the very high group compared to all other levels of injury likelihood. However, there were no significant differences in the strength of correlation between the very low, low and high group, although results were in the expected direction. This indicated partial support for hypothesis 5b. For safety of others, significant differences in the strength of correlation were significantly lower in the very low group compared to the low, high and very high impact on safety of others groups. Thus, hypothesis 5c was partially supported.

Overall, the trend emerged that transformational leadership and Management-By-Exception-Active showed higher co-occurrence under conditions where safety is highly salient compared to lower levels of safety salience, but differences were not significant between all groups.
<table>
<thead>
<tr>
<th>Safety Salience Measure</th>
<th>Group 1 Very low</th>
<th>Group 2 Low</th>
<th>Group 3 High</th>
<th>Group 4 Very high</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation r between TF and MBEA</td>
<td>.43***</td>
<td>.40***</td>
<td>.55***</td>
<td>.56***</td>
</tr>
<tr>
<td><strong>p-value for Difference Between Groups’ Correlation Coefficients</strong></td>
<td>p = .76</td>
<td>p = .10</td>
<td>p = .06</td>
<td>p = .10</td>
</tr>
<tr>
<td>Group 2</td>
<td>.07</td>
<td>p = .05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 3</td>
<td></td>
<td>p = .46</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Injury Likelihood</strong></td>
<td>.36***</td>
<td>.46***</td>
<td>.51***</td>
<td>.67***</td>
</tr>
<tr>
<td><strong>p-value for Difference Between Groups’ Correlation Coefficients</strong></td>
<td>p = .17</td>
<td>p = .08</td>
<td>p = .001</td>
<td></td>
</tr>
<tr>
<td>Group 2</td>
<td>p = .28</td>
<td>p = .004</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 3</td>
<td></td>
<td>p = .02</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Safety Others</strong></td>
<td>.33***</td>
<td>.54***</td>
<td>.57***</td>
<td>.65***</td>
</tr>
<tr>
<td><strong>p-value for Difference Between Groups’ Correlation Coefficients</strong></td>
<td>p = .03</td>
<td>p = .002</td>
<td>p = .001</td>
<td></td>
</tr>
<tr>
<td>Group 2</td>
<td>p = .37</td>
<td>p = .14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 3</td>
<td></td>
<td>p = .16</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. Total N = 538, TF = Transformational Leadership, MBEA = Management-By-Exception-Active, p-value for difference between groups’ correlation coefficients = indicates whether the correlation coefficients between the respective two groups under comparison are significantly different based on Fisher z, ***p < .001, Hazard Exposure: N very low = 168, N low = 126, N high = 104, N very high = 140; Injury Likelihood: N very low = 102, N low = 163, N high = 150, N very high = 123; Safety Others: N very = 173, N low = 82, N high = 195, N very high = 88.*

*Salience of safety measures as latent moderators*

It was hypothesised that both transformational and transactional leadership are related to team performance, leader self-efficacy and safety incidents (hypothesis 6) and that their relationship with these three effectiveness criteria is stronger if salience of safety is high (hypothesis 7 for transactional leadership and hypothesis 8 for transformational leadership). Thus, in the analysis it was expected that transformational leadership and
Management-By-Exception-Active are more strongly associated with team performance, self-efficacy and lower safety incidents if injury likelihood/hazard exposure/ safety of others are rated as high.

To test this hypothesis, a series of latent interaction models were conducted. The three safety salience measures were tested as moderators of the relationship between leadership style (i.e., transformational leadership, Management-By-Exception-Active) and outcome variables. For the present purpose the terms moderation and interaction are used interchangeably (Marsh, Wen, & Hau, 2006). To test latent moderation effects, the interaction term between the independent variable and moderator is based on latent constructs and hence inferred from multiple indicators. This has the advantage that measurement error is taken into account, reducing bias in parameter estimation (Dimitruk, Schermelleh-Engel, Kelava, & Moosbrugger, 2007; Klein & Moosbrugger, 2000; Marsh et al., 2006).

Each safety salience measure (i.e., injury likelihood, hazard exposure, safety of others) was tested separately as a potential moderator of the transformational leadership-outcome link and the link between Management-By-Exception-Active and outcome variables. That is, for each of the study’s three outcome measures (i.e., (1) team performance, (2) leader self-efficacy, (3) safety incidents), six models were run (three models for interactions with transformational leadership and three models for interactions with Management-By-Exception-Active). In all models the main effects for both transformational leadership and Management-By-Exception-Active as well as the main effect for respective moderator variable were included. A schematic representation of the moderation models tested is presented in Figure 11. The interaction effects were not tested simultaneously, as including multiple latent interaction terms in a model tends to increase multicollinearity (Kelava, Moosbrugger, Dimitruk, & Schermelleh-Engel, 2008). For transformational leadership and Management-By-Exception-Active, the factor structure that was identified in the confirmatory factor analysis of the MLQ was specified.
Mplus 7.1 does not provide chi-square values, incremental fit indices or standardised parameter estimates for models with latent interactions (Muthén & Muthén, 2010). Instead, the chi-square difference based on log-likelihood values and scaling correction factors was used to examine whether adding the latent interaction term improved model fit (Dimitruk et al., 2007; Muthen & Muthen, 2010). This chi-square difference test was computed using the respective formulas provided by Muthén and Muthén (2010). Models that included the latent interaction term, were compared to a nested model without the interaction term. To obtain more interpretable estimates and avoid non-convergence problems, latent factor variances were constrained to one and latent factor means were constrained to zero (Mplus product support, email communication, August 2013).

The results from the latent interaction models are summarised in Table 13 for hazard exposure as the moderator, in Table 14 for injury likelihood as the moderator, and in Table 15 for safety of others as the moderator. For each model the unstandardised parameter estimates for the main effects of transformational leadership, Management-By-Exception-Active, the respective moderator and interaction term are displayed.
The log-likelihood based chi-square difference value refers to the comparison between the model with, and the model without the interaction term. A significant difference indicates that inclusion of the interaction term significantly improved model fit.

*Main effects (hypothesis 6)*

Before reporting the result for the interaction terms, the main effects are briefly addressed. Hypothesis 6 stated that both transformational and transactional leadership are related to the outcome variables. In the moderation models (Table 13, Table 14, and Table 15) transformational leadership consistently showed a significant path with team performance and leader self-efficacy, but was unrelated to safety incidents. Management-By-Exception-Active showed a significant path with leader self-efficacy, but not with team performance and safety incidents. Moreover, the strength of the relationship between Management-By-Exception-Active and leader self-efficacy was lower compared to transformational leadership. These findings indicated that Management-By-Exception-Active augments transformational leadership with regards to leader self-efficacy, but not with regards to team performance. Thus, the results lent support for hypothesis 6b, but hypothesis 6a and hypothesis 6c were not supported as only transformational leadership was significantly related to team performance (6a) and neither transformational nor transactional leadership were related to safety incidents (6c).
Table 13. Estimates for latent interaction effects between MBEA, transformational leadership with hazard exposure (hypotheses 7a and 8a)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>SE</td>
<td>p</td>
</tr>
<tr>
<td><strong>Model 1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transformational</td>
<td>.36</td>
<td>.08</td>
<td>.001</td>
</tr>
<tr>
<td>MBEA</td>
<td>-.01</td>
<td>.07</td>
<td>.98</td>
</tr>
<tr>
<td>Hazard Exposure</td>
<td>-.03</td>
<td>.06</td>
<td>.59</td>
</tr>
<tr>
<td>Hazard Exposure x TF</td>
<td>-.07</td>
<td>.07</td>
<td>.35</td>
</tr>
<tr>
<td>∆χ²_{LL}</td>
<td>1.10 (p = .29)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Model 2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transformational</td>
<td>.36</td>
<td>.07</td>
<td>.001</td>
</tr>
<tr>
<td>MBEA</td>
<td>-.01</td>
<td>.08</td>
<td>.92</td>
</tr>
<tr>
<td>Hazard Exposure</td>
<td>-.04</td>
<td>.06</td>
<td>.44</td>
</tr>
<tr>
<td>Hazard Exposure x MBEA</td>
<td>.01</td>
<td>.07</td>
<td>.93</td>
</tr>
<tr>
<td>∆χ²_{LL}</td>
<td>.01 (p = .92)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. TF = Transformational Leadership, MBEA = Management-By-Exception-Active; ∆χ²_{LL} log-likelihood based chi-square difference test (compares model fit between model with and model without interaction term for significance).*
Table 14. Estimates for latent interaction effects between MBEA, transformational leadership with injury likelihood (hypotheses 7b and 8b)

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Team Performance</th>
<th></th>
<th></th>
<th></th>
<th>Leader Self-Efficacy</th>
<th></th>
<th></th>
<th></th>
<th>Safety Incidents</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>SE</td>
<td>p</td>
<td>B</td>
<td>SE</td>
<td>p</td>
<td>B</td>
<td>SE</td>
<td>p</td>
<td>B</td>
<td>SE</td>
</tr>
<tr>
<td><strong>Model 1</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transformational</td>
<td>.37</td>
<td>.08</td>
<td>.001</td>
<td>.62</td>
<td>.09</td>
<td>.001</td>
<td>.01</td>
<td>.07</td>
<td>.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MBEA</td>
<td>.01</td>
<td>.07</td>
<td>.86</td>
<td>.14</td>
<td>.07</td>
<td>.05</td>
<td>-.02</td>
<td>.07</td>
<td>.81</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injury Likelihood</td>
<td>-.08</td>
<td>.05</td>
<td>.14</td>
<td>-.01</td>
<td>.06</td>
<td>.85</td>
<td>.45</td>
<td>.06</td>
<td>.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injury Likelihood x TF</td>
<td>-.14</td>
<td>.06</td>
<td>.02</td>
<td>-.04</td>
<td>.07</td>
<td>.59</td>
<td>-.03</td>
<td>.07</td>
<td>.62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Δχ² LL</td>
<td>5.68(p = .02)</td>
<td></td>
<td></td>
<td>.23(p = .63)</td>
<td></td>
<td></td>
<td>.24(p = .62)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Model 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transformational</td>
<td>.38</td>
<td>.08</td>
<td>.001</td>
<td>.13</td>
<td>.07</td>
<td>.07</td>
<td>.03</td>
<td>.07</td>
<td>.65</td>
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</tr>
<tr>
<td>MBEA</td>
<td>-.01</td>
<td>.07</td>
<td>.92</td>
<td>.63</td>
<td>.09</td>
<td>.001</td>
<td>-.04</td>
<td>.07</td>
<td>.56</td>
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<td></td>
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<tr>
<td>Injury Likelihood</td>
<td>-.08</td>
<td>.05</td>
<td>.15</td>
<td>-.01</td>
<td>.07</td>
<td>.87</td>
<td>.45</td>
<td>.06</td>
<td>.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injury Likelihood x MBEA</td>
<td>-.09</td>
<td>.06</td>
<td>.13</td>
<td>-.01</td>
<td>.07</td>
<td>.87</td>
<td>-.08</td>
<td>.07</td>
<td>.24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Δχ² LL</td>
<td>2.20(p = .14)</td>
<td></td>
<td></td>
<td>.01(p = .92)</td>
<td></td>
<td></td>
<td>1.24(p = .26)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* TF = Transformational Leadership, MBEA = Management-By-Exception-Active; Δχ² LL log-likelihood based chi-square difference test (compares model fit between model with and model without interaction term for significance).
Table 15. Estimates for latent interaction effects between MBEA, transformational leadership with safety of others (hypotheses 7c and 8c)

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>1. Team Performance</th>
<th>2. Leader Self Efficacy</th>
<th>4. Safety Incidents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>SE</td>
<td>p</td>
</tr>
<tr>
<td><strong>Model 1</strong></td>
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<td></td>
</tr>
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<td>Transformational</td>
<td>.41</td>
<td>.11</td>
<td>.001</td>
</tr>
<tr>
<td>MBEA</td>
<td>-.02</td>
<td>.07</td>
<td>.84</td>
</tr>
<tr>
<td>Safety Other</td>
<td>-.05</td>
<td>.03</td>
<td>.11</td>
</tr>
<tr>
<td>Safety others x TF</td>
<td>-.01</td>
<td>.03</td>
<td>.69</td>
</tr>
<tr>
<td>∆χ² LL</td>
<td>.11 (p = .74)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Model 2</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Transformational</td>
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<td>.08</td>
<td>.001</td>
</tr>
<tr>
<td>MBEA</td>
<td>.02</td>
<td>.12</td>
<td>.87</td>
</tr>
<tr>
<td>Safety Others</td>
<td>-.05</td>
<td>.03</td>
<td>.11</td>
</tr>
<tr>
<td>Safety others x MBEA</td>
<td>-.01</td>
<td>.03</td>
<td>.69</td>
</tr>
<tr>
<td>∆χ² LL</td>
<td>1.78 (p = .18)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. TF = Transformational Leadership, MBEA = Management-By-Exception-Active; ∆χ² LL log-likelihood based chi-square difference test (compares model fit between model with and model without interaction term for significance).*
**Interaction terms (hypotheses 7 and 8)**

Across the different models tested, two interaction terms reached significance: hazard exposure moderated the relationship between Management-By-Exception-Active (see Table 13) and injury likelihood moderated the path between transformational leadership and team performance (see Table 14). These two significant interaction terms are examined further below.

Hazard exposure emerged as a significant moderator of the relationship between Management-By-Exception-Active and safety incidents ($B = .11$, $p = .04$). The chi-square difference test based on log-likelihood values showed that adding the interaction between Management-By-Exception-Active and hazard exposure when predicting safety incidents, significantly improved model fit. In Figure 12, the interaction term between Management-By-Exception-Active and hazard exposure is displayed. In low hazard exposure conditions, Management-By-Exception-Active did not show a relationship with safety incidents, whereas in high hazard exposure conditions, Management-By-Exception-Active and safety incidents showed a negative relationship. Thus, if hazard exposure was high, Management-By-Exception-Active was associated with fewer safety incidents. This finding was in support of hypothesis 7a.

The graph displayed in Figure 12 also illustrates a significant main effect of hazard exposure on safety incidents. Leaders’ whose subordinates work in hazardous work environments, tended to report higher safety incident rates.

None of the other interaction terms between Management-By-Exception-Active and hazard exposure were significant, so that hypothesis 7a was only partially supported. Hypotheses 7b and 7c were not supported, as injury likelihood and safety of others did not moderate any of the relationships between Management-By-Exception-Active and the outcome variables.
Moderation effect of hazard exposure on the relationship between Management-By-Exception-Active and safety incidents.

Low = one standard deviation below mean; high = one standard deviation above mean.

For transformational leadership a significant interaction was found with injury likelihood in the model predicting team performance ($B = -0.14$, $p = .02$, see Table 14). The log-likelihood difference test showed that adding the interaction term significantly improved model fit. The interaction effect is plotted in Figure 13. In both high and low injury likelihood conditions, transformational leadership showed a positive link with team performance. However, this relationship was stronger when leaders rated the likelihood of injury for their employees as low, whereas under conditions of high injury likelihood, the link between transformational leadership and team performance weakened. This finding was in the opposite direction as hypothesised (hypothesis 8b).

It was expected that transformational leadership is more strongly related to performance if safety is highly salient. However, the detected moderation effect of injury likelihood suggested that transformational leadership was less effective if subordinates work in contexts with threat for harm.

Hypothesis 8a and hypothesis 8c were not supported, as none of the interaction terms between transformational leadership with hazard exposure (8a) and with safety of others (8c) were significant.
Figure 13. Moderation effect of injury likelihood on the relationship between transformational leadership and team performance.
Low = one standard deviation below mean; high = one standard deviation above mean.

Manifest interaction effect analysis
As noted above, latent interaction analysis in Mplus has the advantage of taking measurement error into account, but cannot provide standardised estimates and does not provide the statistics to conduct simple slopes analysis. Hence, to further explore the two significant interaction effects identified from the latent interaction analysis, the models were repeated with manifest variables.

Manifest interaction between hazard exposure and Management-By-Exception-Active
The moderation effect of hazard exposure on the link between Management-By-Exception-Active and safety incidents was repeated with manifest variables. As recommended by Aiken and West (1991), Management-By-Exception-Active and hazard exposure were centred prior to computing the interaction term. The model results with standardised parameters are displayed in Figure 14. As in the latent interaction analysis, hazard exposure moderated the relationship between Management-By-Exception-Active and safety incidents. Hazard exposure showed a significant positive main effect on safety incidents. The main effects for Management-By-Exception-Active and transformational leadership were not significant, which again conforms to the latent interaction model.
Figure 14. *Manifest moderation of hazard exposure on the relationship between Management-By-Exception-Active and safety incidents.*

***p < .001, *p < .05; ns = non-significant; all values are standardised.

Hayes’s (2013) moderation macro was used to conduct simple slope analysis. The macro uses ordinary least squares analysis for estimating interaction effects, simple slope testing and probing for regions of significance of conditional effects (Hayes, 2009, 2013; Preacher, Ruckert, & Hayes, 2007). The macro has been used by prior research investigating leadership and is frequently used within the organisational literature to assess indirect effects (e.g., Eisenbeiss, Van Knippenberg, & Boerner, 2008; Klein, Knight, Ziegert, Lim, & Saltz, 2011; Ng, Ang, & Chan, 2008).

The relationship between Management-By-Exception-Active and safety incidents was tested at one standard deviation below and above the mean as well as at the mean value of hazard exposure. This revealed that at one standard deviation above the mean value for hazard exposure (+ 1SD = 3.79), the relationship between Management-By-
Exception-Active and safety incidents was significant ($\beta = -0.15, p = .02, 95\% CI [-.27 to -.03]$). Thus, when employees are frequently exposed to high levels of hazard, Management-By-Exception-Active was associated with fewer safety incidents. At the mean value of hazard exposure ($M = 2.42$) and one standard deviation below the mean ($-1SD = 1.05$), the relationship between Management-By-Exception-Active and safety incidents became non-significant (at mean value $\beta = -0.04, p > .33, 95\% CI [-.14 to .05];$ one standard deviation below mean $\beta = .06, p = .35, 95\% CI [-.06 to .18]$). Thus, if hazard exposure is low, the relationship between Management-By-Exception-Active and safety incidents becomes non-significant.

Using the Johnson-Neyman technique through Hayes’s macro (2013), it was tested at which hazard exposure value, the effect of Management-By-Exception-Active on safety incidents changed from non-significant to statistically significant. This revealed that when hazard exposure was greater than 3.24, the relationship between Management-By-Exception-Active on safety incidents became significant ($\beta = -0.12, p = .05, 95\% CI [-.23 to -.01]$).

To further investigate whether both hazard-level and exposure frequency contributed to the interaction effect, the analysis was repeated using the individual items as potential moderators. The results showed that hazard-level, but not exposure frequency emerged as a significant moderator (for interaction term with hazard-level $\beta = -0.13, p = .003;$ for interaction term with exposure frequency $\beta = -0.07, p = .11$). Thus, this finding suggested that the level of hazard in the work environment, but not how often employees are exposed to hazards, influences whether Management-By-Exception-Active is effective in reducing safety incidents or not.

The interaction effect between Management-By-Exception-Active and hazard-level (single-item) on safety incidents is displayed in Figure 15. Simple slopes analysis showed that at the mean value for hazard-level ($M = 2.23$) and one standard deviation below the mean ($-1SD = 1$), Management-By-Exception-Active was not significantly related to safety incidents (for mean value $\beta = -.05, p = .31, 95\% CI [-.14 to .05];$ for one standard deviation below mean $\beta = -.08, p = .20, 95\% CI = [-.04 to .20]$). However, the effect of Management-By-Exception-Active was significant at one standard
deviation above the mean value for hazard-level (+ 1SD = 3.47, \( \beta = -.17, p = .008, 95\% \text{ CI } [-.30 \text{ to } -.05]).

Again, the Johnson-Neyman technique was implemented through Hayes’s (2013) macro to determine at which hazard-level point, the relationship between Management-By-Exception-Active and safety incidents changed from non-significant to significant. Results showed that for hazard-level values greater than 2.8, Management-By-Exception-Active had a significant negative effect on safety incidents (\( \beta = -.11, p = .05, 95\% \text{ CI } [-.21 \text{ to } -.002]). Rounding this value up to the next response scale anchor point, suggests that when employees are exposed to at least “moderate hazard-levels”, Management-By-Exception-Active can be effective in decreasing safety incident rates. However, engaging in Management-By-Exception-Active practices if subordinates’ exposure to hazards is low, is not effective for reducing safety incidents.

![Figure 15. Moderation effect of hazard-level (single item) on the relationship between Management-By-Exception-Active and safety incidents.](image)

Low = one standard deviation below mean; high = one standard deviation above mean.
Manifest interaction between injury likelihood and transformational leadership

Latent interaction analysis showed that injury likelihood significantly moderated the relationship between transformational leadership and team performance. To further examine this interaction the analysis was repeated with manifest variables using the same procedures as above. In Figure 16, the standardised parameters are shown for the model. Congruent with the findings from latent interaction modelling, the interaction term between transformational leadership and injury likelihood was significant. The main effect for transformational leadership was significant but the effects for Management-By-Exception-Active and injury likelihood were non-significant, which again conformed to the result from latent interaction modelling.

Simple slopes analysis revealed that at the mean value of injury likelihood ($M = 2.27$) as well as one standard deviation below (-1SD = 1.26) and above (+1SD = 3.28) the effect of transformational leadership on team performance was significant (at one standard deviation below mean $\beta = .37$, $p < .001$, 95% CI [.25 to .50]; at mean value $\beta = .26$, $p < .001$, 95% CI [.16 to .35]; at one standard deviation above the mean $\beta = .14$, $p = .02$, 95% CI [.02 to .27]). However, the findings showed that the relationship between transformational leadership and team performance weakened with higher levels of injury likelihood. Implementation of the Johnson-Neyman technique showed for injury likelihood values greater than 3.4 ($\beta = .11$, $p = .11$, 95% CI [-.03 to .25]), the effect of transformational leadership on team performance turned from statistically significant to non-significant. Thus, these results suggested that transformational leadership is positively related to team performance, but that its influence was weaker if threat for harm is present within the work context.
Figure 16. Manifest moderation of injury likelihood on the relationship of transformational leadership to team performance.  
***p < .001, **p < .01, ns = non-significant; all values are standardised.

**Leader flexibility (hypothesis 9)**

Hypothesis 9 stated that leader flexibility has an influence on outcome variables over and above transformational and transactional leadership. To test whether leader flexibility was related to the study’s outcome variables, whilst controlling for transformational leadership and Management-By-Exception-Active, a series of manifest regression analyses were conducted. In each regression analysis transformational leadership and Management-By-Exception-Active were entered as independent variables, and in a second step, leader flexibility was included as an additional independent variable. A separate regression analysis was performed for each respective outcome variable. The results for the three regression models are reported in Table 16. Leader flexibility emerged as a significant predictor of team performance and leader self-efficacy when controlling for transformational leadership and Management-By-Exception-Active (β = .12, p < .05 for team performance and β = .09, p < .05 for leader self-efficacy). However, in both regression analyses the amount of incremental variance that was explained by adding leader flexibility was small at 1%. Thus, for self-efficacy, transformational leadership, Management-By-Exception-Active and leader flexibility, each made a unique contribution. For team performance,
only transformational leadership and leader flexibility emerged as significant predictors. Thus, leader flexibility augments the influence of transformational leadership, but Management-By-Exception-Active does not have an effect over and above the other leadership variables.

For safety incidents leader flexibility did not emerge as a significant predictor. Overall, the results show that leader flexibility has an influence on team performance and leader self-efficacy beyond transformational-transactional leadership, although the size of the effect was small.

Thus, hypothesis 9 was partially supported as leader flexibility had an influence on team performance (9a) and leader self-efficacy (9b), whilst controlling for transformational leadership and Management-By-Exception-Active, but not on safety incidents (9c).

Table 16. Hierarchical regression with team performance, leader self-efficacy and safety incidents as dependent variable

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Team Performance</th>
<th>Leader Self Efficacy</th>
<th>Safety Incidents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>SE</td>
<td>β</td>
</tr>
<tr>
<td>Block 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>1.79</td>
<td>.28</td>
<td>3.59</td>
</tr>
<tr>
<td>TF</td>
<td>.26***</td>
<td>.08</td>
<td>.38***</td>
</tr>
<tr>
<td>MBEA</td>
<td>.04</td>
<td>.06</td>
<td>.17***</td>
</tr>
<tr>
<td>Block 2</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Constant</td>
<td>1.42</td>
<td>.32</td>
<td>3.13</td>
</tr>
<tr>
<td>TF</td>
<td>.22***</td>
<td>.08</td>
<td>.35***</td>
</tr>
<tr>
<td>MBEA</td>
<td>.01</td>
<td>.06</td>
<td>.15**</td>
</tr>
<tr>
<td>Leader Flexibility</td>
<td>.12*</td>
<td>.07</td>
<td>.09*</td>
</tr>
</tbody>
</table>

\[ R^2 = .09*** \]
\[ R^2_{adj} = .08*** \]
\[ \Delta R^2 = .01** \]

Note. N = 538; TF = transformational leadership; MBEA = Management-By-Exception-Active; \( R^2_{adj} = \) R-square adjusted; \( \Delta R^2 = \) R-square change between block 1 and block 2; *p < .05, **p < .01, ***p < .001.
Latent interaction leader flexibility (hypothesis 10)

From regression analysis, leader flexibility emerged as a significant predictor of team performance and leader self-efficacy, but not for safety incidents as the dependent variable. In hypothesis 10, it was stated that leader flexibility is more strongly related to outcome variables if salience of safety is high.

Therefore, it was tested whether the three safety salience measures moderate the relationship between leader flexibility and the study outcome variables (i.e., team performance, leader self-efficacy and safety incidents). The same methods for latent interaction modelling was used as for transformational leadership and Management-By-Exception-Active as described above. A schematic representation of the latent interaction analysis with leader flexibility is displayed in Figure 17.

Figure 17. Schematic representation of latent interactions between leader flexibility and safety salience measures.
Results showed that none of the interaction terms between leader flexibility and the respective safety salience measures reached significance at $p < .05$ (see Table 17). The interaction between leader flexibility and hazard exposure in the model predicting safety incidents was significant at $p < .08$. The chi-square difference test based on log-likelihood values showed that adding the interaction term led to improved model fit with the chi-square difference significant at $p = .07$. Low power is a well-discussed issue in the analysis of moderator effects and makes the detection of significant moderation effects challenging (Aiken & West, 1991; Champoux & Peters, 1987; McClelland & Judd, 1993). Therefore, using a less stringent significance criterion to decrease the probability of a type-two error when investigating interaction terms has been recommended (Arnold, 1982). Thus, it was considered acceptable to interpret and further examine the moderating effect of hazard exposure on the link between leader flexibility and safety incidents. The interaction between leader flexibility and hazard exposure is plotted in Figure 18. Under high hazard exposure conditions leader flexibility showed a weak negative relationship with safety incidents. However, this association became positive if hazard exposure was low.

Thus, hypothesis 10a was only partially supported with a weak interaction effect between leader flexibility and hazard exposure when predicting safety incidents. Neither injury likelihood (hypothesis 10b), nor safety of others (hypothesis 10c), showed significant interactions with leader flexibility when predicting team performance, leader self-efficacy or safety incidents. Therefore, no support was found for these two hypotheses.
Figure 18. Moderating effect of hazard exposure on the relationship of leader flexibility to safety incidents.
Low = one standard deviation below mean; high = one standard deviation above mean.
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>SE</td>
<td>p</td>
<td>B</td>
</tr>
<tr>
<td><strong>Injury Likelihood</strong></td>
<td></td>
<td></td>
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<td></td>
</tr>
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<td>.001</td>
<td>.57</td>
</tr>
<tr>
<td>MBEA</td>
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<td>.55</td>
<td>.09</td>
</tr>
<tr>
<td>Leader Flexibility</td>
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<td>.08</td>
<td>.02</td>
<td>.09</td>
</tr>
<tr>
<td>Injury Likelihood</td>
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<td>.05</td>
<td>.10</td>
<td>-.01</td>
</tr>
<tr>
<td>Injury Likelihood x Leader Flexibility</td>
<td>-.07</td>
<td>.06</td>
<td>.26</td>
<td>-.03</td>
</tr>
<tr>
<td>$\Delta \chi^2_{LL}$</td>
<td>.61</td>
<td></td>
<td></td>
<td>.08</td>
</tr>
<tr>
<td><strong>Hazard Exposure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TF</td>
<td>.28</td>
<td>.09</td>
<td>.001</td>
<td>.57</td>
</tr>
<tr>
<td>MBEA</td>
<td>-.05</td>
<td>.08</td>
<td>.56</td>
<td>.10</td>
</tr>
<tr>
<td>Leader Flexibility</td>
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<td>.08</td>
<td>.03</td>
<td>.10</td>
</tr>
<tr>
<td>Hazard Exposure</td>
<td>-.03</td>
<td>.06</td>
<td>.55</td>
<td>-.03</td>
</tr>
<tr>
<td>Hazard Exposure x Leader Flexibility</td>
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<td>.06</td>
<td>.37</td>
<td>-.05</td>
</tr>
<tr>
<td>$\Delta \chi^2_{LL}$</td>
<td>.57</td>
<td></td>
<td></td>
<td>.46</td>
</tr>
<tr>
<td><strong>Safety of Others</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TF</td>
<td>.30</td>
<td>.09</td>
<td>.001</td>
<td>.53</td>
</tr>
<tr>
<td>MBEA</td>
<td>-.05</td>
<td>.08</td>
<td>.47</td>
<td>.09</td>
</tr>
<tr>
<td>Leader Flexibility</td>
<td>.21</td>
<td>.13</td>
<td>.11</td>
<td>.14</td>
</tr>
<tr>
<td>Safety Others</td>
<td>-.05</td>
<td>.03</td>
<td>.14</td>
<td>.02</td>
</tr>
<tr>
<td>Safety Others x Leader Flexibility</td>
<td>-.02</td>
<td>.04</td>
<td>.62</td>
<td>-.02</td>
</tr>
<tr>
<td>$\Delta \chi^2_{LL}$</td>
<td>.30</td>
<td></td>
<td></td>
<td>.13</td>
</tr>
</tbody>
</table>

*Note.* N = 538; TF = Transformational Leadership, MBEA = Management-By-Exception-Active; $\Delta \chi^2_{LL}$ = Chi-square difference test based on log-likelihood that compares model with and model without interaction term (significance indicates improved model fit after adding the interaction).
Manifest interaction leader flexibility

As in the moderation analysis for transformational leadership and Management-By-Exception-Active, the interaction between leader flexibility and hazard exposure was repeated with manifest variables. The results from for this manifest moderation analysis are displayed in Figure 19, which are congruent with the findings from latent moderation modelling. Simple slope analysis using Hayes’s macro (2013), revealed that the regression coefficient for the effect of leader flexibility on safety incidents remained non-significant at the mean value of hazard exposure as well as one standard deviation above and one standard deviation below the mean (at the mean $\beta = .02$, $p = .72$, 95% CI = [-.07 to .11], at one standard deviation below the mean $\beta = .08$, $p = .19$, 95% CI [-.05 to .21]; at one standard deviation above the mean $\beta = -.05$, $p = .38$, 95% CI [-.17 to .06]). However, the results showed that the regression coefficient at one standard deviation above the mean was negative and became positive at one standard deviation below, as well as at the mean of hazard exposure. This suggested that in high hazard exposure conditions, leader flexibility might reduce safety incidents, but not in moderate or low hazard exposure conditions. However, this conclusion must be seen as somewhat speculative as results were not significant.

![Figure 19. Manifest moderation of hazard exposure on the relationship between leader flexibility and safety incidents. ***p < .001, **p < .01, †p < .10, ns = non-significant; all values are standardised.](image-url)
Results from the moderation analysis for Management-By-Exception-Active revealed that the level of hazard exposure, but not the frequency of hazard exposure, moderated the link with safety incidents. Thus, this analysis was repeated for leader flexibility, investigating the two hazard exposure items separately as potential moderators. The results showed that the level of hazard exposure significantly moderated the influence of leader flexibility on safety incidents, whereas exposure frequency did not emerge as a significant predictor (for hazard-level $\beta = -.08, p = .04$; for exposure frequency $\beta = -.04, p = .22$). The finding is consistent with the interaction between Management-By-Exception-Active and hazard exposure that was reported earlier. To test at which value of hazard-level the relationship becomes significant, the Johnson-Neyman technique through Hayes’s macro (2013) was applied. Results did not show a regression coefficient at any level of hazard exposure that was significant at $p < .05$. However, a positive relationship between leader flexibility and safety incidents was found at one and a half standard deviations below the hazard-level mean, which was significant at $p = .09$ ($\beta = .13, 95\%CI [-.02 to .29]$). The relationship between leader flexibility and safety incidents at one and a half standard deviations above the mean was negative, but not statistically significant ($\beta = -.11, p = .13, 95\% CI = [-.24 to .03]$). This tentatively suggests that leader flexibility at low hazard-levels might actually increase safety incidents, but not at high hazard-levels.

7.6 Discussion

This section summarises the main results from study 1 and discusses some of the key outcomes from the analysis. Further, integration with existing research and theory, as well as a discussion of potential limitations, are presented in the general discussion in chapter nine.

The overall aim of the study was to assess whether hazard exposure, injury likelihood and the impact of employees’ work on safety of others are related to perceptions, occurrence and effectiveness of transformational and transactional leadership. The sample consisted of participants who all had leader responsibilities and worked in different occupational settings with varying degrees of safety salience. Thus, the study
assessed the role of these three contextual attributes (i.e., hazard exposure, injury likelihood and safety of others) in leadership from a leaders’ perspective. It was argued that if salience of safety is high, leaders perceive transformational and transactional leadership as more effective and adopt the two leadership styles more frequently. In addition it was hypothesised that transformational and transactional leadership are more strongly related to the study’s outcome variables (i.e., team performance, leader self-efficacy and safety incidents) if salience of safety is rated as high.

A summary of the results with regards to the proposed hypotheses, is displayed in Table 18.
### Study 1

<table>
<thead>
<tr>
<th><strong>Hypothesis</strong></th>
<th><strong>Summary of results</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hypothesis 1</strong></td>
<td>Partially supported, as MBEA was perceived as more effective in higher hazard exposure (1a) and impact on safety of others (1c) groups, but no significant differences for injury likelihood (1b), although results were in the expected direction.</td>
</tr>
<tr>
<td><strong>Hypothesis 2</strong></td>
<td>Partially supported, as TF was perceived as more effective in higher impact on safety of others groups (2c), but no significant differences were found for hazard exposure (2a) and injury likelihood (2b), although results were in the expected direction.</td>
</tr>
<tr>
<td><strong>Hypothesis 3</strong></td>
<td>Supported, as mean levels of MBEA were significantly higher in higher hazard exposure (3a), injury likelihood (3b) and impact on safety of others (3c) groups compared to low hazard exposure, injury likelihood and safety of others.</td>
</tr>
<tr>
<td><strong>Hypothesis 4</strong></td>
<td>Partially supported, as mean of TF was higher in higher hazard exposure (3a) and impact on safety of others groups (3c), but no significant differences were found for injury likelihood (4b), although results were in the expected direction.</td>
</tr>
<tr>
<td><strong>Hypothesis 5</strong></td>
<td>Partially supported, as TF and MBEA were more strongly correlated in higher hazard exposure (5a), injury likelihood (5b) and impact on safety of others (5c) groups, but differences were not significant between each of the groups.</td>
</tr>
<tr>
<td><strong>Hypothesis 6</strong></td>
<td>Partially supported as MBEA and TF were significantly related to leader self-efficacy (6b), but MBEA did not show main effects on team performance (6a) and both TF and MBEA were unrelated to safety incidents (6c).</td>
</tr>
<tr>
<td><strong>Hypothesis 7</strong></td>
<td>Partial support for hypothesis 7a, as hazard exposure moderated the link between MBEA and safety incidents, but not with team performance or leader self-efficacy. No support for hypotheses 7b and 7c.</td>
</tr>
<tr>
<td><strong>Hypothesis 8</strong></td>
<td>Injury likelihood (8b) moderated the link between TF and team performance, but this effect was in the opposite direction as hypothesised. No support for hypotheses 8a and 8c.</td>
</tr>
<tr>
<td><strong>Hypothesis 9</strong></td>
<td>Support for hypothesis 9a and 9b, as leader flexibility was significantly related to team performance and leader-self efficacy, whilst controlling for TF and MBEA. No support for hypothesis 9c, as leader flexibility was unrelated to safety incidents.</td>
</tr>
<tr>
<td><strong>Hypothesis 10</strong></td>
<td>Partial support for hypothesis 10a, as hazard exposure moderated the link between leader flexibility and safety incidents (p = .08), but not for team performance and leader self-efficacy. No support for hypotheses 10b and 10c.</td>
</tr>
</tbody>
</table>

*Note. Numbering of hypotheses refers to Figure 7 (see p. 126) and Figure 8 (see p. 126); MBEA = Management-By-Exception-Active; TF = Transformational Leadership.*
7.6.1 Transactional leadership and salience of safety

Within the existing literature studies have often placed their focus on transformational leadership and not paid much attention to transactional leadership. Moreover, criticism has been repeatedly voiced that leadership research does not give sufficient consideration to the context in which leaders operate (Leiden & Antonakis, 2009). Thus, the present research advanced the existing leadership literature by investigating transactional leadership, and considered hazard exposure, injury likelihood and the impact on the safety of others as contextual attributes.

Results from factor analysis showed that Management-By-Exception-Active was the only dimension that loaded on transactional leadership. Hence, as in the results section, the term Management-By-Exception-Active continues to be used in this discussion of the empirical results of the present analysis.

The results on leaders’ perceived effectiveness, the mean occurrence and the co-occurrence with transformational leadership, indicated that Management-By-Exception-Active is evaluated as more effective and used more frequently when safety is salient. For ratings of perceived effectiveness, significant differences were found within the different hazard exposure and impact on safety of others groups. The finding suggests that leaders whose subordinates are frequently exposed to hazards, and have an impact on the safety of others, evaluate leader behaviours such as monitoring performance and vigilantly checking for errors as more effective compared to leaders whose subordinates are not exposed to hazards and have little impact on the safety of others. Moreover, mean values of Management-By-Exception-Active tended to be higher if safety was rated as salient. Significant group differences in the mean levels of Management-By-Exception-Active were found for each of the three measures of safety salience. Thus, the result denotes that leaders who operate in safety-critical contexts tend to engage more frequently in Management-By-Exception-Active behaviours.

Together these results suggested that if safety is salient within a work environment, leaders evaluate behaviours such as monitoring for standards and proactively correcting mistakes, as more effective and consequently adopt these practices more
frequently. The results on differences in perceived effectiveness and mean values of Management-By-Exception-Active across levels of safety salience are in support of the proposition that leaders adjust their behaviour in line with the context in which they operate. With reference to implicit leadership theories, it has been theorised that contextual attributes constrain what leadership tactics are perceived as prototypically effective (Hogg, 2001; Emrich, 1999; Lord & Emrich, 2001). The result from the present study offer empirical support for this notion that evaluations and the deployment of leadership tactics are context-sensitive for Management-By-Exception-Active. It has been suggested that such contextual variation in the perceived effectiveness of a leadership style can be explained through differences in the type of performance goals that are relevant in the respective context (Antonakis et al., 2003; Keller, 1992; Lord & Emrich, 2001). Leaders might perceive Management-By-Exception-Active as more effective if hazard exposure and the impact on safety of others is high as under such conditions the prevention of failure and correction of mistakes is particularly important to avoid harm. The item assessing perceived effectiveness was worded in a generalised form. It would be interesting for future research to assess leaders’ perceived effectiveness of different leadership styles with regards to specific performance aspects.

Whilst the results on differences on mean levels of Management-By-Exception-Active and its perceived effectiveness showed that these varied across the different safety salience levels, it should be noted that mean differences tended to be small. Leaders in each of the different safety salience groups rated Management-By-Exception-Active as overall effective. The lowest effectiveness rating was reported by participants in the low-level impact on safety of others group (M = 3.90). Yet, this mean rating still was in the upper half of the scale (perceived effectiveness was measured on a scale from one to five) and indicated that on average participants within this group evaluated Management-By-Exception-Active practices as effective. Similarly, mean levels of Management-By-Exception-Active across the different safety salience groups, demonstrated that participants in all groups reported that they adopt Management-By-Exception-Active regularly. The lowest mean level was found in the low-level hazard exposure group (M = 3.84). This value corresponds to the scale anchor “fairly often” indicating that although group differences exist, leaders across all levels of safety salience adopt Management-By-Exception-Active. This is an interesting finding as it
has been argued that Management-By-Exception-Active is depicted as unnecessarily negative within the leadership literature (Griffin & Talati, 2011). In contrast to this prevailing negative view, the present findings on perceived effectiveness and average occurrence levels suggest that leaders perceive behaviours such as actively monitoring performance and checking for errors as effective leader practices and frequently engage in these.

*Moderation results*

Results from moderation analyses showed that Management-By-Exception-Active was associated with lower safety incident rates if hazard exposure was high, but was not associated with safety incidents if participants rated their subordinates’ hazard exposure as low. Moreover, Management-By-Exception-Active was not associated with safety incidents under any other conditions (i.e., for injury likelihood or impact on safety of others as moderators). This suggests that Management-By-Exception-Active is not universally effective in influencing safety. In environments where employees are exposed to high hazard levels, behaviours such as correcting errors and monitoring performance might reduce the level of uncertainty and pre-empt any erroneous employee behaviour, so that accidents are prevented. The finding that these practices were associated with fewer safety incidents in high-level hazard exposure, but not low-level hazard exposure contexts might be explained through the visibility or perspicuity of hazards. In contexts with high-level hazard exposure, hazards are likely to be readily identifiable and conspicuous within the work environment. Consequently, hazards are more easily controlled through actions such as monitoring and checking for errors. However, if hazards are less apparent and less noticeable, then these leader actions might be less effective in detecting failure and preventing accidents.

Moderation analysis also revealed that only the level of hazard, but not the frequency of exposure to hazards moderated the link between Management-By-Exception-Active and safety incidents. This matches the explanation above that hazards need to be readily identifiable for Management-by-Exception-Active to be effective for preventing injury. Moreover, this finding has implications for practitioners as it indicates that even if employees are exposed to hazards relatively infrequently, but the hazard level is high, Management-By-Exception-Active is effective in reducing safety incidents.
Although results showed that Management-by-Exception-Active was significantly linked with fewer safety incidents under high hazard conditions, it should be acknowledged that this relationship was of low magnitude. This indicates that leaders positively influence safety incidents through engaging in Management-By-Exception-Active, but that the amount of influence they exert is small. Moreover, it has been recognised that it is not unusual for moderation effects to only account for small amounts of variance.

The main effects in the moderation analyses showed that Management-By-Exception-Active augmented transformational leadership with regards to leader self-efficacy, but not with regards to team performance. This is in line with suggestions that the augmentation effect is constrained to certain types of outcomes.

When discussing the results on the moderating role of hazard exposure on the relationship between Management-By-Exception-Active and safety incidents, it should be acknowledged that alternative interpretations to the one presented above could apply. It could be argued that in low hazard exposure conditions, safety incidents do not present an appropriate performance outcome, as injury at work might be very unlikely. Thus, the non-significant relationship between Management-By-Exception-Active and safety incidents when hazard exposure is low, might not be due to lower leadership style effectiveness, but because safety incidents are not a contextually relevant criterion. Similarly, safety incidents might be such rare events in low hazard exposure conditions, that restricted range of the dependent variable diminishes any association between Management-By-Exception-Active and safety incidents. However, the value of hazard exposure at which the relationship changed from non-significant to significant was 3.24, reflecting a moderate hazard level. Thus, the relationship between Management-By-Exception-Active and safety incidents was non-significant in lower hazard exposure conditions (i.e., below 3.24), but these were not entirely free from hazards. Also, participants with a hazard exposure rating of less than 3.24, still reported on average 5.83 safety incidents (this refers to the mean value of the sum of all incident severity categories). This shows that safety incidents do present a relevant outcome criterion even in low hazard level conditions.
Overall, the results on perceived effectiveness, occurrence and co-occurrence showed that Management-By-Exception-Active tends to be perceived as more effective, and employed more often, if work environments are characterised by very high safety salience. Results also indicated that Management-By-Exception-Active has a desirable effect on safety incident rates in hazardous conditions, but not in contexts where hazard exposure is low.

7.6.2 Transformational leadership and safety salience

It was hypothesised that transformational leadership is on average perceived as more effective (hypothesis 2), used more frequently (hypothesis 4), and more strongly related to criterion variables (hypothesis 7), if safety is salient within subordinates work environments.

Results on perceived effectiveness showed that transformational leadership was evaluated as more effective by leaders in the higher impact on safety of others group. This finding indicated, that when the safety of others is at stake, leaders view transformational leadership as particularly important, although participants across all levels of impact on safety of others evaluated transformational leadership as effective.

For hazard exposure and injury likelihood no significant differences between the different levels of safety salience were detected. These results are in contrast to hypothesis 2, and denoted that transformational leadership might be less context-sensitive and is perceived as equally effective in safety-critical as well as non-safety-critical contexts. In further support of this notion, overall group differences on the average effectiveness ratings were smaller for transformational leadership compared to effectiveness ratings of Management-By-Exception-Active.

Comparison of mean transformational leadership showed the trend that participants who reported that their employees work in contexts where safety is salient, tended to engage more frequently in transformational leadership style, lending support for hypothesis 4. Significant mean differences were found for hazard exposure and safety of others, but not injury likelihood as the safety salience measure. This finding was in line with previous research that has shown that under critical situations leaders
intervene more and display more involvement (De Hoogh et al., 2004, 2005; Morgeson, 2005).

Moreover, comparison of covariances between transformational leadership and Management-By-Exception-Active across the different levels of safety salience, showed the pattern that if hazard exposure, injury likelihood and impact on safety of others were rated as high, the two leadership styles correlated more strongly with each other. Significant differences were found for each of the three safety salience measures, although not all group differences within the three respective measures were significant. Thus, if salience of safety was high, leaders tended to either adopt high levels of both transformational leadership and Management-By-Exception-Active or adopted low levels of both leadership practices (i.e., high correlation between the two leadership styles). If salience of safety was low, the relationship between the two leadership styles was weaker, indicating that leaders adopting a high/low level of one of the leadership styles were less likely to also adopt high/low level of the other leadership style. The result was in accordance with hypothesis 5, indicating that transformational and transactional leadership are more likely to co-occur in safety-critical contexts. The present result on the co-occurrence of the two leadership styles can be linked to findings that transformational leadership is more strongly associated with contextual performance, whereas transactional leadership is more strongly related with compliance (e.g., Clarke, 2013; Wang et al., 2011). It can be suggested that if safety is salient, endeavouring leaders adopt transformational leadership as well as Management-By-Exception-Active because both compliance with rules as well as contextual performance are important (e.g., error prevention as well as promotion of error learning). In non-safety-critical contexts, compliance might be less pivotal for performance, so that endeavouring leaders adopt transformational leadership but engage to a lesser extent in transactional leadership. This interpretation corresponds with previous research that has suggested that under critical or urgent conditions, leaders show greater amounts of active leadership (Künzle et al. 2010; Pillai & Meindl, 1998; Morgeson, 2005; Morgeson & DeRue, 2006).
Moderation results

It was hypothesised that transformational leadership is more strongly related to team performance, leader self-efficacy and safety incidents, if salience of safety is high (hypothesis 8). Results from moderation analysis showed that transformational leadership had significant main effects on team performance and leader self-efficacy and showed that injury likelihood moderated the relationship between transformational leadership and team performance. However, the effect of the moderation was in the opposite direction to that hypothesised (hypothesis 8b). Hazard exposure and impact on safety of others did not emerge as significant moderators, so that hypothesis 8a (hazard exposure) and hypothesis 8c (safety of others) were not supported.

The moderation effect of injury likelihood on the link between transformational leadership and team performance showed that transformational leadership had a weaker association with team performance if injury likelihood was rated as high. This effect was in the opposite direction to hypothesis 8b, as it was expected that transformational leadership is more strongly related to performance if safety is critical. However, the results from moderation analysis indicated, that transformational leadership becomes less effective in influencing team performance if injury likelihood is high. This is an important finding as it is in contrast to the prevailing notion within the literature that transformational leadership is universally effective. The current result suggests that if threat for harm is present within a work setting, the positive influence of transformational leadership on team performance is reduced. It can be argued that under conditions where there is imminent threat for injury, transformational leadership might not offer the required amount of direction. The relationship between transformational leadership and team performance became non-significant at an injury likelihood value, which was more than one standard deviation above the mean and that reflected moderately high levels of injury likelihood. In these contexts the threat for injury might be so prevalent that any room for error cannot be tolerated. Hence under such conditions, leader strategies such as encouraging new ways of doing things and emphasis on inspiring employees might be less relevant for performance. Inness et al. (2010) reported that transformational leadership was not related to safety compliance. They suggested that transformational leadership might indirectly decrease compliance as it provides employees with greater latitude in how
they implement rules and procedures. Overall, the present finding on the moderator role of injury likelihood is an important contribution to the literature as it indicates that transformational leadership is not context-free. Although, transformational leadership was positively related with team performance under conditions of both high as well as low injury likelihood, its impact on performance was less strong if there was a high threat for harm in subordinates’ work environments.

It should be recognised that alternatively the interaction effect between transformational leadership and injury likelihood could be explained through a change in subordinates’ evaluation of transformational leadership if a threat for injury continues to persist. Pillai and Meindl (1998) showed that level of crisis in a work environment was negatively related to followers’ perceptions of charismatic leadership. They suggested that if a crisis continues to persist along with a leader engaging in charismatic leadership behaviours, then employees conclude that leaders’ charismatic practices are ineffective as these were unable to eliminate the crisis (Emrich, 1999; Lord & Emrich, 2001; Pillai & Meindl, 1998). The notion that transformational leadership might be viewed as “part of the problem” (Emrich, 1999, p. 1002) could also apply to the present finding. If threats for injury cannot be reduced despite a leader employing transformational leadership, then employees might consequently view transformational practices as less effective, hence leading to a weaker association with team performance.

It should also be pointed out that the cross-sectional nature of the study constraints the interpretation of the results. Team performance and transformational leadership were assessed at the same time. Hence, leaders were likely to rely on events in the recent past for their ratings of team performance. If team performance has recently been poor, in reaction leaders might have increased their level of transformational leadership. Thus, the weaker relationship between transformational leadership and team performance if injury likelihood is high might be influenced by a recent change in leaders’ behaviour. Limitations of cross-sectional research will be further discussed in the general discussion in chapter nine.
7.6.3 Leader flexibility

It has been proposed that to maximise their influence on leadership outcomes, leaders need to be able to adapt their behaviour to different settings and requirements (Denison et al., 1995; Yukl & Lepsinger, 2004). Thus, in addition to engaging in transformational as well as transactional leadership style, the adoption of these practices needs to be matched to the particular problem or situation at hand. It was therefore hypothesised that leader flexibility augments transformational-transactional leadership and might be particularly important in safety-critical contexts where leaders have to address a variety of competing demands (hypothesis 9).

Results showed that leader flexibility emerged as a significant predictor of team performance (hypothesis 9a) and leader self-efficacy (hypothesis 9b), but not safety incidents when controlling for transformational leadership and Management-By-Exception-Active (hypothesis 9c). The influence of leader flexibility over and above transformational leadership and Management-By-Exception-Active indicated that the competency of being able to adjust ones leadership behaviour and shift between different leadership practices, augments the sole use of transformational-transactional leadership. The finding was in line with theorisations, that leaders need to be able to adjust their leadership behaviours to the requirements of a particular situation to maximise their influence on performance (Denison et al., 1995; Hooijberg, 1996; Yukl & Lepsinger, 2004; Yukl & Mashud, 2010). The present finding also supported the notion that trait variables such as leader flexibility augment leadership behaviours, and demonstrated that considering both leader traits and behaviours, offers a more complete understanding of the influence of leadership on outcomes.

However, it should be noted that the amount of additional variance explained through leader flexibility was small for team performance and for leader self-efficacy as dependent variables. Thus, the unique contribution of leader flexibility beyond transformational leadership and Management-By-Exception-Active was small. Yet, this finding that leader flexibility constituted a weaker predictor is plausible. For effective leadership it might be of foremost importance to be able to engage in transformational leadership and Management-By-Exception-Active. The
effectiveness of active leadership practices is then amplified, if the behaviour is matched to the specific situation.

*Moderation results*

It was hypothesised that leader flexibility is more strongly related to team performance, leader self-efficacy and safety incidents if safety is salient (hypothesis 10). However, the results only showed weak support for the hypothesis. An interaction effect between leader flexibility and hazard exposure was found for safety incidents as the dependent variable. However, the moderation effect was of small magnitude and only significant at $p = .08$. The direction of the interaction indicated that if hazard exposure was high, leader flexibility was weakly associated with fewer safety incidents, but if hazard exposure was low, leader flexibility was weakly associated with higher safety incident rates. The finding denoted that being able to adapt one's leadership style is effective for reducing safety incidents if hazard exposure is high, but not if hazard exposure is low. However, the effect must be interpreted tentatively simple slope analysis showed that the relationships between leader flexibility and safety incidents at high/low hazard exposure levels were not significant.

Injury likelihood (hypothesis 10b) and impact on safety of others (hypothesis 10c) did not show any significant interaction effects with leader flexibility. Thus, these hypotheses were not supported. Overall, results from moderation analysis suggested that leader flexibility is effective beyond transformational leadership and Management-By-Exception-Active for enhancing team performance and leader self-efficacy irrespective of the level of safety salience. However, leader flexibility was not related to safety incidents.
7.7 Chapter Summary

The chapter presented the results from study 1, which explored the research objectives from the leaders’ perspective. In the methods section it was outlined that a cross-sectional, questionnaire study was conducted in a sample of 538 participants in leadership positions who worked in different occupational settings with varying degrees of safety salience. Three measures, i.e., hazard exposure, injury likelihood and impact on safety of others, were used to assess different aspects of safety salience.

Results showed that Management-By-Exception-Active tended to be perceived as more effective and used more frequently if leaders rated hazard exposure, injury likelihood and impact on safety of others within their subordinates’ work context as high. For transformational leadership a similar pattern emerged but differences in perceived effectiveness and mean levels of transformational leadership across the different safety salience levels were small and significant differences were not detected for each of the three safety salience measures. The strength of correlation between transformational leadership and Management-By-Exception-Active was compared across different levels of safety salience. Results indicated that leaders tend to use the two leadership styles to a similar extent if safety is more salient, compared to lower levels of safety salience.

Moderation analysis was performed to test whether transformational leadership and Management-By-Exception-Active are more strongly related to the study outcome variables (i.e., team performance, leader self-efficacy and safety incidents) in safety-critical contexts compared to non-safety critical contexts. For Management-By-Exception-Active, hazard exposure moderated its link with safety incidents. The moderation effect showed that Management-By-Exception-Active was associated with fewer safety incidents if level of hazard exposure was high but not under low hazard exposure settings. None of the other interactions between Management-By-Exception-Active and safety salience measures were significant. For transformational leadership, moderation analysis revealed a surprising result, indicating that transformational leadership is less positively associated with team performance if injury likelihood is high. It was suggested that if threat for harm is present, transformational behaviours might lack the necessary direction to ensure that failure
is prevented (Inness et al., 2010; Keller, 1992, 2006). Overall, the results on mean comparison of perceived effectiveness and average occurrence levels of transformational and transactional leadership as well as findings from moderation analysis made an important contribution as they demonstrate that both transactional as well as transformational leadership are not context-free. Moreover, results showed that Management-By-Exception-Active augmented transformational leadership with regards to leader self-efficacy, but not for team performance as the dependent variable. This finding is in line with the notion that transactional leadership might be relevant for certain outcomes but not others.

The competency of leader flexibility was investigated and result showed that leader flexibility made a unique contribution beyond transformational leadership and Management-By-Exception-Active when predicting leader self-efficacy and team performance, but was not related to safety incidents. This finding denoted that to maximise their influence on performance leaders need to be able to adjust their behaviour to the specific situation at hand.
8 Study 2

8.1 Chapter Overview

This chapter presents the empirical research conducted in study 2, which explored the research’s objectives in a sample of manufacturing and oil and gas employees using a two-source study design. The aim of the study was to investigate whether safety salience at the team-level influences the effectiveness of transformational leadership, transactional and passive leadership as well as leader flexibility, with regards to safety-specific as well as non-safety specific outcome variables. It was expected that in safety-critical contexts, where safety is salient, transformational leadership, transactional leadership and leader flexibility have a stronger, positive effect, and passive leadership has a stronger, negative effect on desirable outcomes. In addition, it was investigated whether the included leadership variables influence safety performance through safety climate. Thus, the aims of study 2 can be summarised as follows:

Aim 1. To explore whether the relationship of transformational, transactional and passive leadership style to safety-specific and non-safety specific criteria is affected by team-level safety salience.

Aim 2. To explore whether the relationship of leader flexibility to safety-specific and non-safety specific criteria is affected by team-level safety salience.

Aim 3. To examine whether safety climate mediates the relationship of transformational, transactional, passive leadership and leader flexibility to safety performance.

The chapter begins by outlining how study 2 complements the empirical work that was conducted in study 1. In particular, the two-source design and the team-level measurement of safety salience in study 2, added to the research that was carried out in study 1. To overcome issues of single-source bias, in the present study data on the independent and dependent variables were collected from subordinates and leaders respectively, which constitute two different sources. Moreover, in the present study the three aspects of safety salience (i.e., hazard exposure, injury likelihood and impact
on safety of others) were conceptualised and analysed at the team-level. Members of the same team are exposed to similar contextual characteristics as they work in the same environment. Hackman (1992) describes contextual attributes as ‘ambient’ factors that affect the entire team as a whole. Thus, contextual attributes such as the degree of salience of safety within a work context were assessed at the team-level rather than individual-level perceptions. In line with this, the present study tested safety salience as team-level moderators of the relationship between transformational, transactional, passive leadership and leader flexibility with five different effectiveness criteria (i.e., safety performance, safety climate, job performance, job satisfaction and satisfaction with the leader). This set of criteria was selected to include safety-specific as well as non-safety-specific outcomes and represents performance as well as satisfaction aspects of leader effectiveness. It was tested whether the level of safety salience within a team affects the relationship of transformational, transactional, passive leadership and leader flexibility to these five outcome criteria. It was hypothesised that if safety is highly salient within a team’s work environment, leadership is more strongly related to the investigated set of outcome variables.

To empirically examine these research aims, a cross-sectional survey study in a sample of 160 employees from an oil and gas services company and a manufacturing company was carried out. In the method section, procedures for data collection with the two participating companies are outlined. These two sectors were selected to compile a sample of participants, who all work in contexts where safety plays a role, but is salient to varying degrees. Within both organisations employees were clustered within teams, which means that observations were non-independent. In the analysis strategy section (section 8.5.4) it is outlined how multilevel modelling was used to address this clustered data structure and examine safety salience as team-level variables. Results from the analysis are presented in section 8.5 and findings are discussed in section 8.6.

8.2 Introduction

Study 2 aimed to investigate whether the effectiveness of leadership styles differs in dependence on the level of safety salience within employees’ work contexts. The same three measures of safety salience as in study 1 were explored, i.e., hazard exposure,
injury likelihood and impact on the safety of others. It was tested whether these three contextual characteristics moderate the relationship between transformational-transactional leadership, passive leadership and leader flexibility with several leadership criterion variables. Thus, similarly to study 1, the present study combined a contextual, behavioural and trait perspective on leadership. Parallel to study 1, it was argued that safety-critical contexts pose particular challenges, as there is little margin for error, and competing demands increase ambiguity as to which goals take priority. Consequently, it was proposed that the level of safety salience within a work context impacts on the effectiveness of different leadership styles. To further investigate this proposition the present study complemented study 1 in several ways, which are addressed in the section below.

- In study 1, all data was collected from managers. Collecting information on the independent and dependent variable from a single source, increases the potential for single-source bias, which can inflate statistical estimates of relationships (Podsakoff, MacKenzie & Podsakoff, 2012; Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). In the present study, subordinates rated their leader’s leadership style and leaders rated their subordinates’ performance. Thus, the independent variables (i.e., leadership styles and leader flexibility) and dependent variables (i.e., safety and job performance) were collected from two different sources.

- The present study extended study 1, as passive leadership in addition to transformational-transactional leadership and leader flexibility was investigated. It was proposed that under conditions where safety is salient, passive leadership might be particularly detrimental. This hypothesis is further described below.

- In study 1, individuals’ safety salience perceptions were explored as moderators of the relationship between leadership styles with leadership outcome criteria. Consideration of the level of analysis has been discussed as an essential for a more comprehensive understanding of organisational and leadership issues (Graen & Uhl-Bien, 1995; Klein, Conn, Smith, & Sorra, 2001; Nielsen & Daniels, 2011).

For example, Zohar and Luria (2005) examined ‘job routinisation’ as a contextual, group-level variable, because it is shared amongst members of the same job group. The present study conceptualised the three safety salience measures (i.e., hazard exposure, injury likelihood and impact on safety of others) as team-level variables. Employees of the same team operate in the same work context, and are therefore exposed to similar contextual characteristics. Hence, safety salience can be
theorised as a collective attribute of the team’s context, and the three safety salience measures (i.e., hazard exposure, injury likelihood, impact on safety of others) were therefore investigated as team-level variables.

- In line with the present research design and sample, study 2 assessed a different set of leadership effectiveness criteria compared to study 1. In the present study, leaders rated their subordinates’ safety performance and job performance, which provided criteria that were not based on self-report data. In addition, subordinates reported their safety climate perceptions, which were investigated as a mediator between leadership and safety performance. Moreover, to assess whether salience of safety impacts on the effectiveness of leadership with regards to employee satisfaction, subordinates reported their job satisfaction and satisfaction with their leader. Together, study 1 and study 2 explored a variety of safety-specific and non-safety-specific leadership criteria, including behavioural performance ratings (i.e., team performance in study 1 and safety and job performance in study 2), attitudinal outcome measures (i.e., leader self-efficacy in study 1; safety climate, job satisfaction and satisfaction with leader in study 2) and actual safety incident reports (study 1).

8.3 Hypotheses

The emphasis in the present study was on exploring whether the three safety salience measures moderate the relationships of leadership variables (i.e., transformational, transactional leadership, passive leadership and leader flexibility) to a range of safety-specific and non-safety specific outcomes. A summary of the study’s hypotheses, structured around the above research’s aims, is provided below. Figure 20 shows a schematic representation of the hypotheses.

8.3.1 Aim 1:

**Safety salience as moderators of the relationship of transformational-transactional leadership to effectiveness criteria**

As hypothesised in study 1, it was expected in the present study that transactional and transformational leadership are more strongly related to the investigated leadership criteria if safety is salient, compared to work contexts where safety salience is low. It
was proposed previously in this thesis that transactional leadership behaviours, such as checking for performance standards and errors, might be effective if safety is salient, but might be perceived as too controlling if safety salience is low. In support of this proposition, results from study 1 showed that Management-By-Exception-Active was related to reduced safety incidents if hazard exposure was high, but not under low hazard exposure conditions. The present study further investigated whether safety salience as a team-level variable, moderates the relationship between transactional leadership with the five leadership outcomes that were included in the present study (i.e., safety performance, safety climate, job performance, job satisfaction and satisfaction with leader). Based on the proposition that transactional leadership matches the demands of safety-critical contexts, it was expected that the relationship between transactional leadership and these leader outcomes is stronger if team-level safety salience is high. Thus, it was hypothesised that:

Hypothesis 1: The relationship between transactional leadership with safety performance, safety climate, job performance, job satisfaction and satisfaction with the leader, is moderated by team-level safety salience, with a more positive relationship if salience of safety is high compared to low levels of safety salience (the hypothesis was itemised into hypothesis 1a for hazard exposure, hypothesis 1b for injury likelihood and hypothesis 1c for safety of others as the respective moderators).

Existing research has shown that in critical or uncertain settings, leaders show more intervention and involvement to enhance performance (Morgeson & DeRue, 2005; Künzle et al., 2010; Pillai & Meindl, 1998). Based on these findings, it was proposed that greater amounts of active leadership are required for leader effectiveness if safety is salient. It was expected that leaders have a stronger influence on employee behaviour and attitudes under critical conditions. However, the results from study 1 showed mixed evidence with regards to transformational leadership in safety-critical contexts. In support of the above proposition, findings in study 1 showed that leaders engaged more frequently in transformational leadership practices if hazard exposure and impact on safety of others was rated as high. However, in contrast to the above proposition, results from moderation analysis in study 1 showed that transformational leadership had a weaker relationship with team performance if injury likelihood was high. It was speculated that transformational leadership might provide employees with...
greater leeway in how to apply safety rules, and therefore is less effective for employee performance under conditions where injury likelihood is high. Overall, the findings showed that the level of safety salience impacts on occurrence and effectiveness of transformational leadership, but produced mixed results regarding the direction of this effect. Therefore, in the present study it was expected that the level of safety salience influences the relationship between transformational leadership and outcome criteria, but no prediction was made as to the direction of this effect.

Hypothesis 2: The relationship of transformational leadership to safety performance, safety climate, job performance, job satisfaction and satisfaction with the leader, is moderated by team-level safety salience (the hypothesis was itemised into hypothesis 2a for hazard exposure, hypothesis 2b for injury likelihood and hypothesis 2c for safety of others as the respective moderators).

Safety salience as moderators of the relationship between passive leadership and leadership outcome criteria

It was discussed earlier how passive leadership might have a particularly negative relationship with leader outcomes if salience of safety is high. Previous research has shown that passive leadership has a deleterious influence on safety beyond the absence of active leadership (Kelloway et al., 2006). It was argued that in safety critical-contexts, where prevention of failure is pivotal and employees are frequently faced with competing demands, subordinates look more towards their leaders for support and guidance than in non-safety-critical contexts. It can therefore be proposed that passive leadership is particularly detrimental in safety-critical contexts, as it does not offer guidance for reducing uncertainty and clarifying priorities. Moreover, passive leaders are less likely to proactively rectify mistakes and detect problems, so that there might be more scope for failure. It was expected that if safety is less salient, passive leadership still has a negative impact on effectiveness outcomes, but this might be attenuated as the context calls less for constant vigilance, as employees rely less on their leaders’ guidance and overlooking mistakes has less severe consequences. Thus, the following hypothesis was stated:

Hypothesis 3: The relationship of passive leadership to safety performance, safety climate, job performance, job satisfaction and satisfaction with leader is moderated by
team-level safety salience, with a more negative relationship if safety salience is high compared to low levels of safety salience (the hypothesis was itemised into hypothesis 3a for hazard exposure, hypothesis 3b for injury likelihood and hypothesis 3c for safety of others as the respective moderators).

8.3.2 Aim 2:

Safety salience as a moderator of the relationship between leader flexibility and leadership outcome criteria

It was discussed that effective leaders need to be able to draw on different leadership tactics and adapt their behaviour to the requirements of a particular situation. In support of this proposition, results from study 1 indicated that leader flexibility has an effect on team performance and leader self-efficacy over and above transformational leadership and Management-By-Exception-Active. It was also proposed that in safety-critical contexts both task performance (i.e., compliance with rules and procedures) and contextual performance are of comparable importance, whereas in non-safety-critical contexts compliance might be secondary to contextual performance. Moreover, it was argued that safety-critical contexts pose the challenge of meeting different demands that might be challenging to integrate. Therefore, it was expected in the present research that leader flexibility is of particular relevance if safety is salient. Study 1 showed that leader flexibility was weakly associated with reduced safety incidents if hazard exposure was high, but this moderation effect was not significant at p < .05. In the present study, the role of safety salience for the effectiveness of leader flexibility was further investigated using a two-source design and team-level safety salience variables. Parallel to study 1, it was expected that leader flexibility, as a trait, has an incremental effect on outcome criteria beyond transformational, transactional and passive leadership. It was also proposed that leader flexibility has got a stronger impact on employee performance and satisfaction if safety salience is high compared to low levels of safety salience. Hence, the following hypotheses were advanced:

Hypothesis 4: Leader flexibility is related to job performance (4a), job satisfaction (4b), satisfaction with leader (4c), safety performance (4d) and safety climate (4e) whilst controlling for transformational, transactional and passive leadership.
Hypothesis 5: The relationship between leader flexibility and safety performance, safety climate, job performance, job satisfaction and satisfaction with leader, is stronger if team-level safety salience is high compared to when levels of safety salience are low (the hypothesis was itemised into hypothesis 5a for hazard exposure, hypothesis 5b for injury likelihood and hypothesis 5c for safety of others as the respective moderators).

8.3.3 Aim 3:

Mediator role of safety climate

Existing research has identified safety climate as a mediator in the relationship between leadership and safety-related outcomes (e.g., Clarke, 2010, 2013; DeJoy et al., 2004; Griffin & Neal, 2000; Zohar & Luria, 2005). It has been demonstrated that transformational as well as transactional leadership shape safety climate perceptions, which in turn are associated with safety behaviour (Barling et al., 2002; Clarke & Ward, 2006; Kelloway et al., 2006; Luria, 2008; Zohar & Tenne-Gazit, 2008). It has been explained that subordinates draw on their leader’s behaviour to make sense of their work environment and discern which behaviours are prioritised and rewarded. Through this process leadership actions influence employees’ safety climate perceptions. Whilst several studies have provided evidence for safety climate as a mediator between transformational leadership and safety outcomes, for passive leadership and leader flexibility the mechanisms through which they influence safety has been less researched (Dragoni, 2005). Based on the existing findings that safety climate acts as a mediator between transformational-transactional leadership and safety outcomes, it was expected that safety climate also mediates the relationship of leader flexibility and passive leadership to safety performance. Thus, the following hypothesis was proposed:

Hypothesis 6: Safety climate mediates the relationship of transformational leadership (6a), transactional leadership (6b), passive leadership (6c), leader flexibility (6d) to safety performance.
Figure 20. Schematic representation of study 2 hypotheses.
8.4 Method

8.4.1 Organisational background

Study 2 was conducted in two organisations, an oil and gas service provider (company A) and a food manufacturer (company B). Access to the companies was arranged through the researcher’s contacts. The intent in selecting these two host organisations for the research, was to compose a sample that consisted of employees who work in contexts where safety is salient, but also with variation in the level of safety salience in participants’ work environment. The oil and gas industry and manufacturing industry were identified as suitable in meeting these requirements. In the oil and gas service company, the employees who were invited to participate worked on offshore rigs. Offshore installations pose major hazards such as handling explosive materials, pressurisation control and risk for hydrocarbon release that can have far-reaching consequences not only for a worker carrying out a task, but also for others. In addition, participants’ work activities pose risks for their own physical harm, such as risk from handling and lifting activities (e.g., operating pulley systems), being struck by objects, working at heights, and slips, trips and falls. The participants from the food manufacturing company were based in a factory setting, with the majority of participants working in the production process. Common risks associated with this work setting are colliding with machinery, handling hot goods and chemicals as well as slips, trips and falls. In addition, participants’ work activities have an impact on the safety of other workers (e.g., fork lift driver operating truck around other workers, engineer adjusting machinery that is handled by other workers) as well as for consumers of the product (i.e., food hygiene and safety). The manufacturing sample also included office-based employees who work on the factory site, but less frequently enter the production area to achieve a wide range of safety salience levels.

Further information about the two organisations and the work environment in which employees and leaders operate is provided below.
Company A

Company A is a large oilfield services company that operates across a large number of different countries. The employees that participated in the present research were based on rigs in Thailand and Malaysia. The oilfield service provider is contracted in by companies that own or operate a rig to perform highly specialised services (e.g., drilling operations, well cementing, wireline logging). The present study was conducted with a group of employees that worked in wireline logging services. These operations are usually carried out as part of explorations to find oil or gas reservoirs and acquire information about these. For example, wireline logging services might be performed to obtain data on the quality and quantity of the oil, and might involve taking fluid samples and physical measurements of the rock formation. The information compiled in wireline logging is then taken into consideration for decisions on well and field development.

The employees, who were invited to participate in the study, were field engineers and field technicians. Both field engineers and field technicians travel out to offshore rigs, where they are involved in testing, setting up and running equipment and tools. Usually an engineer/technician works in a crew along with other engineers/technicians and several operators (operators were not included in the study as they do not report to the same manager). Typically one or two projects are performed per month. For each project, engineers and technicians spend approximately ten to twelve days offshore and the remaining days at their company’s nearest on-land office for project preparation and post-processing. When offshore, they work on a twelve-hour shift pattern with frequent night work. Engineers and technicians are positioned in a certain region (e.g., Thailand) and work on different locations within that region. Typically the same crew moves from project to project, although staffing sometimes changes (e.g., if specialist knowledge is required or if additional crew members are needed).

Both field engineers and field technicians report directly to the Field Service Manager, who remains at the on-land office with some visits to the offshore rig, although these are relatively infrequent. When offshore, engineers and technicians report at least once a day to their Field Service Manager to provide progress up-dates and beyond that make contact as required. Most communication takes place over the phone and there is some email contact. When working on-land, engineers and technicians have frequent
face-to-face contact with their Field Service Manager. Field Service Managers are responsible for the performance assessment of field engineers and field technicians.

**Company B**

Company B is a large food manufacturer that produces fresh and frozen bakery products for wholesale customers in the United Kingdom and Europe. The company has four locations across England and the present survey was carried out at one factory site based in the Midlands.

Seven job groups were included in the sample (i.e., production/process operatives, hygiene operatives, packing operatives, quality analysis technicians, electrical engineers, fork lift drivers and customer care and sales). The majority of participants worked in the production process. These employee groups are based in the production or warehouse area of the factory with some employees working in more hazardous environments such as the frozen warehouse or baking area. Descriptions for each job group from company B and the frequently associated risks and hazards are provided in Table 31 in Appendix E. Slips, trips and falls, colliding with machinery, working at heights and burns from handling baking equipment pose the most common hazards and risks. Most employees involved in the production process work on a twelve-hour shift pattern rotating between night and day shifts. It was decided to also include the on-site customer care and sales team in the study to achieve variation with regards to the degree of safety salience and include employees who work in environments where safety is less salient. Employees in the customer care and sales team are based in offices at the factory site, but infrequently enter the production area. All employees are structured into teams of between four and fourteen members with one team leader. The team leader is based on site, but might spend time away from the production area for administrative tasks or meetings. For the customer care team and the sales team, both team members and team leaders are office based. The majority of team member-leader communication takes place face-to-face. Typically, production team members would interact with their team leader several times a day. When employees work nights, they might work unsupervised, so that interactions with the team leader are less frequent. Team leaders are responsible for their team members’ performance assessment and feedback.
8.4.2 Sample

As described above, participants were drawn from two organisations using a two-source study design. In both organisations employees rated the leadership style of the person who they directly report to at work (i.e., Field Service Manager in company A and team leader in company B) and leaders rated their employees’ safety and job performance. Pooling these two sub-samples together allowed for variation within salience of safety, which was essential for testing whether degree of safety salience influences the effectiveness of leadership. Combining the two sub-samples also increased the number of teams, which constitutes the sample size at the team-level, and was therefore important for conducting multilevel analysis.

From the two organisations combined, 239 employees from twenty-four teams were invited to take part, of which 166 participants from twenty-three teams completed the survey (response rate 69.46%).

In organisation A, 123 employees from thirteen teams were invited to take part in the study. Seventy-four participants nested within twelve teams completed the survey, which yields a response rate of 60.16% (i.e., from one team, none of the employees participated). A possible reason for this low response rate might be that all participants were solely approached through email contact rather than face-to-face, which might have reduced employees’ engagement in the study. As described above employees worked on different offshore locations, where the regional Safety and Quality Manager, who acted as the contact for this research, was not physically present, so that all information on the study had to be send via email. Also, the company regularly conducts their own employee survey, which might have affected employees’ willingness to participate in a further survey. In company A, the study was conducted across thirteen teams, from which four managers chose not to participate in the study, so that no performance ratings were available for their team members. As stated above, for one team the manager as well as all team members did not take part, so that no data was available for the entire team. For two managers who did not take part, only one team member had completed the survey. As their performance ratings were missing and no responses from other employees in the team were available, it was decided to delete these two cases from the analysis. Thus, the sample of company A was reduced
to seventy-two participants from ten teams. For the fourth manager who did not participate, nine team members completed the survey. It was therefore decided to keep these participants in the sample.

In company B, the survey was distributed to 116 employees from eleven teams, of which ninety-two employees nested within the eleven teams completed the survey, yielding a response rate of 79.31%. All eleven team leaders agreed to participate and provided performance ratings for their team members.

Preliminary analysis of the data led to a further deletion of four cases (see section 8.5.1), so that the final sample consisted of 160 participants from twenty-one teams (sixty-nine participants from ten teams in company A and ninety-one participants from eleven teams in company B).

Sample demographics for the complete sample, and the oil and gas and bakery manufacturing sub-samples are reported in Table 19. Comparison of the two sub-samples, showed that participants in company A (i.e., oil and gas sample) tended to be younger and had fewer years of job and industry tenure than employees from company B (i.e., manufacturing sample). Also, on average the length of how long leaders have been working with their team members was shorter in the oil and gas sample compared to the manufacturing sample. However, in both samples the average length of employee-supervisor relationship was longer than one year and the shortest period that was reported was ten months. Thus, all employee-leader dyads had been working with each other for a sufficient time length to provide ratings on leadership style and employee performance.

On average teams had $M = 7.6$ team members, $SD = 2.67$ (oil and gas sample $M = 6.9$, $SD = 2.42$; manufacturing sample $M = 8.27$, $SD = 2.83$). In company A, team sizes ranged from four to eleven team members. In company B the smallest team consisted of three members the largest team of thirteen members.
Table 19. Sample demographics for complete sample and sub-samples

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<th>Complete Sample (N = 160)</th>
<th>Oil &amp; Gas Sample (N = 69)</th>
<th>Manufacturing Sample (N = 91)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td><strong>Employee Demographics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>36.35</td>
<td>11.58</td>
<td>29.69</td>
</tr>
<tr>
<td>Job Tenure Years</td>
<td>5.04</td>
<td>5.55</td>
<td>3.49</td>
</tr>
<tr>
<td>Industry Tenure Years</td>
<td>7.44</td>
<td>6.99</td>
<td>5.42</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N Female</td>
<td>27 (18.5%)</td>
<td></td>
<td>7 (12.1%)</td>
</tr>
<tr>
<td>N Male</td>
<td>119 (81.5%)</td>
<td></td>
<td>51 (87.9%)</td>
</tr>
<tr>
<td><strong>Leader Demographics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leader Age</td>
<td>41.55</td>
<td>9.20</td>
<td>49.65</td>
</tr>
<tr>
<td>Leader Job Tenure Years</td>
<td>9.53</td>
<td>7.53</td>
<td>9.33</td>
</tr>
<tr>
<td>Leader Industry Tenure Years</td>
<td>12.74</td>
<td>7.82</td>
<td>9.77</td>
</tr>
<tr>
<td>Length of Leader-Employee Relationship</td>
<td>1.50</td>
<td>2.48</td>
<td>1.36</td>
</tr>
<tr>
<td>Leader Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N Female</td>
<td>4 (19.05%)</td>
<td>0</td>
<td>4 (36.36%)</td>
</tr>
<tr>
<td>N Male</td>
<td>17 (80.95%)</td>
<td>10 (100%)</td>
<td>7 (63.64%)</td>
</tr>
</tbody>
</table>

*Note.* Percentages are valid percentage; fourteen participants did not report their gender and job tenure; eighteen participants did not report their industry tenure and twenty participants did not report their age.
In Table 20 frequencies for participants’ job roles are displayed. The most common job roles were field engineers (27.9%) and production/process operatives (22.1%).

Table 20. Job role frequencies for complete sample and sub-samples

<table>
<thead>
<tr>
<th>Job Role</th>
<th>Complete Sample (N = 160)</th>
<th>Oil &amp; Gas Sample (N = 69)</th>
<th>Manufacturing Sample (N = 91)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Engineer</td>
<td>43</td>
<td>62.3</td>
<td></td>
</tr>
<tr>
<td>Field Specialist</td>
<td>13</td>
<td>18.8</td>
<td></td>
</tr>
<tr>
<td>Trainee Field Engineer</td>
<td>12</td>
<td>17.4</td>
<td></td>
</tr>
<tr>
<td>Trainee Field Specialist</td>
<td>1</td>
<td>1.4</td>
<td></td>
</tr>
<tr>
<td>Process/Production Operative</td>
<td>34</td>
<td>22.1</td>
<td>40</td>
</tr>
<tr>
<td>Packing Operative</td>
<td>18</td>
<td>11.7</td>
<td>21.2</td>
</tr>
<tr>
<td>Fork Lift Driver</td>
<td>7</td>
<td>4.5</td>
<td>8.2</td>
</tr>
<tr>
<td>Service Operative</td>
<td>6</td>
<td>3.9</td>
<td>7.1</td>
</tr>
<tr>
<td>Hygiene Operative</td>
<td>6</td>
<td>3.9</td>
<td>7.1</td>
</tr>
<tr>
<td>Electrical Engineer</td>
<td>6</td>
<td>3.9</td>
<td>7.1</td>
</tr>
<tr>
<td>Customer Service Agent</td>
<td>3</td>
<td>1.9</td>
<td>3.5</td>
</tr>
<tr>
<td>Quality Assurance Technician</td>
<td>3</td>
<td>1.9</td>
<td>3.5</td>
</tr>
<tr>
<td>Yard Maintenance Worker</td>
<td>1</td>
<td>0.6</td>
<td>1.2</td>
</tr>
<tr>
<td>Sales Agent</td>
<td>1</td>
<td>0.6</td>
<td>1.2</td>
</tr>
</tbody>
</table>

*Note.* Percentages are valid percentage; six participants in the manufacturing sample did not report their job role title.

To assess whether employees’ perceptions of the level of safety salience in their work environment significantly differed between the two companies, t-tests were performed for the three safety salience measures (i.e., injury likelihood, hazard exposure, safety of others). As displayed in Table 21, employees in the oil and gas sample reported on average significantly higher levels of injury likelihood, hazard exposure and impact on the safety of others. This finding was to be expected as the employees in the oil and gas sample are exposed to major hazards (e.g., explosives, drilling fluids, cranes), which are not present in the manufacturing work environment. The result indicated that the three safety salience measures were appropriately interpreted and rated by participants. However, although t-tests were significant, the magnitude of the mean differences was not large, indicating participants in the manufacturing sample
perceived the level of safety salience as only somewhat lower compared to participants in the oil and gas sample.

### Table 21. Risk mean comparison between the two sub-samples

<table>
<thead>
<tr>
<th>Sample</th>
<th>Injury Likelihood</th>
<th>Risk Measure Hazard Exposure</th>
<th>Safety of Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil and Gas sub-sample (N = 69)</td>
<td>3.06 .78</td>
<td>3.92 .70</td>
<td>3.85 1.07</td>
</tr>
<tr>
<td>Manufacturing sub-sample (N = 91)</td>
<td>2.56 .92</td>
<td>3.24 .57</td>
<td>3.22 1.42</td>
</tr>
</tbody>
</table>

| t-value                  | 3.44***          | 6.45***                      | 2.91**           |

*Note.* ***p < .001, **p < .01.

#### 8.4.3 Procedure

A cross-sectional survey design was used for the study. Both employees and managers/team leaders were invited to complete a survey on ‘management and safety practices’. Data collection procedures in the two organisations were similar, with the difference being that in organisation A, the survey was distributed online whereas in organisation B paper copies were distributed.

**Procedure in Company A**

In the oil and gas service provider company, employees and their Field Service Manager were invited by email between September 2012 and December 2012 to participate in an online survey. Prior to the study invitation all employees and managers received an advanced email notification from the regional Quality and Safety Manager informing them that their company is taking part in this research project and that the researcher will contact them. The email invitation provided employees with an overview of the study’s purpose and further information about participation was displayed on the first page of the online survey. To allow matching of managers’ and employees’ responses, email invitations included personalised links. This was outlined to participants in the invitation and on the first page of the online
Reminder invitations were issued at three time points after the initial email invitation to employees and managers who had not yet taken part. As an incentive for survey completion, all participants were offered to enter into a prize draw to win an Amazon voucher.

In organisation A, a web-based survey was most suitable as participants worked in remote locations. Also, all participants had access to a computer at their place of work and were allowed to complete the survey during their work hours.

**Procedure in Company B**

In the food manufacturing company, the Operations Manager, who acted as the organisation’s contact for this research, distributed paper copies of the survey to employees and their team leaders on site. Data collection took place during October and November 2012. Prior to the survey distribution the Operations Manager was briefed by the researcher on the data collection procedure, including ethical issues and was provided with the materials. Participants were invited to complete a pen-and-paper questionnaire during their normal work hours. Envelopes were provided to seal completed questionnaires, which were then returned to the Operations Manager. A pen-and-paper questionnaire format was most suitable in organisation B, as not all participants had access to computers at work. To match team leaders’ performance ratings with employees’ responses each questionnaire was issued with a unique code. Prior to the survey distribution, the researcher received a list of names for all potential participants. Each subordinate questionnaire was issued with a match code that corresponded to an employee’s name. In the leader questionnaire, team leaders were asked to write down the name of the team member they were rating in the respective performance rating section. The researcher then matched the names in the performance ratings from the leader questionnaire to the employee questionnaire codes. Participants from organisation B were also entered into a prize draw for an Amazon voucher by listing their email address on a separate sheet.
8.4.4 Materials

In the following sections the measures used in the study are described. A copy of the questionnaire that was completed by subordinates is included in Appendix F, and a copy of the questionnaire that was completed by leaders is included in Appendix G.

8.4.4.1 Leadership measures

Employees’ perceptions of their leaders’ leadership style and leader flexibility were measured, using the same instruments as in study 1. Transformational, transactional and passive leadership style were measured through the MLQ (Avolio & Bass, 1995; see section 6.5.4 for example items). Leader flexibility was measured through the scale adopted from Kaiser (2010) and Kaiser, Lindberg, and Craig (2007; see section 7.4.3.1 for example items).

8.4.4.2 Safety salience

As in study 1, three measures of the level of safety salience within participants’ work environments were used (i.e., hazard exposure, injury likelihood and impact on the safety of others). Compared to study 1 where leaders rated the level of safety salience in their subordinates’ environment, in the present study employees self-reported their perceptions on the three safety salience measures and the item wording was changed accordingly. For safety of others the same single-item as in the two previous studies was used (see section 7.4.3.2, p. 131). For injury likelihood and hazard exposure, measurement slightly varied as described below. The term safety salience is used again to refer to all three measures together.

Injury likelihood

As in study 1, three items from Cox and Cheyne’s (2000) appreciation of risk sub-scale were used to assess perceived injury likelihood. As was explained in study 1, perceptions of risk of injury have been shown to constitute a safety outcome and were therefore measured as a contextual variable rather than a facet of safety climate (Dedobbeleer & Béland, 1991; Tomás et al., 1999; Yule et al., 2007). This was confirmed in a CFA, where a two-factor model with safety climate and injury likelihood as two separate factors showed better fit compared to a one-factor model.
(see Appendix J). Analysis of the scale showed that the reverse scored item “I am rarely worried about being injured in my job” substantially reduced scale reliability (Cronbach’s alpha with the item = .29, Cronbach’s alpha without the item = .55). In addition, confirmatory factor analysis showed that the item only weakly loaded onto the common factor at -0.01, p = .91, whereas the other two items showed significant loadings of .69, p = .001 and .57, p = .001, respectively. Thus, it was decided to exclude the problematic item in the analysis. Thus, the two remaining items measured injury likelihood in the present study. The reliability coefficient for the reduced two-item version was still below the generally recommended value of .70, but was in line with previous research, which has reported similar reliability (Coy & Cheyne, 2000).

**Hazard exposure**

Employees rated the level of hazard exposure in their job on one item adapted from DeJoy et al. (2004; “Rate the level of hazards associated with your type of job”). A five-point response scale was used with anchor points ranging from one “very low hazard-level” to five “very high hazard-level”.

### 8.4.4.3 Outcome criteria

#### Job satisfaction

Employees self-reported their job satisfaction on one item (“All things considered, how satisfied are you with your job?”, Rusbult & Farrell, 1983; Scarpello & Campbell, 1983). A five-point response scale ranging from one “very dissatisfied” to five “very satisfied” accompanied the item. Single-item measures have been frequently employed in organisational research to assess global job satisfaction (e.g., Begley & Czajka, 1993; Nagy, 2002; Pierro, Cicero, Bonaiuto, Van Knippenberg, & Kruglanski, 2005; Yousef, 2000). It has been remarked that if a construct is narrow and unequivocal, single-item measurement is acceptable and performs comparably to multiple-item scales (Nagy, 2002; Scarpello & Campbell, 1983; Wanous, Reichers, & Hudy, 1997).

#### Satisfaction with leader

Employees rated their satisfaction with their leader on two items from leader effectiveness scales included in the MLQ (Avolio & Bass, 1996; “My team leader uses
leadership methods that are satisfying”, and “My team leader works with me in a satisfactory way”). The items were accompanied by a five-point scale ranging from one “strongly disagree” to five “strongly agree”.

Safety climate
Employees’ safety climate perceptions were measured using Cox and Cheynes’ (2000) safety climate tool. Items from two sub-scales (i.e., Personal Need for Safety and Appreciation of Risk) were not included as they referred to employees’ personal sense of the meaning of safety or perceptions of risk, rather than the priority of safety over other demands within their work environment. Thus, employees rated their safety climate perceptions on thirty-four items referring to seven sub-dimensions (i.e., (1) Management Commitment, (2) Safety Communication, (3) Supportive Environment, (4) Priority of Safety, (5) Safety Rules, (6) Involvement in Safety, (7) Work Environment). Example items are “In my workplace management turns a blind eye to safety” (Management Commitment), “Co-workers often give tips to each other on how to work safely” (Supportive Environment) and “I am involved in safety issues at work” (Safety Involvement). A five-point response scale was used from one “strongly disagree” to five “strongly agree”.

Leader-rated performance measures
As described above, the study used a two-source design with ratings on subordinate safety and job performance provided by the employees’ leader. The following scales were used to assess safety performance and job performance respectively.

Safety performance
Leaders rated their team members’ safety performance on Griffin and Neal’s (2000; Neal & Griffin, 2006) six-item scale. The scale can be divided into safety compliance and safety participation, with each sub-facet assessed through three items respectively. Safety compliance refers to complying with rules and regulations about safety and adhering to safety procedures (an example item was “This person uses all the necessary safety equipment to do his/her job”). Safety participation describes employees’ voluntary engagement in safety activities and effort directed towards ensuring safety (an example item was: “This person voluntarily carries out tasks or activities that help to improve workplace safety”). A five-item response scale ranging from one “strongly
disagree” to five “strongly agree” accompanied all items. The scale has shown good psychometric properties in previous safety research (e.g., Clarke & Ward, 2006; Kapp, 2012).

Job performance
Leaders rated their team members’ job performance on six items adapted from Griffin, Neal, and Parker (2007) and Griffin and Neal (2000). It is generally accepted that job performance can be categorised as either task or contextual performance (Conway, 1999; Borman & Motowidlo, 1997). Three items by Griffin, Neal and Parker (2007) were used to assess employees’ task performance with regards to their core job tasks (an example item was: “This person carries out the core parts of his/her job well”). The three items to assess contextual performance were adapted from Griffin and Neal’s (2000) safety participation scale and modified to represent non-domain specific extra effort (an example item was: “This person makes suggestions to improve the overall effectiveness of the company”). The division of safety performance into its two components of safety compliance and safety participation, is parallel to the subdivision of job performance into task and contextual performance (Griffin & Neal, 2000; Neal & Griffin, 2006). Thus to measure safety participation and contextual performance in a comparable fashion, Neal and Griffin’s (2006) safety participation items were generalised into facet-free items. A five-point response scale ranging from one “strongly disagree” to five “strongly agree” accompanied all job performance items.
8.5 Results

8.5.1 Preliminary analysis

Prior to hypothesis testing the data values were inspected for plausibility and the data was checked for missing values, normality, outliers and multicollinearity.

Missing values

Missing value analysis was performed to diagnose missing data mechanisms. Little’s MCAR test was significant (chi-square (74) = 107.50, p = .01) inferring that data was not missing at random. Due to a set up error in the online survey, the items of the three safety salience measures were not displayed when the survey link was first emailed out to the participants of the oil and gas company. This error was subsequently corrected but meant that the first participants who completed the survey were not presented with these items. Two safety salience measures, safety of others and injury likelihood, had ten missing cases (6.3%) and hazard exposure had thirteen missing cases (8.1%). Thus, this omission error might have caused the non-random missing data pattern. Schafer (1997) discusses differences between ‘missing at random’ and ‘not missing at random’ patterns. He explained that in situations, where some survey information was collected from only a sub-set of the total sample (as had happened in the present sample), the missing data mechanism can be considered as ‘missing at random’. To further examine whether the erroneous omission of the safety salience scales was the source for the significant Little’s MCAR test, missing value analysis was repeated without injury likelihood, hazard exposure and safety of others. For this reduced variable set, Little’s MCAR test was no longer significant indicating that data was missing completely at random (chi-square (47) = 57.58, p = .14).

Safety performance and job performance as rated by employees’ leaders showed the largest amount of missing data. Both variables had thirty-seven missing cases (23.1%). In both, company A and B some leaders did not provide performance ratings for all of their team members. In the online survey in company A, Field Service Managers were shown separate rating blocks for each of their subordinates, but some managers stopped the survey before having rated all team members. In company B, pen-and-paper questionnaires were used and team leaders were required to independently recall
all their team members, which might have caused some of the missing performance ratings. Also, in some instances team leaders provided performance ratings but did not write down the employee’s name, so that matching of responses was not possible.

Traditional methods of dealing with missing values such as listwise deletion or single imputation, suffer from serious disadvantages and often lead to biased parameter estimation and misleading conclusions (Enders, 2010; Enders & Bandalos, 2001; Schafer & Graham, 2002). Instead in the present analysis, for hypothesis testing performed with Mplus, full information maximum likelihood estimation (FIML) was used for missing values. Simulation results have shown that the FIML method leads to stable estimates even when the amount of missing data is large (e.g., more than 25% missing values; Collins, Schafer & Cam, 2001; Graham, 2003), when data is missing at random (MAR) rather than missing completely at random (Little & Rubin, 2002) and when data is non-normally distributed (Muthén & Asparouhov, 2002).

Testing for normality

Q-Q plots were inspected and z-scores for skewness and kurtosis were computed to inspect the data for deviations from normality. Several study variables did not meet the assumption for normality (see Table 22). Transformational leadership, safety of others, job satisfaction, satisfaction with leader and job variety were significantly negatively skewed. Thus, scores for these variables tended to be clustered at the higher end of the scale for these variables. Passive leadership was positively skewed, which means that scores were clustered towards the lower end of the scale. As some of the variables showed significant departure from normality, it is likely that criteria for multivariate normality were not met (Tabachnick & Fidell, 2012).
Table 22. Results for testing study variables for normality

<table>
<thead>
<tr>
<th>Variable</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>z-score</td>
<td>z-score</td>
</tr>
<tr>
<td>Transformational Leadership</td>
<td>-2.16*</td>
<td>.26</td>
</tr>
<tr>
<td>Management-By-Exception-Active</td>
<td>-1.32</td>
<td>-1.10</td>
</tr>
<tr>
<td>Passive Leadership</td>
<td>5.27***</td>
<td>.10</td>
</tr>
<tr>
<td>Leader Flexibility</td>
<td>.03</td>
<td>.34</td>
</tr>
<tr>
<td>Injury Likelihood</td>
<td>-.70</td>
<td>-.77</td>
</tr>
<tr>
<td>Hazard Exposure</td>
<td>-.95</td>
<td>-.49</td>
</tr>
<tr>
<td>Safety of Others</td>
<td>-3.95***</td>
<td>-1.5</td>
</tr>
<tr>
<td>Job Satisfaction</td>
<td>-2.85**</td>
<td>-.10</td>
</tr>
<tr>
<td>Satisfaction with Leader</td>
<td>-3.10**</td>
<td>1.82</td>
</tr>
<tr>
<td>Safety Climate</td>
<td>-.21</td>
<td>-.24</td>
</tr>
<tr>
<td>Safety Performance</td>
<td>.82</td>
<td>-.60</td>
</tr>
<tr>
<td>Job Performance</td>
<td>.86</td>
<td>-1.58</td>
</tr>
</tbody>
</table>

Note. *p < .05, **p < .01, ***p < .001

As discussed in study 1, transforming variables to alleviate non-normality has disadvantages such as complicating the interpretation of the results (Grayson, 2004). None of the variables showed extreme non-normality and it has been suggested that moderate deviations from normality can be tolerated (Field, 2005). Thus, it was decided not to conduct variable transformations. As in study 1, robust maximum likelihood (MLR) estimation was used in the structural equation modelling analyses, which is capable of calculating reliable model estimates when normality is violated (Bryne, 2012; Muthén & Muthén, 2010).

Testing for outliers

The data was inspected for univariate outliers through computation of z-scores. Four cases were identified as significant outliers and therefore deleted prior to the analysis. This reduced the sample size to 160 participants (N = 69 in the oil and gas sample, N = 91 in the food manufacturing sample). To check for multivariate outliers Mahalanobis distance was computed. No cases exceeded the critical chi-square value for Mahalanobis distance to be significant at p < .001 (Tabachnick & Fidell, 2012). Hence, no multivariate outliers were identified in the data set.
**Multicollinearity**

All independent variables were evaluated for multicollinearity. Transformational leadership showed the lowest tolerance statistic at .34, which does not fall below the recommended value of .20 for indicating multicollinearity problems (Menard, 1995). The Variance Inflation Factors (VIF) for transformational leadership was 2.93, which does not exceed the commonly applied value of 10 to identify problems of multicollinearity (Field, 2005). However, the average VIF was 1.64, which exceeds Bowerman and O’Connor’s (1990) recommended value of 1. Inspection of the correlation coefficients also revealed strong correlations between transformational leadership and Management-By-Exception-Active (r = .70, p < .001) and between transformational leadership and leader flexibility (r = .71, p < .001). The issue of multicollinearity is acknowledged in the interpretation of the results.

**MLQ confirmatory factor analysis**

As outlined in chapter six (Methodology chapter), previous research has produced inconsistent results as to the factor structure of MLQ (e.g., Edwards et al., 2012; Hinkin & Schriesheim, 2008; Tejeda et al. 2001). Study 1 identified a factor model as best fitting that differed from the scale authors’ suggested structure. Therefore, confirmatory factor analysis (CFA) was performed to test the MLQ factor structure in the present study. The results from this CFA are described in Appendix H. The best fitting model specified Contingent Reward as a transformational leadership dimensions and Management-By-Exception-Passive loaded together with laissez-faire leadership on a common passive leadership factor. This factor structure of the MLQ was in line with the outcome of the CFA in study 1. As Management-By-Exception-Active formed its own factor representing transactional leadership, the term Management-By-Exception-Active rather than transactional leadership is used in the following sections, when referring to the present study’s results. The third factor, passive leadership, was defined by Management-By-Exception-Passive and laissez-faire leadership.

The identified MLQ factor structure was tested for invariance between the two sub-samples from the oil and gas services company and the manufacturing company respectively (see Appendix I). Overall, results indicated that the MLQ operates equivalently across the two sub-samples.
8.5.2 Descriptive statistics

Correlation coefficients and descriptive statistics are presented in Table 23. Both transformational leadership and Management-By-Exception-Active correlated positively with job satisfaction, satisfaction with leader and safety climate, with transformational leadership more strongly related to these outcome measures compared to Management-By-Exception-Active. Neither transformational nor Management-By-Exception-Active were significantly related to safety and job performance as rated by employees’ leaders. Safety climate showed significant positive correlations with both safety and job performance. Injury likelihood was significantly, negatively associated with transformational leadership and Management-By-Exception-Active, indicating that if employees perceived injury likelihood as high, they tended to rate their leaders lower on the two leadership styles.
Table 23. Correlation coefficients, means, standard deviations and reliabilities for complete sample

<table>
<thead>
<tr>
<th>Variable</th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
<th>6.</th>
<th>7.</th>
<th>8.</th>
<th>9.</th>
<th>10.</th>
<th>11.</th>
<th>M</th>
<th>SD</th>
<th>α</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. TF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. MBEA</td>
<td>.70***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.95</td>
<td>.65</td>
</tr>
<tr>
<td>3. Passive Leadership</td>
<td>-.44***</td>
<td>-.48***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.69</td>
<td>.73</td>
</tr>
<tr>
<td>4. Leader Flexibility</td>
<td>.71***</td>
<td>.55***</td>
<td>-.44***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.85</td>
<td>.59</td>
</tr>
<tr>
<td>5. Injury Likelihood</td>
<td>-.28***</td>
<td>-.28***</td>
<td>.26***</td>
<td>-.12</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>2.77</td>
<td>.89</td>
</tr>
<tr>
<td>6. Hazard Exposure</td>
<td>.18*</td>
<td>.04</td>
<td>-.13</td>
<td>.18*</td>
<td>-.03</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>3.52</td>
<td>.70</td>
</tr>
<tr>
<td>7. Safety of Others</td>
<td>-.04</td>
<td>-.08</td>
<td>-.07</td>
<td>.09</td>
<td>.11</td>
<td>.03</td>
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<td>8. Safety Climate</td>
<td>.45***</td>
<td>.37***</td>
<td>-.36***</td>
<td>.45***</td>
<td>-.34***</td>
<td>.45***</td>
<td>.01</td>
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<td>9. Safety Performance</td>
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<td>10. Job Performance</td>
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<td>-.04</td>
<td>-.14</td>
<td>.09</td>
<td>.01</td>
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<td>11. Job Satisfaction</td>
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<td>.31***</td>
<td>-.33***</td>
<td>.12</td>
<td>-.15</td>
<td>.33***</td>
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<td>.06</td>
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<td>12. Satisfaction with Leader</td>
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<td>-.36***</td>
<td>.59***</td>
<td>-.38***</td>
<td>.21*</td>
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<td>.02</td>
<td>-.01</td>
<td>.54***</td>
<td>3.86</td>
<td>.77</td>
<td>.76</td>
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</tbody>
</table>

Note. *p < .05, ***p < .001; TF = Transformational leadership; MBEA = Management-By-Exception-Active; reliabilities are Cronbach's alpha; no reliabilities are reported for job satisfaction, safety of others and hazard exposure as these were single-item measures.
8.5.3 Multilevel modelling

The data in the present study had a nested structure as employees were clustered within teams. Hierarchical data structures violate the statistical assumption of independence of observations, which is required in regression approaches (Aguinis, Gottfredson, & Culpepper, 2013; Snijder & Bosker, 1999). It has been extensively observed that failing to address dependency amongst observations, can introduce bias into the analysis (Raudenbush & Bryk, 2002; Snijders & Bosker, 1999). Cohen, Cohen, West, and Aiken (2003) explain that if no adjustments are made for lack of independence, the standard errors of model parameters are likely to be underestimated. As a consequence, p-values as well as confidence intervals are likely to be underestimated and the risk for a Type I error increases. As the degree of non-independence increases (i.e., similarity of scores within clusters), the potential for bias through overestimated significance increases (Cohen et al., 2003).

In the present study, employees within the same team all rated the same leader, so that there are dependencies among their leadership style ratings and leader flexibility perceptions. Further, leaders’ employee performance ratings also do not meet the assumption for independent observations. Leader’s individual conceptions of performance standards and assessment criteria might have influenced their ratings. Also, employees within the same team might be more similar in their job and safety performance. If employee performance is to some degree the outcome of the leader’s actions, then members of the same team who are all subjected to the same leader, might be more similar in their performance levels (Aguinis et al., 2013). Thus, it is important to consider between-group variability for employees’ responses as well as leaders’ performance ratings.

In addition, injury likelihood, hazard exposure and safety of others were conceptualised as team-level variables, as members from the same team are likely to converge in their perceptions of the level of safety salience within their work context. Thus, as is outlined further below, injury likelihood, hazard exposure and safety of others were assessed as team-level variables. Safety climate was also discussed as a team-level variable, although as is explained below, no evidence was found for this.
It was decided to use manifest variables based on item mean scores in the analysis rather than latent factors with item indicators. In multilevel modelling, for models to be identified, estimated parameters must not exceed the number of clusters (Muthén & Muthén, 2010). Therefore, as the number of clusters was relatively small in the present sample (i.e., twenty-one teams) manifest variables were used to avoid model non-identification and convergence problems.

**Degree of non-independence**

To assess the proportions of between-group variance and to confirm that multilevel analysis is appropriate, intraclass correlation coefficients (ICC) were computed. The ICC(1) refers to the proportion of variance that can be attributed to team differences and the ICC(2) refers to reliability of the group mean (Aguinis et al., 2012; Shrout & Fleiss, 1979). In addition, one-way analysis of variance (ANOVA) was conducted to test whether significant mean differences existed between teams on the respective study variables. This set of criteria, ICC(1), ICC(2) and ANOVA, has been commonly applied to assess appropriateness of multilevel modelling (e.g., Zhou, Wang, Chen, & Shi, 2012; Zohar & Luria, 2005). Results for these indexes are displayed in Table 24. Whilst there is no hard rule for a minimum proportion of between-group variance, it has been stressed that even low ICC(1) values of .05 or .10 can lead to bias (Bliese, 2000; Cohen et al., 2003; Geiser, 2012) and ICC(2) values of around .70 are considered to indicate reliability of means (Bryk & Raudenbush, 1992).

Safety and job performance as rated by leaders showed the largest amounts of between-group variance, with ICC(1) values of .37 and .26 respectively. Hence, 37% of variance in employees’ safety performance scores and 26% in their job performance scores are due to differences between teams. For transformational leadership and Management-By-Exception-Active, ICC values were small to moderate, indicating that variance can be attributed to team differences, but that a considerable amount of within-variance remains. This finding is plausible as leaders might relate to their team overall, as well as having more individualised relationships with employees. For example, a leader might generally be more transactional, but their dyadic relationship with separate team members might differ somewhat with regards to their prevalent leadership style. Overall, the ICC values for the leadership variables and performance
outcomes provide support for a nested data structure that requires controlling for non-independence.

As discussed above, the three safety salience measures were conceptualised as team-level variables as they represent contextual characteristics that are likely to be assessed similarly by members within one group who all work in the same context. It was expected that ratings of the level of hazard exposure, likelihood for injury and the impact on safety of others, are similar within teams and would show variability between teams. For hazard exposure, the ICC(1) at .31 and ICC(2) at .78 demonstrated considerable between-group variability. Thus, these values lent support for assessing hazard exposure as a team-level variable and to aggregate hazard exposure scores from a group mean. For injury likelihood and safety of others the ICC(1) values were relatively low at .06 and .08 respectively (see Table 24). This suggested that whilst some variability was accounted for by between-team differences, there was considerable variability within teams with regards to perceptions on injury likelihood and the impact on safety of others. Yet, it has been shown in simulation studies that even small ICC values can lead to bias and Preacher, Zyphur, and Zhang (2010, 2011) recommend a minimum ICC(1) value of .05 for between-level constructs. Given that for both injury likelihood and for impact on safety of others, the ICCs exceeded this suggested value, and based on the theoretical rationale that safety salience perceptions form a contextual variable that pertains to all members of the same group, a team-level perspective of injury likelihood and safety of others were vindicated. Thus, when assessing cross-level effects in the analysis, hazard exposure, injury likelihood and safety of others were included as team-level variables.

Safety climate has also been discussed as a higher unit variable as it refers to employees’ shared perceptions about the priority of safety (Zohar, 2000). However, in the present study no support for safety climate as a group-level variable was found. The ICC(1) at .04 and ICC(2) at .05 did not provide evidence for convergence of individuals’ safety climate perceptions within teams. Further, ANOVA results showed no significant differences between teams’ mean safety climate score. Thus, these findings suggested that safety climate perceptions vary considerably within teams and did not offer support for treating safety climate as a team-level variable. Preacher et al. (2010) explained that forcing variables with very low ICCs to be ‘between-only
variables’ can cause unstable model estimation. It was therefore decided to remain safety climate as an individual-level variable. Possible factors that might have contributed to the low convergence of team members’ safety climate perceptions are considered in the discussion.

Table 24. Intra-class correlations by team for study variables

<table>
<thead>
<tr>
<th></th>
<th>ICC 1</th>
<th>ICC 2</th>
<th>ANOVA F</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Leadership Variables</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transformational Leadership</td>
<td>.12</td>
<td>.54</td>
<td>2.17 **</td>
</tr>
<tr>
<td>Management-By-Exception-Active</td>
<td>.09</td>
<td>.47</td>
<td>1.88*</td>
</tr>
<tr>
<td>Leader Flexibility</td>
<td>.10</td>
<td>.42</td>
<td>1.71*</td>
</tr>
<tr>
<td>Passive Leadership</td>
<td>.09</td>
<td>.42</td>
<td>1.72*</td>
</tr>
<tr>
<td><strong>Safety Salience Variable</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injury Likelihood</td>
<td>.06</td>
<td>.25</td>
<td>1.33</td>
</tr>
<tr>
<td>Hazard Exposure</td>
<td>.31</td>
<td>.78</td>
<td>4.44 ***</td>
</tr>
<tr>
<td>Safety of Others</td>
<td>.08</td>
<td>.43</td>
<td>1.74*</td>
</tr>
<tr>
<td><strong>Dependent Variables (non-safety-specific)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfaction with Leader</td>
<td>.08</td>
<td>.42</td>
<td>1.74*</td>
</tr>
<tr>
<td>Job Satisfaction</td>
<td>.07</td>
<td>.41</td>
<td>1.71*</td>
</tr>
<tr>
<td>Job Performance</td>
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<td>.68</td>
<td>3.16***</td>
</tr>
<tr>
<td><strong>Dependent Variables (safety-specific)</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Safety Performance</td>
<td>.37</td>
<td>.79</td>
<td>4.69***</td>
</tr>
<tr>
<td>Safety Climate</td>
<td>.04</td>
<td>.05</td>
<td>1.05</td>
</tr>
</tbody>
</table>

*Note.* *p < .05, **p < .01, ***p < .001; degrees of freedom in the ANOVA for safety performance and job performance = 19, for all other variable degrees of freedom were 20.

8.5.4 Analysis strategy

The present study aimed to explore whether team-level safety salience (i.e., hazard exposure, injury likelihood and impact on safety of others), influences the effectiveness of leadership (i.e., transformational, transactional and passive leadership style as well as leader flexibility). Therefore, the three safety salience measures were tested as moderators of the relationships between the listed leadership variables and the study’s outcome variables (i.e., safety performance, safety climate, job performance, job satisfaction and satisfaction with leader). It was hypothesised that transformational leadership, Management-By-Exception-Active and leader flexibility
are more positively related to the investigated outcomes, and passive leadership is more negatively related to the outcome criteria if team-level safety salience is high. To test the stated hypotheses a series of moderation models were computed. The following outline provides an overview of the steps in this analysis before presenting the results.

When testing multilevel models it is recommended to sequentially increase model complexity (Aguinis et al., 2013; Geiser, 2012; Preacher et al., 2010). It is common practice to begin by investigating random-intercept models with fixed slopes, which controls for non-independence of data, but does not estimate cross-level effects. From there, analysis is usually progressed to examining random-slope models and cross-level effects (Aguinis et al., 2013; Geiser, 2012; Preacher et al., 2010).

The present analysis followed this strategy and analysed the data in three parts, which are outlined in the following. In the first part of the analysis, the three safety salience measures were tested as moderators of the leadership-outcome relationships in models with random intercepts but fixed slopes. This means that all relationships were modelled at the individual-level, whilst controlling for between-group variability. Detailed results from the random-intercept models are reported in Appendix K rather than in the main text, as the focus of the study was to investigate safety salience at the team-level and its cross-level interactions with leadership styles. However, a brief summary of this part of the analysis is included below.

In the second part of the analysis, the three safety salience measures were tested as team-level moderators in models with random slopes. To create group-level variables, the scores on the three safety salience variables were aggregated to a group mean for members of the same team. Leadership styles and dependent variables were specified at the individual-level, whilst controlling for between-level variance. Thus, in the random-slope models (analysis part two), cross-level interactions between the three safety salience variables (team-level) and transformational leadership, Management-By-Exception-Active, passive leadership and leader flexibility (individual-level) were tested. Raudenbush and Bryk (2002) describe cross-level interactions as distributive effects, because the individual-level relationship between the independent and dependent variable is distributed across the units of the team-level moderator.
In the second part of the analysis as described above, cross-level interactions were tested in separate models for the three respective safety salience measures. In the final part of the analysis (analysis part three), the cross-level interactions that were identified in the second part, were modelled simultaneously, and in addition safety climate was tested as a mediator of the relationships between leadership and safety performance (hypothesis 6). Aguinis et al. (2013) recommended that when investigating multiple cross-level interactions, these should ideally be tested in one common model. However, the authors highlighted that model non-convergence, lack of degrees of freedom and insufficient statistical power, often pose issues that impede simultaneous testing of multiple cross-level interactions (Aguinis et al., 2013). If it is not possible to test cross-level interactions in one combined model, it is recommended to test separate models, provided that a theoretical rational underlines the interaction effects and results are reported and interpreted transparently (Aguinis et al., 2013; Brutus, Aguinis, & Wassmer, 2013). In the present study, a full model that specified cross-level interactions between safety salience variables and leadership variables, as well as safety climate as a mediator, and included all dependent variables (i.e., job performance, job satisfaction, satisfaction with leader and safety performance) did not converge. Thus, following Aguinis et al.’s (2013) guidelines, it was decided to split the full model into two models with reduced complexity. One ‘safety-specific model’ was specified that tested the moderation effects of the three, team-level safety salience measures on the relationship between leadership styles and safety performance, whilst also testing the mediating role of safety climate. A second, ‘generalised model’ was specified that tested the cross-level interactions between the three safety salience variables at the team-level and leadership on the non-safety-specific outcomes (i.e., job performance, job satisfaction and leader satisfaction). Thus, the former model examined whether leadership styles’ effectiveness on safety outcomes differed depending on the level of safety salience. The latter model examined whether safety salience moderated the influence of leadership on outcomes beyond safety.
8.5.5 Hypotheses testing

*Analysis part one: Random-intercept models*

In the first part of the analysis, random-intercept models were specified that tested whether safety salience (i.e., hazard exposure, injury likelihood and safety of others) moderated the relationship between the different leadership variables and study outcome measures (see Figure 21). All paths were modelled at the individual- and team-level simultaneously to address the nested data structure. The results from the interaction effects in these random-intercept models are summarised in Table 35 in Appendix K. Detection of significant interaction terms is often affected by low statistical power. Aguinis et al. (2013) point out that insufficient power constitutes a particular problem in multilevel models, as sample sizes at the higher level are often small. Thus, in the present analysis, interaction terms with p-values smaller than .10 were considered for interpretation, whereby exact p-values are reported for transparency. Results for the random-intercept models showed several significant interaction effects between the safety salience measures and leadership variables. However, in these models all paths are either modelled at the individual-level or the team-level without any cross-level effects. The focus of the present study was to examine the three safety salience measures as team-level variables. Therefore, in the subsequent two parts of the analysis, the interaction models were repeated with hazard exposure, injury likelihood and safety of others as team-level variables.
Figure 21. Schematic representation of random-intercept model.
Analysis part two: Cross-level interactions

In the random-intercept models in the first part of the analysis, variables were specified at the individual- and team-level simultaneously, but without any cross-level effects. In this second part of the analysis, it was tested whether the degree of safety salience at the group-level impacts on the effectiveness of the investigated leadership variables. Thus, cross-level interactions between the three safety salience measures (group-level) and leadership variables (individual-level) were assessed. A schematic representation of the tested cross-level interactions is shown in Figure 22. To test the three safety salience variables as group-level moderators, random slopes were specified at the within-level relationships and group-level injury likelihood, hazard exposure and safety of others were regressed on the random slopes (Muthén & Muthén, 2010). In the random-intercept models (analysis part one, see Appendix K), none of the paths between the different leadership variables and safety climate were moderated by any of the three safety salience measures. Therefore in this second part of the analysis, no cross-level interactions were specified between safety salience and leadership for safety climate as the dependent variable.

Results for the cross-level interactions are reported in Table 25. Significant interactions were probed by testing slopes at one standard deviation above and below the moderator mean following guidelines by Preacher et al. (2010) and Bauer and Curran (2005). Interactions were plotted at one standard deviation below, above and at the moderator mean. It should be noted that in the figures depicting the respective interaction effects, the scale of the respective outcome measure on the y-axis was truncated for ease of interpretation (i.e., the y-axis in figures ranges from two to four-and-a-half, whilst outcomes were measured on response scales from one to five). Slope analysis and points to plot were computed using Preacher, Curran, and Bauer’s (2006) tool for testing interactions in multilevel models.
Figure 22. Schematic representation of cross-level interaction models between leadership variables and team-level safety salience variables.
Management-By-Exception-Active and safety salience (hypothesis 1)

Hypothesis 1 stated that group-level safety salience moderates the relationships between Management-By-Exception-Active and the investigated outcome variables (i.e., satisfaction with leader, job satisfaction, job performance, safety climate and safety performance).

As stated above, for safety climate as the dependent variable, no interaction effect was found between Management-By-Exception-Active and the three safety salience measures. Thus, for safety climate as the dependent variable, a moderation effect was not supported. In support of hypothesis 1 results from random-slope models, showed three significant interactions between Management-By-Exception-Active and group-level safety salience measures (see Table 25).

Group-level injury likelihood moderated the relationship between Management-By-Exception-Active with safety performance and with job performance. The coefficients for the relationship between Management-By-Exception-Active and safety performance at one standard deviation below mean injury likelihood and at one standard deviation above mean injury likelihood, showed that if team-level injury likelihood was high, Management-By-Exception-Active was positively related with safety performance. However, if team-level injury likelihood was low, Management-By-Exception-Active and safety performance were unrelated (see Table 25). This moderation effect is displayed in Figure 23. The finding was in line with hypothesis 1b, indicating that if threat for injury is high within a team’s work context, Management-By-Exception-Active is an effective leadership style to enhance safety performance, but has no effect if injury likelihood is low.

Team-level injury likelihood also moderated the relationship between Management-By-Exception-Active and job performance. At one standard deviation below the mean of team-level injury likelihood, there was a negative relationship between Management-By-Exception-Active and job performance. At one standard deviation above the mean, Management-By-Exception-Active and job performance were weakly, positively associated, although the coefficient was near-zero at .03 (see Table 25, Figure 24). Thus, the finding suggested that Management-By-Exception-Active
has a detrimental effect on job performance if group-level injury likelihood is low, but is unrelated to performance if threat for injury within a team is high. This finding lent further support for hypothesis 1b, although the direction of the moderation effects is somewhat different than hypothesised.

The third significant cross-level interaction was found between Management-By-Exception-Active and the team-level impact on safety of others (see Table 25). The relationship between Management-By-Exception-Active and job satisfaction was moderated by the teams’ impact on the safety of others. Under conditions where teams had a high impact on safety of others, Management-By-Exception-Active was negatively associated with job satisfaction, but not when the impact on safety of others was low (see Figure 25). Thus, this moderation effect was in the opposite direction as expected in hypothesis 1. It was hypothesised that Management-By-Exception-Active is more positively related to job satisfaction, if safety salience is high. However, in contrast the present finding suggested that engaging in Management-By-Exception-Active practices is associated with lower job satisfaction levels if a team’s work has a high impact on the safety of others.

Overall, results from testing of cross-level interaction, showed partial support for hypothesis 1b as team-level injury likelihood moderated the relationship between Management-By-Exception-Active and safety as well as job performance. Results also showed that team-level impact on safety of others moderated the relationship between Management-By-Exception-Active and job satisfaction, but this effect was in the opposite direction as stated hypothesis 1c. No support was found for hypothesis 1a, as team-level hazard exposure did not moderate any of the relationships between Management-By-Exception-Active and the assessed outcome variables.
Table 25. Cross-level interactions with safety salience variables as team-level moderator

<table>
<thead>
<tr>
<th>Moderator: Team-Level Injury Likelihood</th>
<th>Leader Satisfaction</th>
<th>Job Satisfaction</th>
<th>Job Performance</th>
<th>Safety Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>MBEA x Injury Likelihood</td>
<td>PE</td>
<td>SE</td>
<td>p</td>
<td>PE</td>
</tr>
<tr>
<td>Slope at +1SD of moderator</td>
<td>-.19</td>
<td>.18</td>
<td>.29</td>
<td>-.17</td>
</tr>
<tr>
<td>Slope at -1SD of moderator</td>
<td>-.11 (p = .96)</td>
<td>.09 (p = .97)</td>
<td>.17 (p = .86)</td>
<td>-.01 (p = .98)</td>
</tr>
<tr>
<td>TF x Injury Likelihood</td>
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<td>.34</td>
<td>.82</td>
<td>.15</td>
</tr>
<tr>
<td>Passive x Injury Likelihood</td>
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<td>.14</td>
<td>.32</td>
<td>-.03</td>
</tr>
<tr>
<td>Slope at +1SD of moderator</td>
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<td>.02 (p = .97)</td>
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<td>Slope at -1SD of moderator</td>
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<td>-.13 (p = .72)</td>
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<td></td>
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<td>Flexibility x Injury Likelihood</td>
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<td>.24</td>
<td>.15</td>
<td>-.21</td>
</tr>
<tr>
<td>Moderator: Team-Level Hazard Exposure</td>
<td>Leader Satisfaction</td>
<td>Job Satisfaction</td>
<td>Job Performance</td>
<td>Safety Performance</td>
</tr>
<tr>
<td>MBEA x Hazard Exposure</td>
<td>PE</td>
<td>SE</td>
<td>p</td>
<td>PE</td>
</tr>
<tr>
<td>Slope at +1SD of moderator</td>
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<td>.12</td>
<td>.92</td>
<td>.28</td>
</tr>
<tr>
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<td>.09</td>
<td>.26</td>
<td>-.23</td>
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<tr>
<td>Passive x Hazard Exposure</td>
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<td>.09</td>
<td>.26</td>
<td>-.23</td>
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<td>-.13 (p = .09)</td>
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<td>.01 (p = .99)</td>
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<td>Flexibility x Hazard Exposure</td>
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<td>.14</td>
<td>.21</td>
<td>.24</td>
</tr>
<tr>
<td>Moderator: Team-Level Safety of Others</td>
<td>Leader Satisfaction</td>
<td>Job Satisfaction</td>
<td>Job Performance</td>
<td>Safety Performance</td>
</tr>
<tr>
<td>MBEA x Safety of Others</td>
<td>PE</td>
<td>SE</td>
<td>p</td>
<td>PE</td>
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<tr>
<td>Slope at +1SD of moderator</td>
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<td>.07</td>
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<td>Slope at -1SD of moderator</td>
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<tr>
<td>Flexibility x Safety of Others</td>
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<td>.18</td>
<td>.32</td>
<td>-.04</td>
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</table>

Note. PE = Parameter estimate for cross-level interaction, SD = standard deviation, SE = standard error.
Figure 23. Cross-level interaction between Management-By-Exception-Active and team-level injury likelihood on safety performance.

Figure 24. Cross-level interaction between Management-By-Exception-Active and team-level injury likelihood on job performance.
Transformational leadership and safety salience (hypothesis 2)

For transformational leadership one cross-level interaction emerged as significant. Group-level hazard exposure moderated the relationship between transformational leadership and job performance. Under conditions where team-level hazard exposure was low, transformational leadership and job performance were positively associated with each other, but the strength of this relationship decreased if a teams’ exposure to hazards was high (see Figure 26). The result supported hypothesis 2a, and indicated that the level of safety salience within a teams’ work contexts impacted on the effectiveness of transformational leadership. The direction of this cross-level moderation effect suggested that transformational leadership might be effective when the level of hazards in employees’ work contexts is low, but might be a less influential leadership style if hazard exposure is high. When interpreting this finding it must be pointed out though, that the slopes at one standard deviation above and below mean hazard exposure were not statistically significant (see Table 25).
None of the other interactions between team-level safety salience measures and transformational leadership were significant, so that hypotheses 2b and 2c were not supported.

![Graph](image)

Figure 26. Cross-level interaction between transformational leadership and team-level hazard exposure on job performance.

**Passive leadership and safety salience (hypothesis 3)**

It was hypothesised that passive leadership is more negatively related to leader outcomes if team-level safety salience is high, compared to low levels of safety salience. Results showed that passive leadership significantly interacted with each of the three team-level safety salience measures (see Table 25). However, as is detailed below, not all moderation effects were in the expected direction.

Group-level injury likelihood moderated the relationship between passive leadership with job performance and with safety performance respectively. There was a negative relationship between passive leadership and safety performance when group-level injury likelihood was low, but not when group-level injury likelihood was high (see Figure 27). The results from this interaction indicated that under conditions where threat for injury within a team is low, passive leadership has a detrimental effect on
safety performance. However, when injury likelihood within a team is high, this negative effect of passive leadership fades. The moderation effect of team-level injury likelihood on the relationship between passive leadership and job performance showed the same pattern (see Figure 28). If team-level injury likelihood was low, passive leadership was negatively associated with job performance, but this relationship changed direction under conditions where threat for injury within a team was high. The direction of these cross-level interactions is in the opposite direction to that which was hypothesised. It was expected that passive leadership would have a stronger, negative effect on performance if safety is salient. However, the present findings suggested that the deleterious effects of passive leadership might be offset in contexts where threat for injury is highly salient.

It must be noted however that when testing the slopes for the above interaction effects at one standard deviation below and above the mean value of team-level injury likelihood, relationships between the passive leadership and job and safety performance were non-significant. Thus, whilst the significant interaction terms suggest that injury likelihood affects the link between passive leadership and performance outcomes, the interpretations for the effect of passive leadership on safety and job performance in high/low injury likelihood conditions must be viewed as tentative.

![Figure 27. Cross-level interaction between passive leadership and team-level injury likelihood on safety performance.](image-url)
Figure 28. Cross-level interaction between passive leadership and team-level injury likelihood on job performance.

The impact of a team’s work on the safety of others also moderated the relationship of passive leadership to job and safety performance respectively (see Figure 29 for safety performance and Figure 30 for job performance). As for team-level injury likelihood, this interaction effect was in the opposite direction to that hypothesised. Under conditions where teams’ work had a low impact on the safety of others, passive leadership was negatively associated with both job and safety performance. The direction of this relationship however changed if teams worked in a context where their actions had a high impact on the safety of others. This finding suggested that the impact on safety of others compensates for the negative effects of passive leadership.

Passive leadership also showed a significant interaction with team-level hazard exposure for job and safety performance as dependent variables. This moderation effect however was in the opposite direction to the interaction with injury likelihood and safety of others (see Figure 31 for safety performance, and see Figure 32 for job performance). If the level of hazard exposure within a team was high, passive leadership was negatively associated with both, job and safety performance, but not
when team-level hazard exposure was low. The finding was in line with hypothesis 3a, which stated that passive leadership is more negatively associated with performance outcomes if safety is salient compared to contexts where safety is not salient.

![Figure 29. Cross-level interaction between passive leadership and team-level safety of others on safety performance.](image)

Thus, the relationships of passive leadership to job and safety performance were moderated by all three team-level safety salience measures, but the direction of the interactions differed for hazard exposure compared to injury likelihood and impact on safety of others as moderators. This finding suggested that hazard exposure presents a different aspect of safety salience than injury likelihood and impact on safety of others. Possible interpretations for the different moderating roles will be considered in the discussion.
Figure 30. Cross-level interaction between passive leadership and team-level safety of others on job performance.

Figure 31. Cross-level interaction between passive leadership and team-level hazard exposure on safety performance.
Analysis part three: Simultaneous testing of cross-level interactions

As outlined in the analysis strategy, in the last part of the analysis, the cross-level interactions between leadership and team-level safety salience that were identified in separate random-slope models, were tested simultaneously and in addition, the mediating role of safety climate was assessed.

Mediation moderation model

It was discussed above, that it has been recommended as best practice to test multiple interaction effects simultaneously. However, in multilevel models, especially when cluster numbers are small, this is not always possible (Aguinis et al., 2013). A full model specifying the identified cross-level interactions and hypothesised mediation path through safety climate did not converge. Therefore, two models were tested, with one testing paths to safety-specific outcomes (i.e., safety performance and safety climate) and the second model testing the paths to non-safety-specific outcomes (i.e., job performance, job satisfaction and satisfaction with the leader). Results for both models are reported in the following two sections.
The safety-specific model tested safety climate as a mediator of the relationship between leadership variables and safety performance and also included the group-level moderation effects of safety salience measures that were identified in the second part of the analysis.

Hypothesis 6 stated that safety climate mediates the relationship between the different leadership variables (i.e., transformational leadership, Management-By-Exception-Active, passive leadership and leader flexibility) and safety performance. Thus, indirect effects from transformational leadership, Management-By-Exception-Active, passive leadership and leader flexibility through safety climate to safety performance were specified. As outlined earlier, it was decided to model safety climate at the individual-level, as its ICC values did not indicate substantial proportions of between-group variance. Therefore, all paths between independent, mediator and dependent variables were tested at the individual-level with random intercepts and slopes to address the nested data structure, following guidelines by Preacher et al. (2010) for testing multilevel mediation. This mediation design is often referred to as a 1-1-1 model as all variables are specified at the individual-level, whilst between-group variance is controlled (Hox & Roberts, 2011; Krull & MacKinnon, 2001; Preacher et al., 2010). In addition to the mediation paths, the cross-level moderation effects that emerged as significant in the separate models in the second part of the analysis were included in the model. That is group-level injury likelihood was included as a moderator of the direct relationships between Management-By-Exception-Active with safety performance, and all three safety salience measures were specified as group-level moderators of the direct link between passive leadership and safety performance. To facilitate interpretation of the results, variables at the individual-level were group-mean centred and variables at the group-level were grand-mean centred (Bliese, 2002; Enders & Tofghi, 2007; Hox & Roberts, 2011; Snijders & Bosker, 1999).

Parameter estimates for the direct paths are displayed in Figure 33 and estimates for the indirect effects of transformational leadership, Management-By-Exception-Active, passive leadership and leader flexibility through safety climate on safety performance are displayed in Table 26.
Direct and indirect effects (hypothesis 6)

Direct effects showed that transformational leadership and leader flexibility had significant paths to safety climate, whilst Management-By-Exception-Active and passive leadership were not significantly related to safety climate. The findings showed that leader flexibility has a positive effect on safety climate over and above transformational leadership. However, Management-By-Exception-Active and passive leadership did not influence safety climate beyond transformational leadership and leader flexibility. None of the leadership variables showed significant direct relationships on safety performance.

Safety climate was not significantly related to safety performance (see Figure 33) and none of the indirect paths were significant and confidence intervals included zero (see Table 26). Thus, the results did not provide evidence for safety climate as a mediator and hypothesis 6 was rejected.

Moderation effects

To simultaneously test the specified cross-level interactions between the respective leadership variables and the three safety salience measures, random within-level slopes were regressed on team-level injury likelihood, hazard exposure and safety of others. Based on the moderation results in the second part of the analysis, team-level injury likelihood was specified as a moderator of the relationship between Management-By-Exception-Active and safety performance. Further, each of the three safety salience variables were specified as moderators of the relationship of passive leadership to safety performance. Model results showed that group-level injury likelihood significantly moderated the path from Management-By-Exception-Active to safety performance. Under conditions where threat for injury within a team was high, Management-By-Exception-Active was positively related with safety performance, but was not related to safety performance if team-level injury likelihood was low. The finding confirmed the result from the separate moderation models in the second analysis part and is in line with hypothesis 1b.
Table 26. Individual-level indirect effects from leadership style variables to safety performance, safety participation and safety compliance through safety climate

<table>
<thead>
<tr>
<th>Indirect Effect through</th>
<th>Safety Climate</th>
<th>Safety Performance</th>
<th>Dependent Variable</th>
<th>Safety Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>95%</td>
<td>95%</td>
<td>95%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PE</td>
<td>p</td>
<td>CI</td>
</tr>
<tr>
<td></td>
<td>Transformational Leadership</td>
<td>.001</td>
<td>.91</td>
<td>-.04</td>
</tr>
<tr>
<td></td>
<td>MBEA</td>
<td>.001</td>
<td>.91</td>
<td>-.02</td>
</tr>
<tr>
<td></td>
<td>Leader Flexibility</td>
<td>.003</td>
<td>.92</td>
<td>-.05</td>
</tr>
<tr>
<td></td>
<td>Passive Leadership</td>
<td>-.002</td>
<td>.91</td>
<td>-.03</td>
</tr>
</tbody>
</table>

*Note.* MBEA = Management-By-Exception-Active; values refer to the indirect path estimates from the model displayed in Figure 33 (for safety performance), in Figure 34 (for safety participation) and in Figure 35 (for safety compliance); PE = unstandardised path estimate.
Figure 33. Safety-specific model with cross-level interactions.

*p < .05, +p < .10, ns non-significant; dotted lines are non-significant paths; MLR estimation; log –likelihood (df = 44) = -597.11; AIC = 1282.23.
For the relationship between passive leadership and safety performance only group-level hazard exposure and injury likelihood emerged as significant moderators, but not impact on safety of others. Thus, compared to the separate cross-level interactions tested in the second part of the analysis, group-level safety of others no longer showed a significant interaction with passive leadership, when testing the three safety salience measures simultaneously as moderators. As pointed out earlier, findings on interaction effects are considered as statistically more robust, if these are tested simultaneously in one common model (Aguinis et al., 2013). Therefore, interpretations about the earlier reported moderator role of team-level impact on safety of others, as a moderator must be considered with some caution.

The significant interaction effects of passive leadership to hazard exposure and injury likelihood that emerged in the full model, were in the same direction as in the separate cross-level interaction models. For team-level hazard exposure as the moderator, passive leadership was negatively associated with safety performance if hazard exposure was high, but not if hazard exposure was low. This lends partial support for hypothesis 3. For team-level injury likelihood as the moderator, the interaction was again in the opposite direction to that hypothesised. Passive leadership was negatively related to safety performance if team-level injury likelihood was low, but not if injury likelihood was high. The different directions of the interaction effects for team-level hazard exposure and injury likelihood might be attributable to the different type of contextual characteristics that these two safety salience measures represent. It is suggested in the discussion section below that hazard exposure might refer to more objective levels of hazards, whereas injury likelihood might describe employees’ shared subjective sense of the level of risk they face at work.
Safety compliance and safety participation

Safety performance can be differentiated into safety compliance and safety participation. The safety-specific model was therefore repeated with safety performance split into safety compliance and safety participation. The path estimates are displayed in Figure 34 for safety participation as the dependent variable, and in Figure 35 for safety compliance as the outcome. For safety participation overall the findings were congruent with the results for global safety performance. Team-level injury likelihood moderated the relationship between Management-By-Exception-Active and safety participation. The path between passive leadership and safety participation was moderated by team-level injury likelihood and hazard exposure. Safety climate was not significantly related to safety participation and all indirect effects between leadership styles and safety participation through safety climate were non-significant (see Table 26). Thus, safety climate did not mediate the relationship between leadership variables and safety participation.

For safety compliance as the dependent variable, results were somewhat different to the model testing global safety performance. Team-level injury likelihood did not moderate the paths between Management-By-Exception-Active and passive leadership with safety compliance respectively. Thus, under conditions of high team-level injury likelihood, Management-By-Exception-Active was positively linked with safety participation, but not with safety compliance.

A further difference between the model for safety compliance as the dependent variable compared to the models for safety participation and safety performance, was that team-level impact on safety of others significantly moderated the relationship between passive leadership and safety compliance. Thus, teams’ impact on the safety of others might offset negative effects of passive leadership with regards to safety compliance, but not safety participation. This is plausible, as under conditions where the safety of others is at stake, team members might be motivated to comply with safety rules despite their leader displaying passive leadership behaviour. However, the impact of team members’ work on the safety of others might not motivate employees to engage in more voluntary safety-related efforts. For safety compliance as the dependent variable, team-level hazard exposure remained as a significant moderator of the relationship between passive leadership and safety compliance with the
interaction being in the same direction as previous results. In line with the models for
global safety performance and for safety participation, safety climate was not
significantly associated with safety compliance and did not mediate any of the indirect
paths between the four leadership variables and safety compliance.

Overall, the results from testing the safety-specific model with simultaneous mediation
and moderation effects suggested that transformational leadership and leader
flexibility are effective in creating a positive safety climate, but are not associated with
actual safety performance. Management-By-Exception-Active appeared as an
effective leadership practice to increase safety performance if team-level injury
likelihood was high, but does not relate to safety climate. Also, when investigating the
sub-dimensions, safety compliance and safety participation, as dependent variables,
the interaction between Management-By-Exception-Active and injury likelihood was
significant for safety participation but not for safety compliance.

Team-level hazard exposure and injury likelihood moderated the relationship between
passive leadership with safety performance, but the interaction effects were in opposite
directions for the two safety salience measures. That is, passive leadership was more
negatively associated with safety performance under high team-level hazard exposure,
but high team-level injury likelihood had a diminishing influence on the deleterious
effect of passive leadership on safety performance.

An unexpected result was that safety climate was unrelated to safety performance and
did not act as a mediator between leadership and safety performance. Possible reasons
for this finding, such as the two-source design of the study, will be addressed in the
discussion.
Figure 34. *Safety participation model with cross-level interactions.*

*p < .05, **p < .01, ***p < .001, ns non-significant; log-likelihood (df=44) = -616.44; AIC = 1320.88.*
Figure 35. Safety compliance model with cross-level interactions.

*p < .05, + p < .10, ns non-significant; log-likelihood (df = 44) = -605.64; AIC = 1299.28.
**Job performance and satisfaction model**

As stated above the second, full model tested the relationship between leadership variables and non-safety-specific outcomes (i.e., job performance, job satisfaction and satisfaction with leader). The specified moderation effects were based on the findings from the separate cross-level moderation models in the second part of the analysis. Thus, group-level injury likelihood was specified as a moderator of the relationship between Management-By-Exception-Active and job performance. Group-level hazard exposure was specified as a moderator of the link between transformational leadership and job performance, and all three safety salience measures were included as group-level moderators of the association between passive leadership and job performance. Lastly, group-level impact on safety of others was included as a moderator of the relationship between Management-By-Exception-Active and job satisfaction.

**Moderation effects**

The path coefficients for the model are reported in Figure 36. In line with the results from the separate moderation models, group-level injury likelihood moderated the path between Management-By-Exception-Active and job performance as well as the path between passive leadership and job performance. These cross-level moderation effects were in the same direction as in the separate moderation effects. Team-level hazard exposure significantly moderated the relationship between passive leadership and safety performance. Again, the direction of the interaction was congruent to the results reported in the separate moderation models in the second part of the analysis. That is, passive leadership was negatively related to job performance if team-level hazard exposure was high, but not if team-level hazard exposure was low.

In contrast to the separate moderation models, team-level impact on safety of others no longer interacted with passive leadership and Management-By-Exception-Active. Also, the moderation effect of team-level hazard exposure on the relationship between transformational leadership with job performance that was identified in the second part of the analysis, was no longer significant in this combined model.
Figure 36. *Job performance and satisfaction model with cross-level interactions.*

*p < .05, **p < .01, ***p < .001, + p < .10, ns non-significant; dotted lines are non-significant paths; log-likelihood (df = 58) = -947.24; AIC = 2010.47.
Main effects
The model results showed that transformational leadership was the only leadership variable with significant direct paths to job performance, job satisfaction and satisfaction with leader. This finding highlights transformational leadership as an effective leadership style for non-safety-specific satisfaction outcomes regardless of the level of safety salience within a work context. Management-By-Exception-Active did not have any significant main effects and appeared only effective in influencing job performance if injury likelihood was high. Leader flexibility and passive leadership did not show any significant main effects, indicating that they do not influence job performance and job satisfaction beyond transformational leadership.

Task performance and contextual performance
Global job performance can be sub-divided into task performance and contextual performance. To test whether the results differ for task and contextual performance, the above model was repeated with these two sub-dimensions of job performance as separate dependent variables (see Figure 37 for task performance and Figure 38 for contextual performance). Team-level injury likelihood showed a significant interaction with Management-By-Exception-Active for contextual performance as the dependent variable, but not for task performance as the outcome. Hence, this result indicated that, if injury likelihood within a team was high, engaging in Management-By-Exception-Active was beneficial for contextual performance, but was not effective in increasing task performance. The result was in line with the safety-specific model where injury likelihood moderated the relationship between Management-By-Exception-Active with safety participation, but not with safety compliance. These findings were surprising, as previous research has often associated transactional leadership with within-role performance rather than contextual performance and extra effort for safety (e.g., Griffin & Hu, 2013; Wang et al., 2011).

For both task performance and contextual performance as dependent variables, hazard exposure showed a significant interaction with passive leadership. That is, passive leadership was more negatively associated with performance if hazard exposure within a team was high.
Transformational leadership showed a direct positive relationship with task performance, but was not significantly related to contextual performance. Management-By-Exception-Active, passive leadership and leader flexibility did not have significant main effects on either task performance or contextual performance.

Overall, the above results demonstrated that the level of safety salience has an influence on the effectiveness of leadership on non-safety-specific outcomes. The results indicated that Management-By-Exception-Active might be a useful leadership style to increase performance when team-level injury likelihood is high, but not if team-level injury likelihood is low. Further, employees in hazardous environments might be particularly vulnerable to negative effects of passive leadership. Transformational leadership emerged as an effective leadership style for influencing non-safety-specific performance and satisfaction outcomes irrespective of the level of safety risk. Leader flexibility was not related to job performance, job satisfaction or satisfaction with the leader when controlling for Management-By-Exception-Active, passive leadership and transformational leadership.
**Figure 37. Task performance and satisfaction model with cross-level interactions.**

***p < .001, *p < .05, + p < .10, ns non-significant; dotted lines are non-significant paths; log-likelihood (df = 58) = -939.79; AIC = 1995.57.**
Figure 38. *Contextual performance and satisfaction model with cross-level interactions.*

**p < .01, ***p < .001, + p < .10, ns non-significant; dotted lines are non-significant paths; log–likelihood (df = 58) = -975.56; AIC = 2067.12.
8.6 Discussion

This section summarises the main findings from study 2 and discusses the key outcomes. The general discussion following in the next chapter further integrates the present results with the findings from study 1 as well as with the existing literature.

A core objective of study 2 was to explore whether the relationship between leadership styles and leader outcomes are a function of the level of safety salience within employees’ work environments. Safety salience was assessed by injury likelihood, hazard exposure and impact on safety of others. These three aspects of safety salience were conceptualised as contextual variables, and were therefore aggregated to the team-level to represent team members’ shared perceptions about the level of safety salience within their work environment. It was hypothesised that transactional leadership is more effective in safety-critical contexts, but might be ineffective if safety is less salient. It was also tested whether the influence of transformational and passive leadership on performance and satisfaction outcomes is dependent on the level of safety salience within a work setting. In addition, it was investigated whether the competency of leader flexibility augments the effect of transformational and transactional leadership on safety outcomes as well as job performance and satisfaction measures. A summary of the study’s main findings is shown in Table 27.
Table 27. Summary of main results in study 2

<table>
<thead>
<tr>
<th>Study 2</th>
<th>Summary of results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hypothesis 1</strong></td>
<td>Partial support for hypothesis 1b as injury likelihood moderated the link between MBEA and safety and job performance (but not of any of the other outcome criteria). Hypotheses 1a and 1c were not supported. Safety of others moderated the link between MBEA and job satisfaction (hypothesis 1c), but the effect was in the opposite direction to that predicted and not significant in combined model.</td>
</tr>
<tr>
<td><strong>Hypothesis 2</strong></td>
<td>Hazard exposure moderated the link between TF and job performance (hypothesis 2a), but the moderation effect was not in the expected direction and was not significant in the combined model. Hypotheses 2b and 2c were not supported.</td>
</tr>
<tr>
<td><strong>Hypothesis 3</strong></td>
<td>Partial support for hypothesis 3a as hazard exposure moderated the link between passive leadership and job and safety performance (but not for any of the other outcome criteria). Injury likelihood moderated the link between passive leadership and job and safety performance (hypothesis 2b), but the effect was not in the expected direction. Impact on safety of others moderated the link between passive leadership and job and safety performance (hypothesis 2c), but the effect was not in the expected direction and was not significant in the combined model.</td>
</tr>
<tr>
<td><strong>Hypothesis 4</strong></td>
<td>There was support for hypothesis 4e as leader flexibility was significantly related to safety climate when controlling for other leadership variables. Hypotheses 4a to 4d were not supported.</td>
</tr>
<tr>
<td><strong>Hypothesis 5</strong></td>
<td>Hypothesis 5 was not supported as none of the safety salience measures moderated the link between leader flexibility and outcome variables.</td>
</tr>
<tr>
<td><strong>Hypothesis 6</strong></td>
<td>Hypothesis 6 was not supported, as safety climate did not mediate any of the leadership-outcome relationships.</td>
</tr>
</tbody>
</table>

*Note. Numbering of hypotheses refers to Figure 20, p. 200; MBEA = Management-By-Exception-Active; TF = transformational leadership.*
8.6.1 Management-By-Exception-Active and safety salience

It was proposed that the effectiveness of transactional leadership is context-dependent and that transactional leadership is particularly relevant in contexts where safety is salient, but might be less effective if safety is not salient. The result from the present study lent partial support to this hypothesis as the relationship of Management-By-Exception-Active to safety and job performance was moderated by team-level injury likelihood, but no interaction effect were found for team-level hazard exposure and impact on safety of others as moderators.

Team-level injury likelihood significantly moderated the relationship between individual-level Management-By-Exception-Active and safety and job performance. Under conditions where injury likelihood was low, Management-By-Exception-Active showed a negative association with job performance and was not related to safety performance. If injury likelihood was high, Management-By-Exception-Active was positively linked with safety performance and the negative link between Management-By-Exception-Active and job performance neutralised. These findings lend support to the proposition that the effectiveness of transactional leadership is context-dependent. If there is threat for harm present within a work context, leader actions such as clarifying priorities and actively correcting errors have a positive influence on safety performance, but not if the likelihood for injury is low. Based on the findings, it can be argued that work settings with high injury likelihood carry a salient potential for failure, so that instructive leader tactics, which minimise the chance of error as much as possible, are effective for safety performance. However, if injury likelihood is low then this level of vigilance and close leader intervention might be perceived as too controlling and therefore leads to a reduction of performance (Antonakis et al., 2003; Griffin & Talati, 2011). The finding on the moderating role of injury likelihood is also in line with research on crisis in work environments. As discussed in study 1, it has been proposed that under crisis conditions employees are more receptive to directive forms of leadership (Pillai & Meindl, 1998; Morgeson, 2005).

Interestingly, when testing the moderation role of team-level injury likelihood for the safety performance sub-dimensions, Management-By-Exception-Active has
significant interaction with injury likelihood when predicting safety participation, but not when safety compliance is the outcome. This was contrary to existing research, which has often associated transactional leadership with compliance and transformational leadership with extra-role behaviours such as safety participation (Bass & Riggio, 2006; Christian et al., 2009; Mullen & Kelloway, 2009). However, the current result appears plausible given that this was a contextually bounded effect. If a team experiences high levels of threat for injury, then team members are likely to comply with safety rules and regulations regardless of their leader’s behaviour, which offers an explanation for the lack of relationship between Management-By-Exception-Active and safety compliance.

As noted above, the interaction effect between injury likelihood and Management-By-Exception-Active differed somewhat for safety performance and non-domain-specific job performance as dependent variables. Under conditions where injury likelihood was low, Management-By-Exception-Active was negatively associated with job performance and was unrelated to safety performance. Under conditions where injury likelihood was high, Management-By-Exception-Active was positively associated with safety performance, but was unrelated to job performance. In other words, the relationship between Management-By-Exception-Active and job performance was no longer negative under high injury likelihood conditions, but there was no positive effect. This suggested that when threat for harm is salient within a work context, actions such as clarifying objectives and monitoring for errors, might increase safety performance, but are less important for enhancing global job performance (although they do not have a negative effect). Safety performance is more narrowly defined than global job performance, which does not refer to a specific task domain. This might make safety performance more easily affected through Management-By-Exception-Active, as there is a clear performance target at which directive leader actions can be aimed. The contents of global job performance are more diffuse and therefore might be more difficult to enhance through one specific leadership style. The finding was in line with the results from study 1, which showed that under hazardous conditions, Management-By-Exception-Active was related to safety incidents but was unrelated to global team performance. As discussed in study 1, Management-By-Exception-Active might not only be context-dependent, but might also have more relevance for certain types of outcomes such as safety performance. As pointed out previously, it
has been argued that the leadership literature often discusses effectiveness without sufficient refinement, and should differentiate more clearly as to what it is that leadership is thought to impact upon (Arvonen & Ekvall, 1999; Keller, 2006).

Hazard exposure and safety of others did not significantly moderate any of the relationships between Management-By-Exception-Active and the study outcome variables in the combined models. A possible explanation might be that the level of threat for harm, rather than the presence of hazards per se, represents a contextual characteristic that impacts on the effectiveness of Management-By-Exception-Active. However, the finding was in contrast to results from study 1, where hazard exposure did emerge as a significant moderator. When testing interactions with hazard exposure in the present study, the direction of the moderation effects was congruent with the results for injury likelihood, but did not reach statistical significance. As will be discussed below the small sample size at the team-level in the current study might have limited statistical power to detect significant effects. Further, differences between the two studies presented in this thesis are addressed in more detail in the general discussion.

Whilst Management-By-Exception-Active was positively related to safety performance in conditions where team-level injury likelihood was high, it was unrelated to safety climate and satisfaction outcomes regardless of the level of safety salience. Thus, Management-By-Exception-Active might be important for influencing actual safety behaviour of employees, but is less effective for creating a positive safety climate. It can be argued that leader practices such as correcting mistakes are directly centred on employees’ behaviour and therefore more effective in influencing performance rather than affecting the surrounding atmosphere with regards to safety. This refers back to the argument presented above that when exploring leadership effectiveness it is important to consider the type of outcome that is to be influenced though leaders’ actions.
8.6.2 Transformational leadership and salience of safety

Previous research has demonstrated that in crisis situations, greater amounts of active leadership are required, and it has been argued that employees rely particularly on their leader’s support under critical conditions (Morgeson & DeRue, 2006; Künzle et al., 2010). However, few studies have tested this notion specifically with regards to transformational leadership style. The present study investigated whether the effectiveness of transformational leadership style differed dependent on the level of safety salience within a team.

Results showed that team-level hazard exposure moderated the relationship between individual-level transformational leadership and job performance when testing the three safety salience variables in separate moderation models. Transformational leadership was positively associated with job performance if hazard exposure was low, but less so if hazard exposure was high. This moderation effect of hazard exposure is in contrast to the propositions made within the leadership literature that transformational leadership is universally effective. As discussed in study 1, transformational leadership might lack the necessary directness and perspicuity, if major hazards are present and in conditions where failure cannot be tolerated. For instance, challenging employees intellectually and encouraging them to try out new ways of working might be less relevant in a highly hazardous work environment for enhancing job performance, and instead more directive actions which focus on prevention of error and reducing ambiguity might be of greater importance (Clarke, 2013; Innes et al., 2010).

However, it must be pointed out that in the combined model, which tested the moderating role of three safety salience measures simultaneously, the interaction between transformational leadership and team-level hazard exposure was no longer statistically significant. The interpretation presented above must therefore be viewed as tentative.

Transformational leadership showed significant main effects on safety climate, job satisfaction and satisfaction with leader, but was unrelated to safety performance. Thus, being charismatic and inspirational might be effective for increasing satisfaction...
as well as creating an atmosphere that conveys the value of safety, but might be less relevant for directly enhancing actual safety behaviour. Previous research that has reported positive links between transformational leadership and safety performance has often used safety-specific measures of transformational leadership (e.g., Barling et al., 2002; Mullen & Kelloway, 2009). Hence, unless transformational leadership is specifically targeted on safety, it might not be effective in influencing safety performance.

Overall, these findings demonstrated that transformational leadership is less affected by safety salience as a contextual boundary and is effective for enhancing satisfaction, task performance and safety climate, irrespective of whether safety is salient or not. However, transformational leadership was not significantly related to safety performance, which indicated that it might be less effective in directly impacting employees’ safety behaviour.

8.6.3 Passive leadership and salience of safety

It was argued that passive leadership offers more scope for failure and is ineffective in reducing uncertainty and clarifying priorities. As these are vital aspects for performance in safety-critical contexts, it was proposed that passive leadership might be particularly detrimental if safety is highly salient within a work context.

Results from cross-level moderation analyses yielded several significant interactions for passive leadership with the safety salience measures. Overall, these findings signified that the influence of passive leadership on outcomes is dependent on the salience of safety within a work context. The direction of the moderation effects however varied for the different safety salience measures. Whereas the pattern of results was the same for injury likelihood and safety of others as moderators, the finding on the moderator role of hazard exposure was in the opposite direction.

For hazard exposure as a team-level moderator, results showed that passive leadership was negatively related to safety and job performance if hazard exposure was high, but less so if hazard exposure was low. This was in support of the hypothesis that passive leadership is particularly destructive in safety-critical contexts. When hazards are
present within a work environment, active clarification of the priority of safety and vigilance towards errors and mistakes are crucial for high-level safety and job performance. Thus the results indicate that, if managers or supervisors who operate in hazardous work environment are passive in their leadership behaviour, this not only leads to an absence of a positive effect on performance, but has a detrimental impact and is associated with reduced levels of safety and job performance. In line with this, Kelloway et al. (2006) showed that passive leadership has a negative effect on safety-specific outcomes over and above transformational leadership alone.

However, as stated above, the results for injury likelihood and safety of others as moderators were in the opposite direction to the moderation effect of hazard exposure. If injury likelihood or the impact on safety of others within a team was high, passive leadership was unrelated to performance, but showed a negative link if injury likelihood or safety of others was low. This inconsistency in the findings between hazard exposures compared to the findings for injury likelihood and safety of others as moderators, might be due to differences in the type of safety salience that these three constructs tap into and will be discussed in more detail below.

It can be argued that injury likelihood refers more to the threat of being harmed or injured at work, whereas hazard exposure might refer to the objective level of hazards present within a work environment. For instance, team members who work in inherently hazardous contexts, but who perceive that the risks stemming from these hazards are well managed, might report low injury likelihood levels despite working in a hazardous environment. This notion is supported by the non-significant correlation between injury likelihood and hazard exposure, indicating that these represent distinct types of safety salience. For injury likelihood, the detected moderation effect showed that passive leadership had a negative relationship with safety and job performance if injury likelihood was low, but not if injury likelihood was high. Based on the notion that injury likelihood refers to the degree of threat for harm, it can be suggested that employees who work in contexts where injury likelihood is high, are sufficiently self-motivated to engage in safe behaviours, which in turn might shield them from the destructive effects of passive leadership. Thus, the imminent presence of the possibility of being harmed, might result in employees taking stronger ownership of their safety performance and might make them less susceptible to their leader’s passive
behaviour. Similarly, if the safety of others is at stake, employees might be more propelled to ensure high levels of safety performance and counter detrimental effects of passive leadership (however it should be noted that the moderation effect of impact on safety of others was only significant in the separate moderation models and not in the combined model). In summary, the salience of the threat for harm might lead to higher self-motivation amongst employees to meet safety and performance levels, which overrides the destructive impact of passive leadership.

Hazard exposure as measured in the present study refers to level of hazards per se rather than the salience of risk for harm, which might vary depending on how hazards are managed. If a work context is inherently hazardous, it is not possible to entirely remove hazards from the environment, but adequate management of risk might lower perceptions of injury likelihood. Thus, despite a work context being hazardous, high levels of risk for harm might not always be salient or visible to employees. This was supported by the correlation findings, that injury likelihood was significantly, negatively correlated with safety climate whereas hazard exposure correlated significantly and positively with safety climate. Results from cross-level moderation analysis indicated that in work contexts where hazard exposure was high, passive leadership was negatively related to job and safety performance, but less so if hazard exposure was low. If hazards are present within a work context, but teams lack a sense of wariness towards risk for injury, passive leadership might foster complacency towards safety and therefore be linked with reduced safety performance. Thus, in work settings that are hazardous but where the signals for risk might be weak, passive leadership is negatively related to safety and job performance, but in contexts where the likelihood of injury for employees themselves or others is highly salient, the detrimental impact of passive leadership might be rendered neutral due to an increased employee self-motivation for safety.

As discussed with regards to the results from study 1, it should be considered that injury likelihood itself might be a result of leadership rather than solely a contextual variable that surrounds the leadership process. In the present study injury likelihood was examined as a moderator variable of the relationship between leadership and performance and satisfaction outcomes. It is plausible that leadership might influence contextual team characteristics such as injury likelihood. This notion was supported
by the significant, negative association of transformational leadership and Management-By-Exception-Active to injury likelihood and the significant, positive link between passive leadership and injury likelihood. Thus, leadership might shape contextual factors such as injury likelihood, which in turn impact on the relationship between leadership and performance or satisfaction outcomes (Breevart et al., 2013; Smircich & Morgan, 1982). Future research could explore this increased complexity of the leadership process by considering safety salience as an outcome variable of leadership as well as a simultaneous moderator of leadership performance pathways. Due to the two-source study design, the size of the participating company departments as well as issues such as response rates, the present study’s sample size at the team-level restricted the complexity of models that could be tested to produce trustworthy parameter estimates.

Overall, the present results supported the hypothesis that the level of safety salience within a team impacts on the effect of passive leadership. However, the direction of this contextual influence of safety salience appeared to differ for hazard exposure and injury likelihood as two different aspects of safety salience.

8.6.4 Leader flexibility and salience of safety

It was hypothesised that leader flexibility has an incremental influence over transformational, transactional and passive leadership (hypothesis 4) and might be particularly relevant if safety is salient (hypothesis 5). However, overall the results from the present study only showed limited support for hypothesis 4 and did not support hypothesis 5.

Leader flexibility was significantly related to safety climate (hypothesis 4e) whilst controlling for leadership styles, but was unrelated to job performance (hypothesis 4a), job satisfaction (hypothesis 4b), satisfaction with the leader (hypothesis 4c) as well as safety performance (hypothesis 4d). These findings suggest that whilst leader flexibility appears effective for enhancing safety climate, it is less important for influencing safety and job performance and satisfaction. Correlation analysis showed that leader flexibility was significantly, positively related to job satisfaction and satisfaction with ones leader. However, when controlling for transformational
leadership, passive leadership and Management-By-Exception-Active, leader flexibility was not significantly associated with satisfaction outcomes, and even showed negative relationships with job satisfaction and performance in the combined model (although these paths were non-significant). Thus, apart from when safety climate is the dependent variable, leader flexibility, did not augment transformational, transactional and passive leadership behaviours. The finding was in contrast to the results of study 1, where leader flexibility augmented transformational leadership and Management-By-Exception-Active with regards to team performance and leader self-efficacy. It is possible that the inclusion of passive leadership as an additional independent variable in the present study, but which was not included in study 1, might have contributed to the difference in these findings. Related to this notion, preliminary analysis showed some evidence for multicollinearity amongst the four leadership variables, which might have suppressed the effects of leader flexibility in the present study.

Leader flexibility did show a significant, positive association with safety climate and augmented the influence of transformational leadership on safety climate. Thus, whilst transformational leadership might be beneficial in promoting a positive safety climate, beyond that it is important that leaders are flexible in their practices and fit their actions to the requirements of a particular work setting. Safety climate is not a fixed perception that once established remains constant, but is likely to evolve and change in response to safety-related events and actions (Clarke, 2006; Payne et al., 2010). Safety climate is conceptualised as multidimensional with different facets such as safety involvement and support for safety rules and regulations (Cox & Cheyne, 2000). Thus, to address the various aspects that constitute global safety climate, adaptive leadership might be required which emphasises different facets depending on the situation at hand. For example, to demonstrate the importance of safety rules and regulations, leaders might have to hold employees accountable for non-compliance, whereas to enhance involvement in safety, it might be particularly important that leaders display concern for employees’ views and ideas about safety matters. Thus, the competency of leader flexibility might enable leaders to more specifically match their leadership behaviours to different safety climate facets and therefore have an influence on global safety climate beyond transformational leadership.
It was also tested whether team-level safety salience moderates the effects of leader flexibility (hypothesis 5). However, leader flexibility did not show any significant cross-level interactions with the three safety salience measures and therefore did not support this hypothesis. This was in line with findings from study 1, and indicated that leader flexibility might be less affected by contextual characteristics such as the level of safety salience.

8.6.5 Mediator role of safety climate

It was hypothesised that safety climate mediates the relationship between transformational, transactional and passive leadership as well as leader flexibility and safety performance (hypothesis 6). However, results showed that none of the leadership variables had an indirect effect on safety performance through safety climate. This was in contrast to existing research, which has identified safety climate as a mediator in the leadership-safety performance relationship (Clarke, 2013; Clarke & Ward, 2006). Another unexpected finding was that the data did not show support for convergence of safety climate perceptions amongst members of the same team. Therefore, safety climate was not assessed as a team-level variable. This result was in contrast to previous research, which has demonstrated that safety climate constitutes a group-level phenomenon (e.g., Hoffmann & Stetzer, 1996; Zohar, 2000; Zohar & Luria, 2005, 2010). It is possible, that the nature of the teams included in the sample might have contributed to this lack of convergence of safety climate scores within teams. In the manufacturing sample team members rotate between day- and night shifts. This means that team compositions change depending on which team members are currently working nights and days respectively. In the oil and gas sample, engineers and technicians work in project-based crews when offshore. Although there is some stability regarding crew compositions, changes in crew staffing are not uncommon between projects. Thus, this fluctuation of team members in both organisations might have reduced the extent to which safety climate perceptions are shared amongst team members. In turn, this lack of shared safety climate within teams might be linked to the finding that safety climate did not emerge as a mediator. It can be suggested that for safety climate to have an effect on safety behaviour, there needs to be a strong degree of cohesion in safety climate perceptions, whereas if safety climate perceptions
are heterogeneous within a work team, the climate might be too ‘weak’ to have any
effect on safety behaviour (Zohar & Luria, 2005; Luria, 2008).

8.6.6 Sample sizes in multilevel modelling

The data in the present study had a nested structure as employees were clustered within
teams, which violates assumptions of independence of observations (Cohen et al.,
2003, Snijder & Bosker, 1999). Thus, to account for between-team variance, and to
analyse safety salience as team-level variables, multilevel modelling was performed.
One acknowledged challenge in multilevel modelling is to obtain a large enough
sample size at the higher-level unit. The present sample consisted of 160 employees at
the individual-level clustered within twenty-one teams at the higher level. Aguinis et
al. (2013) discuss that multilevel research faces a particular dilemma of balancing out
the chances for making a Type I and Type II error. They explain that researchers often
choose to employ multilevel models to take nested data structures into account and
avoid overestimating significance levels and making a Type I error. However, as
sample sizes at the higher-unit tend to be small, multilevel research tends to suffer
from low statistical power and is therefore particularly prone to mistakenly accept the
null hypothesis and making a Type II error. There is no clear consensus about
minimum sample sizes for clustered data. Generally, the recommendation is that the
number of clusters is more important than the number of cases within groups (Cohen
least twenty groups, but note that group sizes should be fairly large. In a review of
articles published in the Journal of Applied Psychology between the years 2000 and
2010, Mathieu et al. (2012) reported a median level-two sample size of fifty-one units.
Given that the present study used data nested within twenty-one teams which conforms
to the minimum higher unit sample size recommended by Kreft and De Leeuw (1998),
but was lower than Mathieu et al.’s (2012), it is likely that lack of statistical power
might have reduced the likelihood of detecting significance in the present cross-level
investigations. In several of the analyses, the moderation effect between individual-
level leadership style and team-level safety salience variable was significant, but the
separate slopes tested for different values of the team-level moderator, did not reach
significance despite being of meaningful magnitude. For example, team-level injury
likelihood significantly moderated the individual-level path between Management-
By-Exception-Active and safety performance. At one standard deviation above the mean for injury likelihood, the relationship between Management-By-Exception-Active and safety performance was $r = .17$ but did not reach significance. Similarly, the interaction between injury likelihood and passive leadership was significant when running separate moderation analyses, but became non-significant when testing moderation effects simultaneously. Insufficient statistical power might have contributed to this lack of statistical significance. The size of the participating departments, issues in response rates and the two-source study design presented practical issues in obtaining a larger sample size at the team-level and as highlighted by Aguinis et al. (2013) this constitutes a prominent problem faced by multilevel research. Despite these practical issues and the relatively small sample size, it was regarded as most suitable to conduct multilevel analysis. Statistics for non-independence showed evidence for substantial proportions of between-group variance, with safety and job performance showing the largest amount of between-group variance proportions. As explained above, not controlling for between-group variance would increase the chances for a Type I error, with the risk for this bias increasing as non-independence increases.

8.7 Chapter Summary

This chapter presented the results from study 2, which investigated whether the level of safety salience within a team impacts on the effectiveness of transformational, transactional and passive leadership as well as leader flexibility. The research was conducted in a sample of 160 employees from an oil and gas services company and a food manufacturing company. Ratings on injury likelihood, hazard exposure and impact on safety of others were used to assess safety salience. Five different effectiveness criteria were examined to address safety-specific outcomes (i.e., safety climate, safety performance) as well as non-safety specific outcomes (job performance, job satisfaction and satisfaction with leader). Moreover, employees’ leaders provided the performance ratings to overcome the issue of single-source bias. It was proposed that in contexts where safety is highly salient, transformational, transactional leadership style and leader flexibility are more positively related to
effectiveness criteria, and passive leadership is more negatively related to effectiveness measures if safety is salient.

Hypotheses were tested using multilevel modelling to control for the non-independence of observations and test safety salience at the team-level. Results showed that the relationship between Management-By-Exception-Active with safety performance and with job performance was moderated by team-level hazard exposure. If hazard exposure within a team was high, Management-By-Exception-Active was positively associated with safety performance, but not under low hazard exposure conditions. This supports the hypothesis that Management-By-Exception-Active is effective in safety-critical contexts, but not if safety is not salient. However, team-level injury likelihood and impact on safety of others did not emerge as significant moderators. The interaction between Management-By-Exception-Active and hazard exposure for job performance as the dependent variable showed that Management-By-Exception-Active was associated with decreased job performance if hazard exposure was low, but was unrelated to job performance if hazard exposure was high. This supports the notion that Management-By-Exception-Active is ineffective if safety is not salient.

Results showed that transformational leadership was significantly related to job performance, job satisfaction and safety climate irrespective of the level of safety salience. However, transformational leadership was not related to safety performance, and was less effective for job performance under hazardous conditions. Together, these findings suggested that transformational leadership is effective for enhancing safety climate and satisfaction, irrespective of the level of safety salience, but might be less effective in influencing actual safety behaviour.

Team-level hazard exposure as well as team-level injury likelihood moderated the relationship of passive leadership to job performance and safety performance, however the effect of the two safety salience moderators was in opposite directions. Under high-level hazard conditions, passive leadership was negatively associated with safety and job performance, but not if hazard exposure was low. This finding suggested that passive leadership has a detrimental effect in safety-critical conditions. Yet, moderation effects for injury likelihood showed that if team-level injury likelihood
was low, passive leadership was negatively associated with job and safety performance, but this association neutralised if injury likelihood was high. It was suggested that injury likelihood and hazard exposure represent two different aspects of safety salience.

Leader flexibility was significantly related to safety climate, but did not augment the other leadership styles with regards to job and safety performance or satisfaction outcomes. Moreover, none of the safety salience variables emerged as moderators of the relationship between leader flexibility and the various effectiveness criteria. Thus, leader flexibility might be relevant for enhancing safety climate, but no support was found for leader flexibility to have an impact beyond transformational, transactional and passive leadership for any of the other outcome measures.

Overall, the study demonstrated that it is important to consider contextual variables such as the level of safety salience within a work environment. In particular, with regards to Management-By-Exception-Active and passive leadership, the results showed that the level of safety salience acts as a boundary condition for the effects of these two leadership styles. For example, the finding on the interaction between Management-By-Exception-Active and hazard exposure suggested that for leaders operating in hazardous contexts Management-By-Exception-Active is an effective leadership tactic to directly enhance safety performance, but it is less suitable for leaders in non-hazardous contexts as they might actually decrease performance, if they engage in Management-By-Exception-Active. Transformational leadership appeared less influenced by the level of safety salience, and was more universally related to satisfaction and job performance, but not safety performance. Thus, in summary the study lent support to the notion that for a more refined understanding of the leadership process, it is important to consider the context in which leadership takes place as well as the type of outcome that is sought to be influenced.
9 General Discussion

9.1 Chapter Overview

This chapter discusses the key results of the research and presents its main contributions. The present research investigated the role of safety salience, as a contextual characteristic, for transformational, transactional and passive leadership style as well as for the competency of leader flexibility. It was explored in two empirical studies whether the level of safety salience within a work context influences the effectiveness and extent to which leaders engage in these types of leadership. The chapter integrates the main findings from study 1 and study 2 and links these to existing research. The present research made several important contributions to the wider leadership literature as well as to the occupational safety literature. These are summarised in the first section below and structure the remainder of the chapter. Moreover, the present results suggested that safety salience influences the effectiveness of transformational, transactional and passive leadership. This has important practical implications for leaders operating in safety-critical contexts, which are outlined in this chapter. The last part of this chapter addresses limitations of the present research and makes suggestions for future research. Finally, the chapter closes with an overall conclusion.

9.2 Main Contributions of the Research

The present research investigated the role of transformational, transactional, passive leadership and leader flexibility in its dependence on the level of safety salience within work contexts. The research made several important contributions to the wider leadership literature and to the safety leadership literature specifically. These are summarised below and discussed further in the following sections of this chapter.

The current studies advanced existing research by investigating whether transformational, transactional and passive leadership are context-sensitive. Previous research has examined the effectiveness of these leadership styles, paying little attention to the context in which leadership is embedded (Antonakis et al., 2003; Liden
Thus, the present research made an important contribution as it considered safety salience (i.e., hazard exposure, injury likelihood, impact on safety of others) as a contextual attribute that influences the leadership process. Results from study 1 showed that leaders’ perceived effectiveness of Management-By-Exception-Active differed depending on the level of hazard exposure in their subordinates’ work environment. Findings in study 1 also showed that the mean levels of transformational leadership and Management-By-Exception-Active as well as the inter-correlations between the two leadership styles varied across different levels of safety salience. Moreover, results from moderation analysis in study 1 and study 2 found evidence for safety salience measures as moderators of the relationship between leadership style and certain outcome measures, although the size of these moderation effects was small. Together these results demonstrate that transformational leadership, Management-By-Exception-Active and passive leadership are not entirely context-free. In section 9.3.1 to section 9.3.3 the findings on the contextualisation of leadership are discussed in more detail.

A further contribution of the research was that transformational as well as transactional leadership were considered together. Existing research has mainly focused on the effectiveness of transformational leadership, but paid less attention to the influence of transactional leadership. The present studies therefore contributed to existing research as they investigated transformational as well as transactional leadership style. In both studies, factor analysis of the MLQ showed that Management-By-Exception-Active formed a single factor, whereas Contingent Reward (which is conceptualised as a transactional dimension in Bass’s original model) loaded onto transformational leadership. This finding added to a growing body of empirical research, which supports a revised structure of transformational-transactional leadership. Both study 1 and study 2 examined the relationships of transformational leadership and Management-By-Exception-Active to a series of outcome criteria. Overall, transformational leadership was more consistently related to outcome measures and showed associations of greater magnitude with the investigated dependent variables. Yet, Management-By-Exception-Active augmented transformational leadership with regards to certain outcomes (i.e., leader self-efficacy), but was unrelated to other criteria. Moreover, as noted above several interaction effects between Management-By-Exception-Active and safety salience measures were significant, indicating that
Management-By-Exception-Active might be more contextually constrained than transformational leadership. Together, these findings suggested that leaders can use Management-By-Exception-Active in addition to transformational leadership to influence specific outcomes under certain conditions, although the relationships of Management-By-Exception-Active to outcome variables tended to be of small magnitude. This contribution of the research is discussed further in section 9.4.

The present research advanced existing research as it investigated the role of leader flexibility in safety-critical and non-safety-critical contexts. This makes an important contribution as it merges behavioural and trait perspectives on leadership, and addresses how leaders can effectively switch between different leadership tactics. Study 1 showed that leader flexibility was significantly related to leader-self efficacy and team performance over and above transformational leadership and Management-By-Exception-Active. In study 2, support for the effectiveness of leader flexibility was limited. Leader flexibility was related to safety climate whilst controlling for transformational leadership, Management-By-Exception-Active and passive leadership, but was unrelated to safety and job performance as well as job satisfaction and satisfaction with leader. This indicates that the competency to adjust leadership behaviour to a particular setting only has an incremental effect with regards to certain types of outcomes. The present research’s contribution of considering leadership behaviours in combination with the competency of leader flexibility is discussed in section 9.5.

Finally, the research made a principal contribution by integrating contextual, behavioural and trait perspectives of leadership research. At the outset of this thesis it was explained that these three perspectives on leadership have been separately investigated, but to overcome the shortcomings within each of these approaches to leadership, integration of different theoretical viewpoints is needed. The present research merged transformational-transactional leadership as a behavioural approach to leadership with leader flexibility, as a leader trait, and investigated how these are influenced by safety salience as a contextual characteristic. Section 9.6 of this chapter discusses the present results with regards to this contribution.
Figure 39 shows the main propositions of the research as they were stated at the beginning of this thesis. A summary of the empirical findings that the present research has produced with regards to these propositions is presented in Table 28.

Figure 39. Recapitulation of research propositions.
<table>
<thead>
<tr>
<th>Proposition</th>
<th>Study 1 summary of results</th>
<th>Study 2 summary of results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposition 1</td>
<td>Partially supported, as both MBEA and TF were perceived as more effective in higher impact on safety of others groups, and higher hazard exposure groups (MBEA only), but no significant differences were found for injury likelihood, although results were in the expected direction.</td>
<td>Not investigated.</td>
</tr>
<tr>
<td>Proposition 2</td>
<td>Partially supported, as mean levels of both MBEA and TF were significantly higher in higher hazard exposure and higher impact on safety of others, and for MBEA only means were also higher in high injury likelihood groups, compared to low safety salience groups.</td>
<td>Not investigated.</td>
</tr>
<tr>
<td>Proposition 3</td>
<td>Partially supported, as TF and MBEA were more strongly correlated if hazard exposure, injury likelihood and impact on safety of others were high, but differences were not significant between all of the groups within each safety salience measure.</td>
<td>Not investigated.</td>
</tr>
<tr>
<td>Proposition 4</td>
<td>Partial support for P4a as MBEA was significantly related to leader self-efficacy whilst controlling for other leadership variables. Partial support for P4b as hazard exposure moderated the relationship between MBEA and safety incidents.</td>
<td>No support for P4a as MBEA did not show any significant main effects. Partial support for P4b as team-level injury likelihood moderated the link between MBEA and safety with job performance in combined, cross-level moderation model.</td>
</tr>
<tr>
<td>Proposition 5</td>
<td>Partial support for P5a as TF was significantly related to leader self-efficacy and team performance, but not safety incidents. Injury likelihood moderated the link between TF and team performance, but effect was not in expected direction (P5b).</td>
<td>Partial support for P5a as TF was significantly related to safety climate, job satisfaction and satisfaction with leader whilst controlling for other leadership variables. Team-level hazard exposure moderated link between TF and job performance, but effect was not in expected direction (P5b).</td>
</tr>
<tr>
<td>Proposition 6</td>
<td>Not investigated.</td>
<td>P6a not supported as passive leadership did not have any significant main effects whilst controlling for other leadership variables. Partial support for P6b as each of the safety salience measures showed interactions with passive leadership, but for injury likelihood and safety of others moderation effects were in opposite direction to that expected.</td>
</tr>
<tr>
<td>Proposition 7</td>
<td>Partial support for P7a as leader flexibility was significantly linked with team performance and leader self-efficacy, but not safety incidents, whilst controlling for other leadership variables.</td>
<td>P7b was not supported.</td>
</tr>
</tbody>
</table>

*Note.* Numbering of propositions refers to Figure 39, TF = transformational leadership, MBEA = Management-By-Exception-Active.
9.3 Merging Behavioural and Contingency Views: Contextualisation of Leadership

The present research examined whether safety salience influences the effectiveness and occurrence of transformational, transactional and passive leadership. This investigation made a key contribution to the wider leadership literature as results from the research indicated that transformational, transactional and passive leadership are not context free when considering safety salience as a contextual characteristic. The research also made a substantial contribution to the safety-specific literature as it addressed how leaders meet the unique requirements of safety-critical contexts in their leadership practices. In the following three sections the research’s findings on the contextualisation of leadership, are discussed for transactional, transformational and passive leadership.

9.3.1 Contextualisation of transactional leadership style

Previous research has produced inconsistent results with regards to the effectiveness of transactional leadership style (Judge & Piccolo, 2004). It has been suggested that these controversies in findings can be contributed to differences between the contexts in which transactional leadership was studied. The present research explored whether the level of safety salience impacts on the perceived effectiveness and occurrence of transactional leadership (study 1) and whether the relationship between transactional leadership and outcome criteria is moderated by safety salience (study 1 and 2). It was proposed that Management-By-Exception-Active and transformational leadership are perceived as more effective in safety-critical conditions compared to settings where safety is less salient.

In study 1, findings showed that the extent to which leaders engage in Management-By-Exception-Active and perceived effectiveness of Management-By-Exception-Active practices varied significantly depending on the level of safety salience within their subordinates’ work environment. That is leaders, who reported that their subordinates work in hazardous work contexts or settings where the impact on safety of others was high, rated Management-By-Exception-Active as more effective
compared to groups with low hazard exposure and low impact on the safety of others. These findings lent support to the proposition that transactional leadership meets the specific demands of safety-critical contexts and hence is regarded as more effective by individuals working within environments where safety is key. The results on perceived effectiveness and occurrence of transactional leadership were in line with previous research that has indicated that followers are more favourable towards directive forms of leadership under conditions of uncertainty (Rast et al., 2012; Schriesheim et al., 1994). For example, Rast et al. (2012) provide empirical evidence that followers have a higher acceptance of autocratic leaders than non-autocratic leaders if uncertainty is high. This is in accord with the present finding that Management-By-Exception-Active tended to be used more frequently and rated as more effective by leaders who operate in hazardous work conditions or where the safety of others is at stake. Thus, the findings from study 1, corroborated the notion that the context in which leadership takes place, configures which leader practices are prototypically perceived as effective (Antonakis et al., 2003; Emrich, 1999; Liden & Antonaki, 2009). Moreover, results from moderator analysis also suggested that transactional leadership is not context-free and indicated that the effectiveness of Management-By-Exception-Active is influenced by safety salience. That is, in both studies safety salience measures emerged as moderators of the relationship between Management-By-Exception-Active and outcome criteria, although the type of safety salience measure and the type of outcome differed between the two studies (i.e., in study 1 hazard exposure moderated the link with safety incidents and in study 2 injury likelihood moderated the link with safety and job performance). The section below discusses these findings and addresses potential reasons for the differences between the two studies.

In study 1, hazard exposure moderated the relationship between Management-By-Exception-Active and safety incidents. If hazard exposure was high, Management-By-Exception-Active was associated with fewer safety incidents, but not if hazard exposure was low. In contexts where employees are exposed to high levels of hazards, avoidance of errors and reliability are pivotal goals. Thus, leadership actions that address this objective, such as vigilantly correcting mistakes, are likely to play an important role in successfully managing hazards and reducing the risk for injury. As suggested in the discussion section of the study 1 chapter, the visibility of hazards in high hazard exposure settings might allow for a greater impact of leadership on safety
incidents. If hazard exposure is rated as high, hazards are likely to be clearly identifiable and visible, and can therefore be controlled through actions such as monitoring performance and vigilantly checking for errors. However, if hazards are less salient, then these directive leadership activities might be less appropriate as hazards are not as readily detectable. This interpretation is in line with the study 1 result that only hazard level, and not frequency of hazard exposure, moderated the relationship between Management-By-Exception-Active and safety incidents.

Findings from study 2 also lent support to the hypothesis that Management-By-Exception-Active might play an important role in safety-critical contexts. Results from cross-level moderation analysis showed that team-level injury likelihood moderated the relationship of Management-By-Exception-Active to safety and job performance. Management-By-Exception-Active was positively associated with safety performance under conditions of high injury likelihood, but not if injury likelihood was low. Parallel to the moderation effect in study 1, it was suggested that if teams experience high levels of threat for injury, Management-By-Exception-Active can pre-empt error making and clarify the priority of safety and therefore enhance workplace safety.

Together, both studies suggested that the level of salience within a work context impacts on the effectiveness of Management-By-Exception-Active. This is an important contribution as it indicates that contextual factors need to be considered when examining the link between transactional leadership and outcome criteria. The results showed that in contexts where safety is salient, Management-By-Exception-Active has beneficial effects with regards to certain outcomes (i.e. safety incidents and safety performance). However, if safety is not salient, engaging in Management-By-Exception-Active might actually be detrimental, as results in study 2 showed that in the case of injury likelihood being low, Management-By-Exception-Active was negatively associated with job performance. Previous research has found conflicting results on the effectiveness of transactional leadership, with studies reporting positive as well as negative effects (Judge & Piccolo, 2004). It has been argued that these controversies might be due to differences in contexts, and that transactional leadership might be desired and effective in some contexts, but might be ineffective in others (Antonakis et al., 2003; Judge & Piccolo, 2004). Taken together, the results from study 1 and study 2 lent support to this argument when considered in relation to safety.
salience as a contextual characteristic. Based on the present findings it can be suggested that in safety-critical contexts, Management-By-Exception-Active might offer the required structure and instrumental direction to manage the ambiguity and work-safety tension within safety-critical contexts. In contexts where hazard exposure or injury likelihood is high, the margin for error is thin and prevention of mistakes is vital. Thus, proactively correcting errors and monitoring performance, enhances safety performance if safety is critical as indicated by the results in study 2, and decreases safety incident rates as indicated by the findings in study 1. Moreover, it was suggested that in contexts where hazard exposure or injury likelihood are high, employees are more frequently confronted with opposing demands. Therefore directive behaviours such as Management-By-Exception-Active might be more beneficial if safety is salient, as it reduces ambiguity stemming from competing goals such as cost and safety. Consistent with this interpretation, Dahl and Olsen (2013) showed in a sample of offshore petroleum workers that leadership involvement enhances safety compliance through increasing role clarity. However, the above interpretations of the moderator effect of safety salience on the relationship of Management-By-Exception-Active to safety performance and safety incidents must be viewed in light of some limitations. Whilst safety salience did emerge has a significant moderator, it must be noted that under high safety salience as well as under low safety salience conditions, Management-By-Exception-Active was only weakly associated with the respective outcome (i.e. safety incidents in study 1 and safety and job performance in study 2). Thus, whilst Management-By-Exception-Active was significantly related to outcome criteria under certain conditions, the magnitude of these effects was small. It should also be acknowledged that in study 1 as well as study 2 a large number of moderation effects were tested. Conducting multiple tests inflates the Type I error rate. In study 1, the interaction effect between Management-By-Exception-Active and hazard exposure on safety incidents was significant at $p = .04$. In study 2, the interaction effect between Management-By-Exception-Active and injury likelihood was significant at $p = .09$ for job performance and $p = .04$ for safety performance as the respective outcome variable. Taking into account that a more stringent criterion for significance might have been appropriate due to the number of hypothesis tests conducted, these findings should be interpreted with some caution. The issues of controlling for Type I and Type II error rates are discussed further in section 9.8.6.
Whilst the findings from study 1 and study 2 both indicated that the effectiveness of Management-By-Exception-Active is dependent on the level of safety salience, the two studies identified different measures of safety salience as significant moderators. In study 1, Management-By-Exception-Active significantly interacted with hazard exposure, whereas in study 2 Management-By-Exception-Active showed a significant interaction effect with injury likelihood. It can be speculated that this difference might be due to the type of outcome investigated. In study 1, safety incidents were investigated, which measures a lack of safety. In study 2, safety performance was investigated as an outcome, which presents a proactive measure of safety. It has also been discussed in this thesis, that hazard exposure might refer to the objective presence of hazards, regardless of whether these are adequately managed or not. In contrast, injury likelihood might refer more to a sense of whether risks and hazards are addressed successfully within a work environment (e.g., if the level of hazards is small, but these are not properly managed, perceived injury likelihood might be rated as high and vice versa if major hazards are controlled, employees’ injury likelihood perceptions might be low). Under conditions where major hazards are present, Management-By-Exception-Active might be effective in preventing concrete safety incidents by directly affecting employees’ behaviour. For example whilst working at height (i.e., major hazard exposure), checking that subordinates use personal protective equipment properly might directly prevent an accident. This is in line with the results from study 1, where the relationship of Management-By-Exception-Active to safety incidents was moderated by hazard exposure. Under conditions where teams experience a collective sense of threat of injury, there might not necessarily be a distinct hazard source present, but a general sense of unsafe working conditions. Thus, under such conditions, Management-By-Exception-Active might not impact on specific behavioural actions related to specific hazards, but might more generally increase safety performance through vigilantly monitoring performance and clarifying the role of safety. This is in line with the finding in study 2, where the relationship between Management-By-Exception-Active and safety performance was moderated by injury likelihood.

A surprising result with regards to the effectiveness of Management-By-Exception-Active emerged in study 2. When investigating the two sub-dimensions of safety performance separately, team-level injury likelihood moderated the link between
MANAGEMENT-BY-EXCEPTION-ACTIVE with safety participation but not safety compliance. This is contrary to existing research, which has suggested that transactional leadership is more strongly associated with compliance or within-role performance than contextual performance (Bass & Riggio, 2006; Clarke, 2013; Griffin & Hu, 2013; Wang et al., 2011). However, as discussed in the study 2 chapter, this result is not inexplicable given that the effect was contingent on the level of injury likelihood. Drawing on substitutes for leadership theory (Kerr & Jermier, 1978), it can be argued that injury likelihood functions as a substitute for leadership with regards to safety compliance and as an enhancer with regards to safety participation as the outcome. If a high threat for injury prevails within a team, it is likely that employees are intrinsically motivated to comply with safety rules and regulations. Thus, no link was found between Management-By-Exception-Active and safety compliance if injury likelihood was high. This interpretation is in line with the leadership substitute approach, which postulates that certain contextual factors can replace the need for leadership (De Vries, Roe, & Tallieu, 2002; Kerr & Jermier, 1978; Podsakoff et al., 1996a). However, Management-By-Exception-Active practices such as vigilantly checking for mistakes and clarifying the priority of safety, might encourage employees beyond their self-propelled efforts to comply with safety rules and to direct extra attention and resources to safety. For example, employees might experience work-safety tension and follow expected safety procedures but not beyond that which is formally expected with regards to safety. If leaders engage in Management-By-Exception-Active and clarify the priority of safety over other goals, employees might be more likely to engage in extra efforts directed towards safety. Congruent with this argument, the substitutes for leadership approach states that certain conditions magnify the influence of leadership (Howell et al., 1986; Kerr & Jermier, 1978; Podsakoff et al., 1996a). One of the host organisations in study 2 was an oil and gas service provider and a company example can be considered to illustrate the foregoing argument. An engineer working offshore might detect a leak in their equipment. The formal company rule states that the leak has to be fixed before work can continue and, as it would be highly dangerous to proceed with the leak, the engineer is likely to be sufficiently self-motivated to comply with this rule. Beyond that the company has a reporting system to log records of safety issues. If a leader clearly demonstrates the priority of safety through Management-By-Exception-Active, an engineer might be more likely to invest in the extra time and log the incident on the reporting system. Thus, the finding
that Management-By-Exception-Active is more positively related to safety participation than compliance if injury likelihood within a team is high, further underpins the importance of considering contextual characteristics when investigating the effectiveness of leadership. Research has generally argued that transactional leadership is less effective for influencing extra-role behaviours (Wang et al., 2011). However, the present results showed that this conclusion might not hold under conditions where threat for injury or harm is highly salient.

Whilst the results discussed above indicate that the effectiveness of Management-By-Exception-Active is dependent on the level of safety salience within a context, it must be noted that alternative explanations of the results could apply. As outlined in the study 1 and study 2 chapters, Management-By-Exception-Active might only be related to safety incidents if hazard exposure and injury likelihood are high, as under low safety salience conditions these might not present meaningful outcome measures. In relation to this argument, safety performance and safety incidents might show a restricted range of scores if safety salience is low, which diminishes the power to detect relationships with leadership styles. However, in study 1 the score at one standard deviation below mean hazard exposure was 2.82. For injury likelihood in study 2 one standard deviation below the mean corresponded to a score of 1.87 (for both measures scales ranged from 1 to 5). This demonstrates that in low hazard exposure and injury likelihood conditions safety was still salient to some degree.

It should also be highlighted that although results in study 1 indicated that perceived effectiveness of Management-By-Exception-Active differed across the different safety salience groups, the magnitude of this effect was relatively small. This in itself presents an interesting outcome, as results indicated that overall Management-By-Exception-Active is perceived as an effective leadership tactic in both non-safety-critical-contexts as well as safety-critical-contexts, but somewhat more so in the latter condition. It has been pointed out that transactional leadership is unnecessarily negatively depicted in the leadership literature (Griffin & Talati, 2011; Yukl, 2010). Yet, the findings from study 1 signified that overall leaders have favourable views on the effectiveness of Management-By-Exception-Active in both non-safety-critical and safety critical-contexts (and even more though in the latter). The more conventional, negative view of transactional leadership might have been induced by the inclusion of Management-
By-Exception-Passive as a dimension of transactional leadership. However, research, including the results from the present two studies, has repeatedly demonstrated that Management-By-Exception-Passive is more strongly related to laissez-faire leadership rather than transactional leadership. Thus, when discussing leader preferences and attitudes towards leadership styles, it is important to take the dimensionality of transactional leadership into account.

In summary, the results from the present research suggested that Management-By-Exception-Active might be particularly effective for enhancing safety outcomes when safety is highly salient, but might be less effective and even detrimental if safety is not salient. The findings can be interpreted against the background of contingency approaches to leadership, which postulate that context affects the impact of leadership (e.g., Fiedler, 1964; Kerr & Jermier, 1978). While safety salience is not explicitly considered in these theories as a context factor, the present results endorse the wider claims of contingency leadership approaches. It has been recognised that Management-By-Exception-Active has been generally discussed as a negative, controlling form of leadership (Griffin & Talati, 2011). The present results challenge this unrefined, negative view and call for a more differentiated view of Management-By-Exception-Active. The findings demonstrated that under certain conditions, such as high hazard exposure or injury likelihood, Management-By-Exception-Active is positively linked to safety outcomes, although the strength of this relationship was low. Other studies have positively linked active transactional leadership practices to safety outcomes (Clarke, 2013; Clarke & Ward, 2006; Griffin & Hu, 2013; Künzle et al., 2010). Clarke (2013) provided meta-analytical evidence that active transactional leadership is positively linked with safety compliance and safety participation. In addition, literature on high-reliability organizations has emphasised the need for monitoring of procedural deviations as critical actions to control intrinsic hazards (Roberts, 1993). Together with the present findings, this makes Management-By-Exception-Active of interest to future research in the area of safety and highlights the importance of merging behavioural leadership approaches with contingency views.
9.3.2 Contextualisation of transformational leadership

Whilst existing research has linked transformational leadership with a range of different outcome variables, it has been repeatedly noted that this body of research has neglected contextual factors that might impact on these relationships between transformational leadership and outcome criteria (e.g., Avolio & Yammarino, 2013; Liden & Antonakis, 2009; Pawar & Eastman, 1997; Rowold, 2011). The present research made an important contribution, as results suggested that the level of safety salience within a context, influences the effectiveness of transformational leadership. Moreover, the direction of these interaction effects was unexpected as it was indicated that transformational leadership might be less effective if safety is highly salient. Results from moderation analysis indicated that transformational leadership is related less strongly to team performance if injury likelihood is high (study 1) and showed a weaker association with job performance if team hazard exposure was high (study 2). The findings adumbrate the possibility that transformational leadership might be less effective for influencing performance if safety is highly salient within work contexts. It was suggested that transformational practices do not provide the necessary structure that safety-critical contexts require and might be less fitted to the demands of safety-critical contexts. Within settings where hazard exposure is high or where a prominent threat for harm prevails, leaders’ most vital objective might be prevention of errors and establishing reliability rather than inspiration or intellectual stimulation of employees. Inness et al. (2010) reported that transformational leadership was not linked with safety compliance. They explain that transformational leadership might provide subordinates with greater discretion in their interpretation and implication of safety rules and regulations. Kapp (2012) showed that transformational leadership was only related to safety compliance if group safety climate was high suggesting that unless transformational leadership is coupled with a clear priority for safety, it does not enhance safety rule following. Together with the present interaction terms between transformational leadership and hazard exposure and injury likelihood, these findings suggest that transformational leadership might be a less pivotal leader tactic in safety-critical contexts.

However, contrary to this notion it must be recognised that numerous studies have demonstrated that transformational leadership can be positively associated with a
variety of safety outcomes (e.g., Barling et al., 2002; Clarke, 2013; Conchie, Taylor & Donald, 2012; Kelloway et al., 2006). In addition, the results of the present study showed that transformational leadership had significant main effects on study outcome variables including safety climate, job satisfaction and satisfaction with leader irrespective of the level of safety salience. Moreover, results in study 1 showed that transformational leadership was perceived as effective if safety was rated as salient and that leaders engaged more frequently in transformational leadership practices if hazard exposure and impact on safety of others were rated as high. Thus, these findings suggest that transformational leadership does have relevance for occupational safety.

Clarke (2013) discusses that some parts of transformational leadership might be beneficial for safety whilst other elements of transformational leadership might have detrimental effects on workplace safety. For example, intellectual stimulation might give employees greater latitude in how they approach safety issues and increase risk-taking (Clarke, 2013). Idealised influence on the other hand might create opportunities to role model the importance of safety compliance and thereby have a beneficial impact on workplace safety. Future research is needed to investigate the role of different sub-dimensions of transformational leadership for safety. The present research’s findings showed that transformational leadership was perceived as less effective under safety-critical conditions, but showed positive direct effects with safety climate and other outcomes. Another explanation for this inconsistency in findings on the effectiveness of transformational leadership for safety, could be that transformational leadership is effective for certain types of outcomes in safety-critical contexts (Griffin & Hu, 2013). For example, the results from study 1 and study 2 showed that transformational leadership was positively related to safety climate but not safety performance. Thus, transformational leadership might be effective for influencing attitudes and values towards safety, but might be less important for directly impacting upon employee safety behaviour.

The significant interaction terms between transformational leadership and team hazard exposure and injury likelihood in the present study converge with claims that conceptualisations of transformational leadership lack contextual sensitivity (Antonakis et al., 2003; Liden & Antonakis, 2009; Peus, Braun, & Frey; 2013; Rowold, 2011; Schriesheim et al., 2009). In response to these calls, empirical research increasingly addresses contextual conditions for transformational leadership, which
counter the notion that transformational leadership is equally effective across different contexts (Dust, Resick, & Mawritz, 2013; Pawar & Eastman, 1997; Shamir & Howell, 1999; Tyssen, Wald, & Heidenreich, in press). Thus, the present research made an important contribution as it tested whether transformational leadership is context-free, and added to a growing body of research that casts doubt on the view that transformational leadership is equally appropriate across all contexts. Whilst the present results did not show that transformational leadership was ineffective if safety was salient, the research did indicate that its degree of effectiveness fluctuates in dependence on the level of injury likelihood (study 1) and hazard exposure (study 2).

However, as noted above it must be acknowledged that a large number of significance tests were performed in study 1 and study 2, which increased the potential for a Type I error. In study 1, the interaction effect between transformational leadership style and injury likelihood on team performance was significant at $p = .02$. In study 2, the cross-level interaction between transformational leadership style and hazard exposure on job performance was significant at $p = .04$. It can be argued that if applying a more stringent criterion for significance to control for the inflated Type I error rate, these effects would not have been considered significant. Nevertheless, there is a need for future research to incorporate a contextual perspective into the existing understanding of transformational leadership and further explore the role of transformational leadership under safety-critical conditions. It was suggested that transformational leadership exerts its influence on workplace safety through employee attitudes, such as safety climate perceptions, but is less effective for directly influencing employee safety behaviour. Thus, an avenue for future research lies not only in the contextualisation of transformational leadership, but also whether this leadership style is specific to certain types of safety outcomes.

Blair and Hunt (1986) defined contextual approaches to management research on a continuum that ranges from context-free to entirely contextualist, with a degree of contextual sensitivity spanning between these two end points. Although the purpose of their classification was to describe orientations of management research, a similar classification system could be applied to the effects of context on leadership behaviour itself. That is, some leadership practices might be context-free, others might be context-sensitive, but not entirely determined by contexts, and at the far end of the continuum, the effectiveness of some leadership practices might be entirely dependent...
on contextual factors. In other words, whilst some leadership practices might be more or less effective in different settings (i.e., context-sensitive), other leadership styles might be either effective or not effective at all depending on the context (i.e., context-dependent). Results from the present research showed that if employees are exposed to hazards and perceive injury likelihood to is, transformational leadership was less positively associated with team performance (study 1) and job performance (study 2), but did not become entirely ineffective. Results regarding Management-By-Exception-Active showed several interactions that indicated that depending on the level of safety salience, Management-By-Exception-Active is effective or not effective at all. When testing the relationships between Management-By-Exception-Active and safety incidents and safety performance at one standard deviation above and below the safety salience moderator mean, results showed that the association changed from related to unrelated (rather than from related to less strongly related). These findings on the magnitude of the moderation effect signified that contextual factors might influence different leadership styles to a different degree. Thus the effectiveness of Management-By-Exception-Active might be more contextually constrained than the effectiveness of transformational leadership.

9.3.3 Contextualisation of passive leadership

Existing research has demonstrated that passive leadership has deleterious effects for safety outcomes (Kelloway et al., 2006), but has paid little consideration to contextual factors that might aggravate or bolster the negative effects of passive leadership. Thus, the present research advanced existing leadership research by investigating the role of safety salience for the impact of passive leadership. In study 2 it was examined whether safety salience moderates the relationship between passive leadership and study outcomes. It was proposed that if safety is salient passive leadership is more strongly, negatively related to outcome variables. The findings showed significant interaction terms between passive leadership and hazard exposure, injury likelihood and safety of others. For hazard exposure as the moderator variable, results were in the hypothesised direction and demonstrated that the relationship between passive leadership and job performance was more strongly negative when hazard exposure was high compared to low levels of hazard exposure. For injury likelihood and safety of others the moderation effects were in the opposite direction. Passive leadership was negatively
related to safety and job performance when injury likelihood and safety of others were low, but not under high injury likelihood conditions or if the impact on safety of others was high. It was discussed in the study 2 chapter that high levels of injury likelihood and safety of others might urge individuals to engage in safety activities and high levels of performance. The prominent threat of injury for either oneself or others might self-motivate employees to commit to workplace safety, which in turn compensates for passive leadership behaviour. The findings that high injury likelihood and safety of others compensated for passive leadership, can be related to the notion that experiencing ‘chronic unease’ can be beneficial for achieving high levels of safety (Fruhen, Flin, & McLeod, 2013; Reason, 1997). Chronic unease describes a continuous wariness towards safety risks and has been defined as “a state of psychological strain in which an individual experiences discomfort and concern about the control of risks” (Fruhen et al., 2013, p. 6). Reason (1997) proposed that chronic unease averts complacency towards safety risks. Similarly, alertness towards risk has been discussed as an important characteristic of high-reliability organisations that facilitates the anticipation of failure (Hopkins, 2011; Weick & Sutcliffe, 2007). In line with these propositions, the findings of the present study denoted that a sense of injury likelihood amongst team members could counteract negative effects of passive leadership as it might stimulate self-motivation for safety-related activities. Thus, a sense of chronic unease might be effective in ensuring vigilance towards safety, which protects employees against poor leadership.

Conceptually, the interaction between injury likelihood and safety of others with passive leadership can be interpreted from the perspective of substitutes for leadership theory (Kerr & Jermier, 1978). The theory postulates that leaders adjust their behaviour in line with changes in task characteristics, team composition and contextual features. According to substitutes for leadership framework such situational factors can neutralise, substitute for, or enhance the influence of leadership (Howell et al., 1986; Kerr & Jermier, 1978). It has been suggested that contextual attributes can not only render active leadership unnecessary, but can also make up for the negative effects of weak leadership (Den Hartog et al., 1997). Passive leadership refers to the absence of leadership with avoidance of decision-making and of supervisory responsibilities (Avolio, 1999; Bass & Riggio, 2006). Within the literature passive leadership is generally perceived as an ineffective form of leadership and empirical research has
produced evidence for a negative effect on leadership criteria including safety outcomes (e.g., Kelloway et al., 2006). However, certain circumstances might countervail for this leader inactivity (Den Hartog et al., 1997; Fay et al., 2004; Van Dyne, Kamdar, & Joireman, 2008). If injury likelihood and the impact on safety of others are high, employees might be immune to the negative effects of passive leadership as they are more strongly self-propelled to engage in safety actions. The finding is in line with previous research, which demonstrated that situational factors can compensate for poor leadership. For example, Fay et al. (2004) produced evidence that a proactive organisational climate compensates for lack of leader initiative. Similarly, Hui, Chiu, Yu, Cheng, and Tse (2007) investigated the link between leadership and customer service quality and reported that a positive service climate at the group-level functioned as a substitute for poor leadership. Concordantly, Van Dyne et al. (2008) found that employees’ role perceptions act as a buffer against negative effects of low-quality leader-member exchange on helping behaviour. Together with the results from the present research, these findings lend support to the proposition that contextual attributes can balance out shortcomings in leadership.

For hazard exposure as the moderator, results from study 2 showed that the moderation effect was in the opposite direction to the interaction of passive leadership with injury likelihood and safety of others. If hazard exposure was high, passive leadership was more negatively related to safety and job performance compared to low levels of hazard exposure. It was suggested in the discussion of the study 2 results that injury likelihood and safety of others might tap into the perceived sense of threat for harm to oneself or to others whereas hazard exposure might assess the presence of hazards per se within a work environment. Thus, it can be suggested that hazards as such, do not present a contextual substitute that compensate for the destructive effects of passive leadership, but team perceptions of a prominent threat for injury can function as a buffer against passive leadership. This is an important finding as it signifies that leaders cannot assume that hazard exposure as such will self-motivate employees sufficiently to bolster any negative effects from passive leadership.

It should be noted that whilst the moderation effects of safety salience discussed above denoted that effectiveness of leadership differs between safety-critical and non-safety-critical contexts, several of the tested interaction terms did not reach statistical
Moreover, across the two studies several moderation effects emerged for transformational leadership, Management-By-Exception-Active and passive leadership, but these were not consistently replicated in both studies. Different safety salience measures emerged as significant moderators in the studies and some of the moderation effects were weak and became non-significant when controlling for other variables. Also, as pointed out above it must be noted that the large number of tests conducted in study 1 and study 2 might have potentially lead to false positives. Thus, whilst the results of the research show an overall pattern that the salience of safety impacts on the effectiveness of leadership, results must be interpreted in the light of these inconsistencies and the increased Type I error risk. Prior research that has explored contextual characteristics in the leadership process, has acknowledged that studies not uncommonly find only a small number of significant interactions relative to the number of moderation effects that were tested. Podsakoff and MacKenzie (1997) reviewed a body of studies that have examined moderation effects based on the Substitutes for Leadership theory (Kerr & Jermier, 1978) and reported that only 7% of hypothesised moderation effects were significant. Despite this small number of significant moderation effects, it is has been repeatedly stressed that this should not steer research away from exploring the role of contextual factors for leadership (De Vries et al., 2002, Fay et al., 2002, Podsakoff & MacKenzie, 1997; Villa et al., 2003). Studies that do report significant interactions clearly show that context factors do matter and omission of these is likely to result in a deficient understanding of leadership (Kapp, 2012; Künzle et al., 2010; Van Dyne et al., 2008; Wang & Rode, 2010). In the present study, inclusion of hazard exposure and injury likelihood revealed that under certain conditions, Management-By-Exception-Active is positively related to safety incidents and safety performance. Studies that do detect significant interactions have often departed from the traditional contingency approach. For example, Wang and Rode (2010) emphasise that traditional contingency theorisations have rarely been joined with other, more current leadership frameworks such as the transformational-transactive leadership model. Hui et al. (2007) found evidence for group-level service climate as a significant moderator on the leadership-outcome relationship. The authors point out that traditional contingency theories, which have not always been supported by empirical evidence, conceptualised context factors at the individual-level and state that group-level attributes might yield more encouraging results. Villa et al. (2003) comment that moderators in leadership research lack
applicability or real-world value and often instead comprise theoretical constructs that are overly abstract. Consistent with these prompts, the present research went beyond the traditional contingency approach. Safety salience is not explicitly recognised within contingency theories and was explored as a novel contextual characteristic. Moreover, the salience of safety within work contexts presents an applied contextual attribute and multi-level interactions were examined. Making a similar appeal to overhaul leadership context theories, Kerr and Jermier (1997) clarified that their substitutes for leadership theory was not intended as a “closed system” and stated “better specification […] of how substitutes exert their effects on various criteria is long overdue“ (p. 97). In light of the current significant moderator effects that were detected, the present studies embolden future research to widen the investigation of contextual boundaries of leadership beyond traditional contingency theories.

9.4 Combination of Transactional and Transformational Leadership

In his original conceptualisation of transformational-transactional leadership, Bass (1985) stated that effective leaders adopt both leadership styles. However, whilst existing research has paid considerable attention to transformational leadership, transactional leadership lacks empirical investigation. Thus, the present studies advanced prior research by exploring transformational as well as transactional leadership. In study 1, it was investigated to what extent transformational and transactional leadership are used in conjunction across different levels of safety salience within a work context. Moreover, study 1 as well as study 2 tested whether transactional leadership has a unique influence on the investigated outcome criteria whilst controlling for transformational leadership.

Based on the argument that transformational and transactional leadership practices are more or less effective under certain conditions, it was proposed that the extent to which leaders use the two leadership styles together depends on the context. Results in study 1 showed that transformational leadership and Management-By-Exception-Active tended to be more strongly related to each other under safety-critical conditions and significant differences in the strength of correlation were found for each of the three...
safety salience measures. The results connoted that leaders in safety-critical-contexts tend to be either active leaders, relying on both forms of leadership style or tend to be passive leaders who do not frequently use either of the two leadership styles. It was suggested that safety-critical contexts might be characterised through greater diversity of goals compared to less safety-critical contexts (Stride et al., 2013; Zohar, 2000, 2010). Therefore, active leaders in safety-critical contexts who are avid to meet situational objectives might be more likely to use both transformational and transactional leadership practices to address the multiple demands they are confronted with. For active leaders who are concerned to meet objectives in non-safety-critical contexts it might be sufficient to largely rely on transformational leadership, as demands are more uniform and they are less frequently faced with having to integrate opposing demands. This interpretation is in line with the present finding on mean levels of transformational leadership and Management-By-Exception-Active, which showed that leaders who operate in contexts where safety is salient engage more frequently in Management-By-Exception-Active practices than leaders in non-safety-critical contexts. However, mean levels of transformational leadership differed less strongly across safety salience levels. Thus, the results on the occurrence and co-occurrence of the two leadership styles further indicated that the effectiveness of Management-By-Exception-Active is contextually bounded. These findings are in line with existing research, which has suggested that under critical conditions greater leader intervention is required. Morgeson and DeRue (2006) produced evidence that leaders’ involvement increases in situations of critical events that disrupt normal working procedures. Similarly, Künzle et al., (2010) investigated leadership in medical critical-care teams and reported higher levels of leadership during non-routine situations. They conclude that the amount of leadership is contingent upon the level of routine within a context. Conditions of high hazard exposure, high threat for injury and high impact on the safety of others might resemble a persistent state of urgency, as there is a continuous need to prevent accidents and injuries. Also, the frequency of disruptions and non-routine situations might be higher in safety-critical contexts as even small events can be critical events with potential for severe consequences. Thus, the increased ambiguity in safety-critical-contexts due to multiple, opposing demands, and a higher frequency of critical events might call for more leader involvement. The present research measured three types of safety salience, but did not formally measure whether safety-critical contexts have more varied demands and increased ambiguity.
Future research would benefit from a systematic assessment of the demands and characteristics specific to safety-critical-contexts and how they differ from environments where safety is less key.

In the moderation models, the relationships of transformational and transactional leadership to outcome criteria were assessed whilst controlling for each other. In study 1, Management-By-Exception-Active had a significant main effect on leader self-efficacy and a moderated effect on safety incidents (conditional on levels of hazard exposure as discussed above), but was unrelated to team performance. In study 2, Management-By-Exception-Active did not show any significant main effects over and above transformational leadership, but had moderated effects on safety and job performance (conditional on the level of injury likelihood as discussed above). Thus, these findings align with the notion presented above that the benefits of Management-by-Exception-Active are more strongly confined to certain contexts as well as outcomes. It can be suggested that Management-By-Exception-Active augments transformational leadership only in certain contexts (e.g., if safety is salient), and only with regards to certain outcomes. In other words the results showed that, the effectiveness of Management-By-Exception-Active is restricted to certain outcomes and certain contextual conditions. In study 1 and study 2, Management-By-Exception-Active showed conditional, positive relationships with safety-specific outcomes, but not with other non-domain specific outcomes such as job satisfaction, or generic team performance. Within the leadership literature, it has been voiced that effectiveness of leadership styles should be discussed in a more differentiated manner, taking into consideration the types of outcomes that are assessed (Arvonen & Ekvall, 1999; Day 2001; Hiller, DeChurch, Murase, & Doty, 2011; Keller, 2006). Management-By-Exception-Active might be effective in influencing safety behaviour but might contribute less towards employee satisfaction outcomes. Further, Management-By-Exception-Active was not related to safety climate, which is concerned with attitudes and perceptions about safety, rather than tangible safety behaviours. In contrast, transformational leadership was related to safety climate and satisfaction outcomes but not to safety behaviour and safety incidents. It can therefore be proposed that Management-By-Exception-Active directly impacts domain-specific employee behaviours (e.g., safety performance) and events that are the direct result of these behaviours (e.g., safety incident). However, Management-By-Exception-Active might
impact less on employee attitudes such as climate perceptions or job satisfaction. This suggestion fits with theories that have aligned transactional leadership with task-oriented leadership and transformational leadership practices with relationship-oriented leadership (Yukl, 2010).

Overall, results showed that transformational leadership tended to emerge as a stronger predictor of leadership outcomes and was less restricted by contextual factors. Management-By-Exception-Active augmented transformational leadership with regards to certain outcomes such as leader self-efficacy and showed unique associations with outcome variables such as safety behaviour, which were not related to transformational leadership. This suggests that transformational leadership might provide a baseline, grounding leadership style, whilst Management-By-Exception-Active provides a situation- and criterion-specific leadership form. Leaders might use transformational leadership as a ‘base’ leadership tactic and supplement their leadership behaviour with Management-by-Exception-Active to influence particular outcomes under certain conditions (e.g., safety performance if injury likelihood is high).

9.5 Going Beyond Leadership Style: Leader Flexibility

It has been suggested that in addition to being able to draw on a repertoire of leadership practices, effective leaders need to be able to match such practices to the requirements of a particular setting (Hooijberg, 1996; Yukl & Lepsinger, 2004). The present study advanced existing research by exploring whether the trait-like competency of leader flexibility has an influence on leadership outcome criteria beyond leadership behaviours such as transformational-transactional leadership. This investigation made an important contribution to the literature as it provides an example of how trait and behavioural approaches to leadership can be synthesised.

The two studies explored the role of leader flexibility. It was proposed that leader flexibility is related to outcomes beyond transformational-transactional leadership. In support of this, findings from study 1 as well as study 2 showed that leader flexibility was significantly related to various outcome measures whilst controlling for
transformational leadership and Management-By-Exception-Active. In study 1, leader flexibility was significantly associated with leader self-efficacy and team performance over and above transformational leadership and results from study 2 showed that leader flexibility was linked to safety climate beyond transformational leadership. Together, these findings provide evidence that being able to situationally adapt ones leadership style is important beyond the use of distinct leadership styles, although it must be noted that the strength of these relationships was weak. Nevertheless, the results are in line with postulations that leaders are likely to draw from a spectrum of diverse leadership behaviours and adapt their practices depending on changes in the situation (Denison et al., 1995; Rowold, 2011). Prior to the present research, few studies have empirically investigated leader flexibility or merged the idea of situational-adaptive behaviour with leadership models such as the transformational-transactional leadership framework. Zaccaro et al. (1991a) conducted an experiment with a student sample and reported that response flexibility was related to task-relevant behaviour and leader emergence. Also, existing research has indicated that self-monitoring ability is important for effective leadership (Anderson, 1990; Foti & Hauenstein, 2007; Sosik & Dinger, 2007), which aligns with the current findings on leader flexibility.

The findings regarding leader flexibility can be integrated based on the notion presented above that Management-By-Exception-Active supplements transformational leadership under certain conditions. Transformational leadership showed several main effects, which were not moderated by any of the three safety salience measures. In contrast, the influence of Management-By-Exception-Active was only effective under certain conditions (i.e., high hazard exposure, injury likelihood). Leader flexibility is required to establish when to supplement baseline transformational leadership with context-specific leadership actions such as Management-By-Exception-Active. Congruent with this interpretation, leader flexibility has been discussed as a meta-competency that embraces the situationally appropriate use of specific leadership styles such as transformational and transactional leadership (Norton, 2010; Kaiser et al., 2007). Overall, the finding that leader flexibility relates to leader outcomes beyond transformational leadership corroborates propositions that it is not simply sufficient to perform a variety of leadership practices, but that leaders need to utilize these in correspondence with contextual circumstances (Denison et al., 1995; Hooijberg, 1996; Sumner-Armstrong, Newcombe, & Martin,
Adaptability in leadership can be distinguished into behavioural repertoire and behavioural differentiation (Denison et al., 1995). The former refers to the availability of a variety of leadership behaviours and the latter describes the capacity to execute these in adaptation to contextual contingencies. Whilst universal leadership frameworks, such as the transformational-transactional leadership model, specify a number of different leadership tactics, they do not propose how leaders fit these practices to different contexts. In light of the significant relationship of leader flexibility to team performance, to leader self-efficacy (study 1) as well as to safety climate (study 2), it can be proposed that universal leadership theories need to include leader flexibility competency within their contentions. To allow for such conceptual extensions of universal leadership theories, further definitional work is needed on the construct of leader flexibility. The concept of adaptive leadership and the construct of leader flexibility are still emerging within the leadership literature and future research is needed to improve construct clarity, dimensionality and operationalization.

The present research also investigated whether the competency to adapt one’s leadership behaviour, is more relevant if safety is salient. The construct of leader flexibility has been considered to play a more prominent role in equivocal contexts (Dinh & Lord, 2012; Meyer et al., 2009). It has been argued that safety-critical contexts are characterised through increased ambiguity, as competing demands are often simultaneously present (Zohar, 2010). Based on these theorisations, it was hypothesised that leader flexibility might be more strongly related to leader criterion variables in safety-critical contexts compared to environments where safety is less salient. However, in contrast to this proposition leader flexibility was significantly linked with leader self-efficacy and team performance (study 1) and safety climate (study 2) irrespective of the level of safety salience. This suggests that leader flexibility augments the sole, unadjusted use of transformational leadership, with regards to these outcome criteria in safety-critical as well as non-safety-critical contexts.

It should be noted that in study 2, leader flexibility was neither related to safety and job performance nor to job satisfaction and satisfaction with leadership. Moreover, several of the associations between leader flexibility and outcome variables in study 2 were negative, although non-significant. It can be suggested that the competency to
adjust leadership behaviour to contextual demands might be relevant for certain outcomes, but might be less crucial for other types of outcomes. Interestingly, leader flexibility was not related to safety performance or safety incidents. Thus, it can be argued that leader flexibility might increase leaders’ effectiveness with regards to more global performance elements such as leader self-efficacy and non-domain specific team performance. This finding aligns with the conceptualisations of leader flexibility as a meta-competency that subsumes more specific practices (Norton, 2010). Domain-specific outcomes, such as safety behaviour, might be influenced by particular leadership actions (e.g., Management-By-Exception-Active), whereas leader flexibility presents an overarching leader competency that enhances the overall effectiveness and success of leadership. Further, leader flexibility was not related to job satisfaction and satisfaction with leader. Thus, being able to adjust leadership behaviour might be less relevant for influencing affective follower outcomes.

9.6 Theoretical Implications: Merging Contingency, Trait and Behavioural Perspectives of Leadership

Subsuming the points discussed above the research made an important, overarching contribution by integrating the contingency, trait and behavioural perspectives on leadership.

At the outset of this thesis it was discussed that behavioural, trait and contingency perspectives on leadership exist within the literature in relative isolation to each other (De Rue et al., 2011; Graen et al., 2010). These three approaches offer a valuable contribution to understanding the leadership process. However, it has been repeatedly warned that integration of the different conceptual approaches to leadership is required to advance the field of leadership and avoid proliferation of leadership theories (Antonakis & House, 2002; De Rue et al., 2011; Graen et al., 2010). Individually the three main theoretical strands within leadership research have weaknesses, which can be diminished through integration of contingency, behavioural and trait perspectives. The present research combined tenets of different leadership theories and demonstrated that this is likely to lead to a more realistic conceptualisation of the
leadership process. The theoretical implications of this integration of contingency, behavioural and trait perspective are further addressed below.

The results provided evidence that the level of safety salience within a work context affects transformational, transactional and passive leadership. This affirms requests that the transformational-transactional leadership framework needs to be refined by integrating contingency views into its postulations (Avolio & Yammarino, 2013). Merging transformational-transactional leadership with a contingency perspective, also suggested that such theoretical integration overcomes some of the shortcomings of contingency theories. It has often been remarked that whilst contingency leadership theories are intuitively appealing, their amount of empirical support is limited (De Vries et al., 2002; Podsakoff et al., 1995). However, the present results corroborate ideas of substitutes for leadership framework and contingency leadership theory. The research indicates that safety salience presents a contextual attribute impacting on the influence of transformational leadership, Management-By-Exception-Active and passive leadership. The present research went beyond the immediate propositions of contingency leadership theorisations, as safety salience is not formally specified by contingency theories as a contextual factor. It has been claimed that the lack of empirical support for situational leadership theories might be due to a narrow focus on overly abstract contextual attributes that lack proximity to real work settings. In addition, contingency theories have been criticised, as there could be an infinite list of contextual factors that potentially impact upon leadership effectiveness (Podsakoff et al., 1995). Related to this notion, Podsakoff et al. (1995) referred to investigations on contextual factors of leadership as attempts to “find the needle in the haystack” (p. 457). The present research departed from the traditional approach of substitutes for leadership theory as it merges contingency views of leadership with the behavioural transformational-transactional leadership framework and has investigated safety salience as a context that has clear real world relevance. This suggests that traditional contingency theories on their own might be too rigid, and that contextual conceptualisations of leadership are viable and important for a more encompassing view of leadership, when incorporated with existing, robust leadership theories. Thus the present research makes an important theoretical contribution as it integrates behavioural, contingency and trait approaches to leadership.
Moreover, leader flexibility was conceptualised as a trait-like competency and was theorised as complementary to leadership behaviours. The results from this research indicated that leader flexibility as a trait and transformational leadership as a behavioural construct can have additive effects on leader outcomes. This, suggested that for a more refined understanding of leadership, research needs to consider leadership behaviours and traits in combination (DeRue et al., 2011). Overall, the research emphasised the need to channel away viewing leadership frameworks as mutually exclusive and demonstrated how elements from the behavioural, trait and contingency approach can be synthesised.

9.7 Practical Implications

The research has several important implications for practitioners, which are outlined below.

The research identified several moderation effects showing that safety salience measures interact with leadership style. This has important implications for practitioners operating in safety-critical contexts as it indicates that certain practices are particularly important for safety leadership. Study 1 showed that Management-By-Exception-Active was associated with reduced safety incidents if hazard exposure was high, but not under low hazard exposure conditions. Study 2 demonstrated that Management-by-Exception-Active had a more positive association with safety performance if team-level injury likelihood was high. The results underline Management-By-Exception-Active practices as an effective leadership form to directly influence employee safety behaviour and prevent safety incidents if safety is highly salient and threat for harm is present within work environments. Whilst the general leadership literature has emphasised the benefits of transformational leadership to practitioners, the present research highlighted that it is important to incorporate context-specific leadership practices such as Management-By-Exception-Active. Practitioners involved in the design of safety leadership training should tailor development programmes to the contextual demands in which leaders operate and should aim to promote sensitivity towards context amongst leaders.
The findings also showed that transformational leadership was less positively associated with team performance if injury likelihood was high (study 1) and had a weaker relationship with job performance if team-level hazard exposure was high (study 2). It has been remarked that leaders are likely to use a mixture of different leadership styles in their day-to-day interactions with subordinates (Rowold, 2011). The result that transformational leadership is less effective if safety is salient, and that Management-By-Exception-Active has a positive influence under safety-critical conditions highlights, that it is important that leaders align the deployment of their different leadership tactics to the setting. For example, in settings of high hazard exposure and injury likelihood, leaders might want to reduce the amount of transformational leadership in return for an increase in the amount of Management-By-Exception-Active behaviour. In situations where hazard exposure is low the emphasis might be more on transformational leadership rather than Management-By-Exception-Active. Thus, under both conditions leaders would use a combination of transformational and transactional practices but shift the emphasis between the two styles in accordance with contextual demands.

To be able to perform such shifts of behaviour successfully, leaders need to be able to recognise the requirements of different situations and environments. Leader flexibility was significantly related to several of the investigated performance outcome variables whilst controlling for transformational leadership and Management-By-Exception-Active. Leadership training and development programmes should not be limited to the development of different leadership styles but should also focus on training competencies to adapt leadership behaviours to changes in the situation or context.

The findings on the moderation effects of safety salience on the effectiveness of Management-By-Exception-Active and transformational leadership as well as the evidence for the incremental influence of leader flexibility, have important implications for leaders whose subordinates switch between working in safety-critical contexts to working in contexts that are less safety-critical. In many jobs, that involve exposure to hazards, the salience of safety is not at a permanent steady level, but might change depending on the type of work-task or project employees are currently performing. During some work periods employees might work in settings where safety is highly salient and on other work days exposure to hazards might be more moderate.
or even low. For example, one of the host organisations in study 2 was an oil and gas service provider where participants oscillate between working on an offshore installation and working onshore in office-based locations. Thus in this type of job role, employees switch between contexts where safety is highly salient with exposure to major hazards, to work environments where salience of safety is low. The present findings suggest that leaders whose subordinates change between contexts with differing degrees of safety salience should adjust their leadership style accordingly. Results from study 2 showed that Management-By-Exception-Active was associated with enhanced safety performance if injury likelihood is high, but was linked with reduced job performance if injury likelihood was low. Using the example of the oil and gas engineers, managers should engage more in Management-By-Exception-Active practices when engineers are working offshore during tasks with a high risk for injury (e.g., during use of explosives to perforate the well casing or when inserting radioactive sources into tools), but should take care to lower the extent to which they adopt Management-By-Exception-Active practices when engineers are working onshore at the office location where safety is less salient. This practical implication can be transferred to a range of other work settings where subordinates oscillate between conditions where safety is highly salient and conditions where safety is less salient.

9.8 Limitations

The results of the research must be viewed in light of some limitations, which are acknowledged below.

9.8.1 Perceptual measures

The study relied on subordinate and leader perceptions to measure the explored constructs. Thus, salience of safety with regards to hazard exposure, injury likelihood and impact on safety of others was assessed through leader and subordinate perceptions rather than an objective measure of level of risk within participants’ work environments. It was discussed above that the subjective sense of threat for injury might have a different impact on the leadership process compared to hazard exposure.
per se. The research did not include any objective indicators of risk and hazards, so that it was not possible to test for such potential confounding effects. However, more objective measures such as outcomes from safety audits also have limitations as they might be subject to social desirability bias and might reflect a desired level rather than the actual level of salience of safety. Referring to leadership criteria, Lowe et al. (1996) remark that objective or ‘hard’ measures do not capture the full picture, underpinning the value of perceptual measures. Moreover, in study 2, safety salience measures were aggregated to the group-level, so that safety salience levels within a team rather than individuals’ perceptions were investigated. Nevertheless, an interesting avenue for future research is to investigate the impact of safety salience on leadership, using objective measures such as safety audits or occupational risk classification systems to measure the salience of safety rather than perceptual measures.

In addition, data on safety incidents might have been subject to inaccurate recall. In study 1, participants were asked to report the number of safety incidents that occurred amongst their subordinates during the past twelve months. This might raise concerns about the accuracy of safety incident data for two reasons (Probst & Estrada, 2010). Firstly, data might be inaccurate because participants might not be able to accurately recall the number of safety incidents that occurred amongst their subordinates. In particular with regards to minor safety events such as near-misses, individuals might not be able to give a reliable response over a longer timeframe (Pobst & Estrada, 2010; Stride et al., 2013). For example, Landen and Hendricks (1995) estimated that employees accurately recall minor injuries only over the past period of four to six weeks. However, as accidents are rare events, such a short time window is unlikely to provide a representative measure of the frequency of safety incidents within a team, and is likely to produce data with limited variance, introducing bias into statistical analysis. A twelve months timeframe has been commonly used by previous safety research to balance out the relatively infrequent occurrence of accidents against reduction in accuracy of memory recall over time (e.g., Probst & Estrada, 2010; Nielsen, Rasmussen, Glassock, & Spangenberg, 2008). Moreover, the present study used a safety incident index that was based on minor injuries as well as more severe incidents, for which recall is likely to be more accurate even after an extended recall period. Nevertheless, alternative means to assess safety incidents such as company logs of accidents or diary studies for the duration of a certain timeframe could help to
overcome this issue (Probst & Estrada, 2010). A second issue regarding the accuracy of safety incident data, is that participants’ responses might have been skewed by social desirability. Although, it was emphasised to participants that data is confidential and no individual responses will be fed back to their organisation, participants might have been reluctant to report safety incidents in the questionnaires. However, Probst and Estrada (2010) note that underreporting of safety incidents would suppress the variable’s variance and therefore lead to an underestimation rather than overestimation of effects. In the present analysis a significant interaction effect was found between Management-By-Exception and hazard exposure for safety incidents as the dependent variable, although the magnitude of the effect was low. In line with Probst and Estrada’s (2010) argumentation, restricted variance due to incident underreporting might have lowered the magnitude of this interaction.

9.8.2 Cross-sectional research design

The two studies used a cross-sectional design, which does not allow conclusions about direction of causality. It was noted that for several of the investigated relationships, effects are plausible in both directions. For example, ANOVA results in study 1 showed that mean levels of Management-By-Exception-Active were higher in high safety salience groups. It was argued that leaders rely more on Management-By-Exception-Active to address the hazards and risks in safety-critical contexts. However, it could also be suggested that safety is perceived as highly salient as a result of Management-By-Exception-Active practices. Similarly, the results demonstrated a significant relationship between transformational leadership and safety climate. It was argued that transformational leader behaviours foster positive safety climate perception. However, it is also plausible that a positive safety climate stimulates leaders to engage more frequently in transformational leadership. Yet, whilst it might be possible that effects exist in this reverse direction, longitudinal research has provided support for leadership affecting safety outcomes, which supports the present interpretations of the current research’s findings (Clarke & Flitcroft, 2008; Mullen & Kelloway, 2009). Given the limited timeframe for this doctoral research, it was not feasible to conduct longitudinal research. Future research should consider longitudinal designs to provide evidence on the direction of causality in the relationships between leadership, safety salience and leader outcomes.
9.8.3 Common method bias

A further limitation of the research was that apart from performance ratings in study 2, data was collected by means of self-report measure. Relying on self-report data poses the threat of common method variance, which can substantially distort estimation of the relationship between two variables (e.g. Doty & Glick, 1998; Podsakoff et al., 2003, 2012; Siemsen, Roth, & Oliveira, 2010). Common method variance refers to shared variance between two variables that results as an artefact from a common method of measurement rather than from a genuine relationship between the two constructs (Campbell & Fiske, 1959; Podsakoff et al., 2003, 2012). The term common method is used to refer to the same type of measurement (e.g. survey method) as well as using the same respondents to assess different variables. The latter case is referred to as common source bias, representing a specific type of common method bias. There is considerable evidence that common method bias leads to inflated estimates of the relationship between variables and spurious relationships in the analysis (Cote & Buckley, 1987; Podsakoff et al., 2003, 2012). Podsakoff et al. (2012) refer to results from meta-analyses of multi-trait-multi-method studies (MTMM) to demonstrate the large amount of error in the estimation of correlations due to common method bias. For example, Cote and Buckley’s (1987) meta-analysis of MTMM studies showed that common method inflated correlations between constructs by approximately forty-five percent. Similarly, Buckley, Cote, and Comstock (1990) estimated from their meta-analysis of MTMM samples that correlations between constructs that are measured by the same method are inflated by approximately thirty-eight percent. These findings show that method bias poses a serious problem when using self-report data.

Podsakoff et al. (2012) combined the data from meta-analyses that have investigated the relationship of leader behaviours to outcome variables (e.g. employee performance and ratings of leader effectiveness), and compared estimates obtained from same source data with estimates obtained from different source data. They reported that the corrected correlation between leader behaviours and outcome variables was .46 for estimates based on same source data, but was only .19 for estimates based on different source data. This evidence for the detrimental effects of common source bias needs to
be taken into consideration when interpreting the estimated relationships, which were drawn from self-report data in the present research.

In study 2, a two-source design was applied with ratings obtained from leaders as well as subordinates. The results showed that leadership was weakly or unrelated to managerial safety and job performance ratings. This suggests that the relationships that were estimated from single-source data, might have suffered from common source bias. However, it should be recognised that several significant moderation effects were found in the two-source data set. Nevertheless, it is important that future research aims to overcome common source bias. In addition, to leader or peer ratings, different methods of measurement provide a remedy for common source bias. The present studies relied entirely on questionnaire data. Future research should consider using alternative methods of data collection. For example, observation of correct use of personal protective equipment and other safety behaviours has been used to assess safety compliance (Diaz & Resnick, 2000; Zohar & Luria, 2005).

9.8.4 Sample size

In study 2, multilevel modelling was applied to assess safety salience measures at the group-level. One limitation of this study is the modest sample size at the team-level and the small number of cases within each team. At the individual-level the sample consisted of 160 participants grouped into twenty-one teams. It was discussed that logistics of the data collection made it not feasible to obtain a larger sample. In the analysis the small sample size led to difficulties, with non-convergence and low power presenting two statistical issues that occurred a number of times. The model testing cross-level interactions between team-level safety salience variables and individual-level leadership had to be computed separately for safety-specific outcomes and non-domain specific outcomes due to non-convergence. Although, there is no clear consensus regarding the minimum number of groups it is generally recommended that researchers should attempt to maximise the number of upper-level units to ensure sufficient power (Mathieu et al., 2012; Mok, 1995). Mathieu et al. (2012) reviewed multilevel research published in the Journal of Applied Psychology between 2000 and 2010 and reported a median upper-level sample size of fifty-one. The present team-level sample size does not reach this average. However, it should also be remarked that the low power in the analysis due to the small sample sizes, means that estimates
are conservative and the moderator effects that did emerge as significant might have actually been underestimated (Aguinis et al., 2013; Mathieu et al., 2012).

It should also be noted that in study 2, ICC values for injury likelihood and impact on safety of others were relatively low, so that it can be debated whether these truly represent team-level variables. Nevertheless, it was decided to aggregate the three safety salience measures to the team-level. The ICC values were at the lower end of the recommended range for multilevel analysis, yet values were within this range to support investigating injury likelihood and impact on safety of others as group-level variables. This was further supported by Preacher et al.’s (2010, 2011) remark that even relatively low ICC values can introduce bias into an analysis. Moreover there is a strong conceptual rationale that safety salience represents a group-level attribute as members of the same team operate in the same work environment and are therefore exposed to risks and hazards to a similar degree. Thus, safety salience refers to Hackman’s (1992) description of “ambient stimuli that pervade the group setting and impinge on all members of a given group” (p. 199) and should therefore be investigated at the group-level as its appropriate level of analysis (Hackman, 1992; Schriesheim, Castro, Zhou & Yammarino, 2001).

9.8.5 Non-normality of safety incident data

It should be noted that Poisson regression might have been a more suitable analysis to examine the relationship of leadership variables to safety incidents. As reported in the study 1 chapter, the distribution of the safety incidents data showed significant, positive skew and kurtosis. It was decided to use square-root transformation of the safety incident variable prior to the analysis to mitigate non-normality. This approach of using square-root transformation followed previous research on incidents data (e.g. Hofmann & Stetzer, 1996; Probst & Brubaker, 2001). However as shown in study 1, distribution of the square-root transformed safety incident variable still showed significant deviation from normality, although skew and kurtosis were reduced compared to the non-transformed variable. Gardner, Mulvey and Shaw (1995) explain that conducting ordinary linear regression with dependent count variables that have low occurrence of events, can lead to inaccurate estimation of standard errors and
significance. Thus, it can be suggested that a Poisson model would have been more appropriate to analyse the relationships of leadership variables to safety incidents.

9.8.6 Control for Type I error rate

Significance testing requires balancing of Type I and Type II error rates. The risk to falsely reject the null hypothesis has to be appropriately controlled, whilst retaining sufficient statistical power to detect any genuine effects and avoid committing a Type II error. In study 1 as well as in study 2, analysis included a large number of statistical tests. For example, in study 1 a series of latent interaction models was tested to assess whether the three safety salience measures moderate the relationship of transformational-transactional leadership to team performance, leader self-efficacy and safety incidents. Interactions between transformational leadership and transactional leadership style with each of the three safety salience measures were tested in separate models. Thus, for each dependent variable, six models were run. Conducting multiple tests on the same data set inflates the Type I error rate. It can be argued that to control for an increased risk of Type I error due to multiple tests in the present analysis, a more stringent criterion for significance should have been applied. For example, a Bonferroni corrected significance level might have been used to protect against Type I error. Bonferroni adjustment corrects significance for the overall number of tests that have been performed, hence reducing the accepted significance level for individual tests. It should be acknowledged that using Bonferroni correction is likely to have affected decisions regarding which results are considered significant. Thus, conclusions from the results of the present studies must be in light of the increased risk for Type I errors as a consequence of the multiple hypotheses tests.

9.8.7 Control for level of leadership

It has been argued that the term leadership is often used somewhat ambiguously in safety research, without specification of the hierarchical level of leadership that is being researched (O’Dea & Flin, 2001). Differentiation of the grade of leadership might be important, as it has been noted that the effectiveness of leadership styles differs across organisational levels (e.g. Bruch & Walter, 2007; Edwards & Gill,
With regards to safety, the level of leadership is likely to influence a leader’s role in managing workplace safety and it has been suggested that direct supervisors might play a more primary role in influencing front-line workers’ safety behaviour and attitudes (Flin & Yule, 2004). The present studies did not control for level of leadership. The sample in study 1 included managers from a range of hierarchical levels. In study 2, leaders in the manufacturing as well as in the oil and gas services sample worked closer to the front-line and can be described as team-leader level. Thus, the findings in study 2 might be applicable at the team-leader level, but might be less relevant for leadership at higher organisational levels such as senior managers’ approach to safety. For example, results in study 2 showed that Management-By-Exception-Active was positively related to safety performance if injury likelihood was high. This finding might be specific to the level of team-leader. Team leaders have relatively frequent, direct interactions with front-line employees and therefore leader actions such as proactively monitoring errors are possible in the event of high injury likelihood. However, for leaders in higher organisational levels it might be more difficult as well as less effective to engage in active monitoring of errors and adherence to standards. Similarly, results from study 2 showed that transformational leadership style was positively related to safety climate, but the strength of this relationship was low. It would be interesting for future research to investigate whether transformational leadership style at higher organisational levels is more or less effective for workplace safety compared to its application at the team-leader level. Bruch and Walter (2007) compared how often managers in positions in middle management and upper management show transformational leadership behaviours. They reported that Idealised Influence and Inspirational Motivation occurred more frequently amongst upper management compared to middle management, but did not find differences in the occurrence of Individualised Consideration and Intellectual Stimulation between the two levels of leadership. Moreover, their findings showed that the effectiveness of the individual transformational leadership dimensions for enhancing job satisfaction differed between the two levels of leadership. Although, Bruch and Walter’s (2007) study did not investigate effectiveness for workplace safety, the results suggest that level of leadership influences the occurrence and effectiveness of transformational leadership behaviours. Future research is needed to investigate whether the findings from the present research on the relationship of transformational-transactional
leadership style to safety outcomes, are specific to the investigated level of team-leader or applicable to other levels of leadership.

9.8.8 Directions for future research

Throughout the above discussion some recommendations for further research have already been stated. In addition, the following avenues for future research have emerged from the findings of the present three studies.

The results from study 1 and study 2 have both indicated that Management-By-Exception-Active might play a more important role in safety-critical contexts. However, whilst hazard exposure emerged as a moderator in study 1, injury likelihood was a significant moderator in study 2. It was suggested that the type of outcome measure (e.g., performance measures vs. satisfaction measures) as well as the type of safety salience measure (i.e., injury likelihood, hazard exposure, impact on safety of others) that is used might have contributed to these findings. Thus, future research is needed to further explore the characteristics of safety-critical contexts and how these impact upon the effectiveness of leadership practices.

The research demonstrated that leader flexibility was associated with study outcome variables beyond transformational leadership suggesting that it is crucial that leaders can change and adapt their behaviours in accordance with the situation at hand. It has already been stated that the construct of leader flexibility is in an emerging phase with further conceptual efforts required to increase construct clarity. In addition, future research is warranted to improve the measurement of leader flexibility. In the present research leader flexibility was assessed through a conventional multi-item scale where participants rated to what extent their leader changes and fits their behaviour to different situations. Whilst the scale showed good reliability and was correlated with transformational and transactional leadership, it can be argued that this represents an abstract form of operationalization that does not fully meet the complexity of the construct. Situational judgment tests are gaining increasing popularity within organisational research and offer to assess constructs such as leadership specific to different situations (Lievens, Peeters, & Schollaert, 2008; Peus et al., 2013). Peus et al. (2013) recently developed a situation-based measure of the Bass’ Full Range...
Leadership Model, which assessed transformational, transactional and laissez-faire leadership behaviours in reaction to different situations. Future research should further extend these efforts and a similar situation-based measure could be developed to operationalise leader flexibility.

A surprising outcome of the research was that team-level injury likelihood and impact on safety of others compensated for passive leadership. Whilst existing research has demonstrated that passive leadership has detrimental effects on workplace safety (e.g., Kelloway et al., 2006), few studies have investigated through which mechanisms poor leadership can be compensated. It has been estimated that a large proportion of individuals in leader positions are ineffective in meeting their leadership responsibilities (Hughes, Ginnett, & Curphy, 2009). Organisations might not only want to develop leaders’ competency, but also look for ways to buffer deleterious effects of poor leadership. In light of the moderator effects of injury likelihood and safety of others, it was suggested that fostering chronic unease might increase subordinates vigilance towards safety and act as a protective barrier for weak leadership. An interesting avenue for future research is to further examine whether organisations can, through certain contextual characteristics such as chronic unease, shield their employees from cases of poor leadership.

Some of the relationships between leadership and safety outcomes were of small magnitude or were not statistically significant indicating that workplace safety is only partially influenced by leaders. Future research should explore other sources that impact and shape employees’ safety behaviour and attitudes. Recent research has pointed to team members and shared leadership as an influence on safety (Brondino, Silva, & Pasini, 2012; Casy & Krauss, 2013; Turner et al., 2012). Formal leaders are not always available and employees might experience greater proximity to their peers than their supervisor or manager. Thus, future research should investigate co-worker interactions and their impact on safety outcomes. In analogue to formal leadership, contextual conditions might play a role in the relationship between team leadership and safety. Future research is needed to explore whether, under certain conditions, shared leadership is particularly effective and possibly of greater importance than formal leadership. One of the host organisations in study 2 was an oil and gas company where engineers frequently worked offshore, but their manager remained at the
company’s onshore base. Under such conditions, team leadership might have a greater role in safety than the influence of formal leaders. In contrast, in other safety-critical settings such as construction work, employees frequently work amongst contracted and temporary staff with high levels of fluctuation amongst fellow workers. This might present a setting where formal leadership has got a stronger influence compared to the impact of peers.

9.9 Chapter Summary and Conclusion

This chapter discussed the main contributions of the research findings and outlined theoretical and practical implications. It was argued that the present research made an important contribution as it merged transformational, transactional and passive leadership with a contingency view of leadership. Findings showed that safety salience, as a contextual attribute, influences the relationship between Management-By-Exception-Active, transformational leadership and passive leadership with effectiveness criteria. In both studies, results indicated that Management-By-Exception-Active might be beneficial for workplace safety, if safety is salient, but is not effective if safety is not salient. Moreover, results indicated that in contexts with high hazard exposure, passive leadership was negatively related to safety and job performance, whereas other elements of safety salience (i.e., injury likelihood and impact on safety of others) might attenuate the detrimental effects of passive leader behaviour. An unexpected finding of the research was that transformational leadership was less positively associated with performance if safety was highly salient. However, it was discussed that these findings need to be interpreted with some caution as the size of the above moderation effects was small, and multiple hypothesis testing might have increased the risk for Type I error. Nevertheless, these results made an important contribution as they demonstrated that transactional, passive and transformational leadership are not entirely context-free.

A further contribution of the research was that it considered leader flexibility as a leader trait in addition to leadership behaviours. Results suggested that leader flexibility has a unique relationship beyond transformational-transactional leadership with regards to team performance, leader self-efficacy and safety climate, although the
strength of these relationships was small. Leader flexibility was not related to satisfaction, job performance and safety performance outcomes. Thus, the ability to adjust ones leadership behaviour to the requirements of a particular setting, might only be relevant for certain outcome criteria.

The research advanced the safety-specific leadership literature as it showed that leaders should take the level of safety salience into consideration, in particular when adopting Management-By-Exception-Active practices. The research also advanced the wider leadership literature as it indicated that contextual characteristics, such as the level of safety salience, play a role in the leadership process.
REFERENCES


APPENDICES

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</tr>
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</tr>
</tbody>
</table>
APPENDIX A

STUDY 1 - QUESTIONNAIRE

This survey is part of a research project at Manchester Business School. We are interested in your views about your team and your experience as a manager.

The survey takes approximately 25 minutes to complete and it is your decision whether to take part.

This questionnaire is anonymous and all information is treated with strictest confidentiality. The answers you give are used solely for the purposes of this study and only the researcher will have access to your responses.

There are no right or wrong answers in this survey. Please answer as honestly as you can, say what you feel, not what you think you should say. There is no need to think hard about your answers: usually the first response that comes to mind is the most accurate one.

As a thank you for your time, each person taking part in the survey has the chance to win a £100 Amazon voucher.

If you have any questions about this survey, please contact sara.guedri@mbs.ac.uk

How many employees do you currently manage/ supervise?

Please report the number of staff that directly report to you.
Please rate to what extent the following statements apply to the employees that you manage. "Work unit" refers to the group of employees that report to you.

The employees in the work unit that I manage...

<table>
<thead>
<tr>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>accomplish tasks quickly and efficiently</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>have high work performance</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>always achieve high standard of task accomplishment</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>almost always beat their targets</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

Please rate how often you engage in the following actions.

<table>
<thead>
<tr>
<th>Not at all</th>
<th>Once in a while</th>
<th>Sometimes</th>
<th>Fairly often</th>
<th>Frequently, if not always</th>
</tr>
</thead>
<tbody>
<tr>
<td>I assist employees in exchange for their efforts</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>I outline employees’ responsibility to achieve performance targets</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>I make clear what employees can expect to receive, when performance goals are achieved</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>I show satisfaction when employees meet expectations</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

For the job of manager, to what extent do you think the above practices are effective?

Rate the effectiveness of the described practices in general, regardless whether you use these or not.

Please rate your confidence in your ability to perform each of the following tasks.

It is very important that you answer as honestly as you can. Your answers will help to develop management research and we rely on your honest responses for this.

Rate your confidence level on the 100-point probability scale.

For example:

0% reflects not at all confident
50% reflects an intermediate level of confidence
100% means completely confident
I can figure out the best direction for where my unit needs to go in the future
I can identify the most critical areas for making meaningful improvement
I can develop plans for change
I see the path my unit needs to take in order to improve
I can develop trusting relationships with my employees
I can obtain the genuine support of my employees
I can gain my employees' commitment even under pressure or difficulties
I can figure out ways for overcoming resistance to change
I can figure out ways for my unit to solve any procedural problems
I can work with my employees to overcome any resource limitations
I can find the needed support in management to back my efforts

In the following section we are interested in the level of hazards and safety risk for the type of jobs that your work unit performs.

Rate how often are the employees that you manage exposed to potentially hazardous conditions?

Never

Rate the level of hazards associated with the type of jobs that the employees in your work unit perform?

Very low hazard level

The work of the employees that I manage is likely to affect the safety of other people.

Strongly Disagree

Please tick the appropriate box to indicate your level of agreement.

I am rarely worried about an employee being injured on the job.
In the type of jobs of the employees that I manage, the chances of being involved in an accident are quite large.
I am sure it is only a matter of time before an employee is involved in an accident.
For how long have you been working in this industry?

Please indicate at which management level you work:
- First Line Management (Supervisor/Team Leader)
- Middle Line Management
- Senior Management

Please select your gender:
- Male
- Female

Please select your age:

During the past 12 months, how many work-related accidents occurred among the employees that you manage?

Please indicate the number of accidents in each category. Report each accident only once (e.g. if reported as 'Lost Time Injury' DO NOT report again in 'Medical Treatment Injury')

**Fatality**
(a fatality that directly resulted from a work-related injury irrespective of the length of time passed between the injury and death)

**Lost Time Injury**
(an incident that resulted in an individual being unfit or unable to work for the period of an entire work day/shift or longer)

**Medical Treatment Injury**
(an incident that resulted in an individual requiring medical treatment beyond the scope of first aid, e.g. stitches, prescription medication)

**Restricted Work Injury**
(an incident that resulted in an individual being unable to perform one or more of their routine functions or being temporarily assigned to another job, e.g. "light work")

**First Aid Injury**
(an incident that resulted in an individual requiring first aid treatment, e.g. non-prescriptive medication, use of bandages, treatment of superficial burns)

**Near-Miss**
(an incident that did not result in injury, but which in slightly circumstances could have caused injury)
Please rate your level of agreement with the following statements:

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I fit my actions to the situation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I learn from experience</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I can adjust my management style</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I act differently depending on the situation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am set in my ways</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I respond to changes in the situation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am effective in different situations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For how long have you been working in your current job role?

[ ]

How many years of management experience have you got?

[ ]

For how long have you been working at your current organisation?

[ ]

Which industry do you work in?

[ ]
APPENDIX B

STUDY 1 - CONFIRMATORY FACTOR ANALYSIS

Prior to the hypotheses testing in study 1, confirmatory factor analyses (CFA) of the MLQ were conducted.

To assess model fit in the confirmatory factor analyses the following five fit statistics were used: (1) chi-square ($\chi^2$), (2) the comparative fit index (CFI), (3) the Tucker-Lewis index (TLI), (4) the root mean square error of approximation (RMSEA) and (5) Standardized Root Mean Square Residual (SRMR). For the chi-square statistic, traditionally a probability value larger than .05 was regarded as indicative of good fit. However, dependence on sample size and the assumption that data is multivariate normal are widely known limitations of the chi-square index. Thus, chi-square was treated as a descriptive indicator and for model comparisons rather than a strict test of model fit. In line with recommendations by Hu and Bentler (1999) values close to .95 were considered as indicative of good fit for the TLI and CFI. Values of less than .05 were adopted as indicative of good fit for the RMSEA and SRMR (Browne & Cudeck, 1993; Geiser, 2012).

In the CFA individual items were grouped into parcels. It has been advocated that creating item composites by aggregating individual indicators, reduces the number of parameters and as a result leads to more stable parameter estimates and better model fit (MacCallum & Austin, 2000; Mathieu & Farr, 1991). Also, parcels tend to show better reliability and are more normally distributed than individual items (Hall, Snell, & Foust, 1999). As the MLQ, was a relatively long instrument with thirty-nine items, it was considered appropriate to form item parcels. Items were grouped into parcels for each respective MLQ sub-scale (i.e., Idealised Influence-Attributed, Idealised Influence-Behaviour, Inspirational Motivation, Individualised Consideration, Intellectual Stimulation, Contingent Reward, Management-By-Exception-Active, Management-By-Exception-Passive, laissez-faire items were grouped into parcels). For all leadership sub-scales apart for Management-By-Exception-Active, two parcels were formed consisting of two items each. For Management-By-Exception-Active three item parcels were created as this sub-scale consisted of seven items due to the three newly added items. A number of different parcelling strategies are discussed in
the literature, including random and so-called planned parcelling methods, which aggregate indicators based on factor loadings, item difficulty or other statistical criteria (Bandalos, 2002; Bandalos & Finney, 2001; Hall et al., 1999; MacCallum & Austin, 2000). In the present analysis, items were formed as a preparatory step to compare different factor models, not as part of post-hoc model modifications. Therefore, quasi-random grouping rather than planned parcelling strategies was used. The term quasi-random is used as items for each leadership sub-dimension were randomly combined (as opposed to randomly parcelling all MLQ items regardless of the sub-dimension they are ascribed to). Thus, parcelling was based on the a priori MLQ sub-dimensions. This strategy was based on findings that parcelling items together, which measure the same sub-constructs or are uni-dimensional, leads to more accurate parameter estimates (Bandalos, 2002; Hall et al., 1999). It should be remarked that the use of item parcels has sparked some debate, which often cautions that parcels can mask model misspecifications (Bandalos & Finney, 2001; Little, Cunningham, Shahar, & Widaman, 2002). However, Antonakis et al. (2003) note that when using item parcels in CFA to compare competing models, all examined models will benefit from parcels. Thus, parcelling should not bias decisions between alternative factor structures based on superior model fit. The technique of grouping items into aggregate indicators has been previously applied by studies investigating the factor structure of leadership instruments including the MLQ (e.g., Antonakis et al., 2003; Vandenberghe et al., 2002). In the following analysis, five different factor models were compared: one one-factor solution and four different three-factor solutions. The models are schematically displayed in Figure 40.

Model 1: First, a null model with all indicators loading on one global leadership factor was tested.

Model 2: A three-factor model with transformational, transactional and laissez-faire leadership was tested. This represents the original factor structure as established by Avolio and Bass (1995). However, previous research has demonstrated that this factor solution often does not emerge as the best fitting model (Tejeda et al., 2001). Thus, based on previous studies, three alternative three-factor solutions were tested.

Model 3: A three-factor solution with transformational leadership defined by its original dimensions as well as Contingent Reward, and transactional leadership defined by Management-By-Exception-Active and Management-By-Exception-
Passive was tested. This model was based on previous research that reported that Contingent Reward relates to transformational rather than transactional leadership dimensions (e.g., Garman et al., 2003; Heinitz et al., 2005; Lowe et al., 1996; Tejeda et al., 2001).

Model 4: A three-factor solution with transformational leadership defined by its original dimensions, transactional leadership defined by contingent reward, and Management-By-Exception-Active and a passive leadership factor that combined Management-By-Exception-Passive and laissez-faire leadership, was examined. Previous research has shown that Management-by-Exception-Passive is more strongly associated with laissez-faire leadership than with the transactional dimensions, which formed the rationale for this model (e.g., Den Hartog et al., 1997; Garman et al., 2003; Heinitz et al., 2005).

Model 5: A three-factor solution with transformational leadership defined by its original dimensions as well as Contingent Reward, and Management-By-Exception-Active forming its own factor. Management-By-Exception-Passive loaded on one factor together with laissez-faire leadership. This model integrated the variations tested in model three and model four. That is, Contingent Reward was grouped together with transformational leadership and Management-By-Exception-Passive and laissez-faire leadership were combined, simultaneously.

The results from the CFA are reported in Table 29. As can be seen model five, with transformational leadership defined by its original indicators as well as Contingent Reward, Management-By-Exception-Active as a single factor and Management-By-Exception-Passive and laissez-faire leadership loading together on a passive leadership factor, was the best fitting model and hence retained.
40a. Model 1 (Null Model).

40b. Model 2.

40c. Model 3.

40d. Model 4.

40e. Model 5.

Figure 40. Schematic representation of compared MLQ model structures.
Numbering of models corresponds with Table 29. Latent factors were allowed to correlate, but are not displayed in the figure for benefits of clarity.
Table 29. Results of MLQ confirmatory factor analyses for complete sample

<table>
<thead>
<tr>
<th>Model</th>
<th>$\chi^2$</th>
<th>df</th>
<th>CFI</th>
<th>TLI</th>
<th>SRMR</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1$^a$</td>
<td>1682.23</td>
<td>152</td>
<td>.59</td>
<td>.54</td>
<td>.10</td>
<td>.14</td>
</tr>
<tr>
<td>Model 2$^b$</td>
<td>1273.66</td>
<td>149</td>
<td>.70</td>
<td>.66</td>
<td>.09</td>
<td>.12</td>
</tr>
<tr>
<td>Model 3$^c$</td>
<td>1113.24</td>
<td>149</td>
<td>.74</td>
<td>.71</td>
<td>.07</td>
<td>.11</td>
</tr>
<tr>
<td>Model 4$^d$</td>
<td>1022.53</td>
<td>149</td>
<td>.77</td>
<td>.73</td>
<td>.08</td>
<td>.10</td>
</tr>
<tr>
<td>Model 5$^e$</td>
<td>863.10</td>
<td>149</td>
<td>.81</td>
<td>.78</td>
<td>.07</td>
<td>.09</td>
</tr>
</tbody>
</table>

Post-Hoc Modifications

<table>
<thead>
<tr>
<th>Model</th>
<th>$\chi^2$</th>
<th>df</th>
<th>CFI</th>
<th>TLI</th>
<th>SRMR</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 6$^d$</td>
<td>657.34</td>
<td>148</td>
<td>.86</td>
<td>.84</td>
<td>.06</td>
<td>.08</td>
</tr>
<tr>
<td>Model 7$^e$</td>
<td>472.18</td>
<td>147</td>
<td>.91</td>
<td>.90</td>
<td>.06</td>
<td>.05</td>
</tr>
<tr>
<td>Model 8$^f$</td>
<td>330.19</td>
<td>146</td>
<td>.95</td>
<td>.94</td>
<td>.05</td>
<td>.05</td>
</tr>
<tr>
<td>Model 9$^g$</td>
<td>289.98</td>
<td>145</td>
<td>.96</td>
<td>.95</td>
<td>.05</td>
<td>.04</td>
</tr>
</tbody>
</table>

Model Comparison

<table>
<thead>
<tr>
<th></th>
<th>$\Delta\chi^2$</th>
<th>$\Delta$df</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 5 vs. Model 6</td>
<td>275.08***</td>
<td>1</td>
</tr>
<tr>
<td>Model 6 vs. Model 7</td>
<td>251.54***</td>
<td>1</td>
</tr>
<tr>
<td>Model 7 vs. Model 8</td>
<td>158.62***</td>
<td>1</td>
</tr>
<tr>
<td>Model 8 vs. Model 9</td>
<td>28.62</td>
<td>1</td>
</tr>
</tbody>
</table>

Note. N = 538; ***p < .001; all estimates based on Maximum Likelihood Robust (MLR) estimation; $\Delta\chi^2$ = Satorra Bentler scaled chi-square difference test, df = degrees of freedom;

$^a$ Null model

$^b$ (1) Transformational leadership by IIa, IIb, IC, IS, IM, (2) Transactional leadership by MBEA, MBEP, CR, (3) LF

$^c$ (1) Transformational leadership by IIa, IIb, IC, IS, IM, CR, (2) Transactional leadership by MBEA, MBEP (3) LF

$^d$ (1) Transformational leadership by IIa, IIb, IC, IS, IM, (2) Transactional leadership by MBEA, CR (3) Passive leadership by MBEP and LF

$^e$ (1) Transformational leadership by IIa, IIb, IC, IS, IM, CR (2) MBEA, (3) Passive leadership by MBEP and LF

$^d$ Residual covariance between IS parcels

$^e$ Residual covariance between IM parcels

$^f$ Residual covariance between LF parcels

$^g$ Residual covariance between IIa parcels

IIa = Idealised Influence Attributed, IIb = Idealised Influence Behaviour, IC = Individualised Consideration, IS = Intellectual Stimulation, IM = Inspirational Motivation, MBEA = Management-By-Exception-Active, MBEP = Management-By-Exception-Passive, CR = Contingent Reward, LF = laissez-faire leadership.
Post-hoc Analysis

Although the retained model showed best fit compared to the alternative models, fit indices did not indicate good fit. To avoid that item parcels masque any model misspecifications at item level, parcels were broken up and a model with individual items as latent factor indicators was run (specifying the same model structure as in model 5, see Figure 40, Table 29). This showed that all items had significant factor loadings with standardised values greater than .55, which exceeds the recommended value of .30 to ensure that items are making a substantial contribution to their factor (Stevens, 1992). However, the model revealed decreased fit in comparison to the model with item parcels ($\chi^2 (557) = 1434.23, p < .001$, CFI = .81, TLI = .80, SRMR = .07, RMSEA = .09).

To further inspect reasons for model misspecification, modification indices (MI) for the model with item parcels were examined. This revealed three large modification indices that contributed most to model misfit. Each modification index indicated residual covariance between item parcels. The largest modification index represented error covariance between the two parcels for Intellectual Stimulation (MI = 67.73), the second largest modification index was between the two Inspirational Motivation parcels (MI = 50.40) and the third largest modification index was between the Laissez Faire parcels (MI = 43.95). Byrne (2000) explains that residual covariance can indicate systematic measurement error due to overlap in item content. The three identified modification indices represent residual covariance between parcels of the same constructs respectively. Thus, the similar content of the items making-up the parcels, might have triggered the large modification indices (Byrne, 2000). It is important that any post-hoc model modifications are supported by a firm rationale to avoid over fitting a model to trivial effects arising from capitalisation on chance factors (MacCallum, Roznowski, & Necowitz, 1992). In the present case the substantial content overlap and the high magnitude of the expected parameter change values, suggest that it is theoretically and empirically justifiable to re-specify the model. In addition, Bentler and Chou (1987) recommend against forcing residuals to be uncorrelated.

Thus, post-hoc models were specified in separate steps (see Table 29). First the error terms of the two Intellectual Stimulation parcels were allowed to covary (model 6 in Table 29). Subsequently, a second post-hoc model was specified allowing the errors of the two Inspirational Motivation parcels to correlate (model 7 in Table 29). Finally
a third model was run with allowing the residuals of the laissez-faire parcels to correlate (model 8 in Table 29). Each post-hoc model showed statistically significant improvement in fit. Reviewing the modification indices for the third post-hoc model revealed an additional, moderately large modification index value referring to the error covariance between the Contingent Reward items (MI = 50.66). As this modification index again referred to a correlation between parcels of the same sub-scale, a further post-hoc model was tested that allowed the two Contingent Reward residuals to covary (model 9 in Table 29). This fourth post-hoc model showed again a significant increase in model fit. All fit indices reached their cut-off values, indicating good model fit. The final model for the MLQ factor structure and parameter estimates are displayed in Figure 41.
Figure 41. Study 1 MLQ factor structure.

Figure relates to model 9 in Table 29; values indicate standardised parameters; all factor loadings and residual correlations significant at p < .001; CR1/ CR2 = Parcel 1/Parcel 2 Contingent Reward, IS1/ IS2 = Parcel1/Parcel 2 Intellectual Stimulation, IM1/ IM2 = Parcel 1/Parcel 2 Inspirational Motivation, IIA1/IIA2 = Parcel 1/Parcel 2 Idealised Influence Attributed, IIB1/ IIB2 = Parcel 1/Parcel 2 Idealised Influence Behaviour, IC1/ IC2 = Parcel 1/Parcel 2 Individualised Consideration, MBEA1/ MBEA2/MBEA3 = Parcel 1/Parcel 2/Parcel 3 Management-By-Exception-Active, MBEP1/ MBEP2 = Parcel 1/Parcel 2 Management-By-Exception-Passive, LF1/ LF2 = Parcel 1/Parcel 2 laissez-fair.
APPENDIX C

STUDY 1 - MLQ FACTORIAL INVARIANCE ACROSS SUB-SAMPLES

As descriptive analysis revealed some differences between the safety professional and MBA sample, it was tested whether the factorial structure identified in the CFA above using a combined sample (see Appendix B), is equivalent across the two individual sub-samples. When testing for invariance across samples, first a configural model is established, which consists of the baseline models pertinent to the samples under comparison. Subsequently, sets of parameters are tested for equivalence in an increasingly restrictive fashion (Byrne, 2000). Thus, the CFA examining the MLQ factor structure was repeated separately for the two sub-samples to establish the configural model. Then equivalence of factor loadings, error covariances and finally invariance of the full structural model between the MBA and safety professional sample was tested.

Establishing the configural model
To establish the configural model, the five alternative models that were tested in the CFA for the combined sample above (see Figure 40) were compared for each of the sub-samples independently. The model that was identified as best fitting in the analysis for the complete sample, also emerged as best fitting for the two sub-samples (see model 9 in Table 29; Figure 41). For the MBA sub-sample, fit statistics were $\chi^2 (145) = 262.21$, CFI = .96, TLI = .95, SRMR = .05, RMSEA = .06. For the safety professional sub-sample fit statistics were $\chi^2 (145) = 179.66$, CFI = .96, TLI = .96, SRMR = .06 and RMSEA = .04.

Testing for measurement and structural invariance
First it was tested whether factor loadings are equivalent across the MBA and safety professional samples. Subsequently, invariance of error covariances was tested between the two sub-samples. In a final step, the full structural model was tested for equivalence. The results from the different invariance steps are summarised in Table 30. To test whether the factor loadings are invariant across the two sub-samples, the model identified as best fitting in the CFAs above was used as the configural model.
As the baseline models identified for both sub-samples did not differ, no group specific model parameters were included. Traditionally, evidence for model invariance is determined using a chi-square difference test (Steiger, Shapiro, & Brown, 1985). If the configural model and the model with invariance constraints do not significantly differ, equivalence can be assumed. However, it has been argued that the chi-square difference test is unreliable as it is influenced by sample size and non-normality (Cheung & Rensvold, 2002). Cheung and Rensvold (2002) recommend using the difference of CFI values. Based on simulation research, they suggest that the CFI difference between the configural model and the model with equivalence constraints should not exceed .01. Thus, both the chi-square difference test and CFI difference are reported for the present analysis.

First the configural model was run with factor loadings not constrained to be equal in the two sub-samples. In a second model, factor loadings were constrained equal across the safety professional and MBA sample (invariant model 1, see Table 30). In comparison to the configural model, the chi-square value slightly increased whereas the CFI value remained the same. Chi-square difference test revealed that the model with constrained factor loadings, did not differ significantly from the configural model. Thus, this finding indicates invariance of factor loadings between the MBA and safety professional sample.

In the analysis for the total sample and the baseline models for the two sub-samples, four residual covariances were specified in post-hoc model modification. To test whether these residual covariances are invariant across the MBA and safety professional samples, a model where residual covariances were constrained equal (invariant model 2, see Table 30) was tested. Results from the chi-square difference test and CFI difference both indicate that the error residuals are invariant across the MBA and safety professional sub-samples (model 1 vs. model 2). Finally, the structural model of the MLQ data was tested for invariance. In this model, factor loadings, residual covariances as well as factor variances and covariances between factors were constrained equal (invariant Model 3, see Table 30). The chi-square difference test between this model with structural parameter constraints and the model with only measurement constraints was significant at p = .02 (model 2 vs. model 3). However, the CFI value did not change between the two models. Thus, the CFI indicates that factor variances and covariances can be considered equivalent between
the MBA and safety professional sample, whereas the chi-square difference test suggests that these vary between the two samples. As stated above, chi-square difference has been criticised as a criterion for invariance testing (Cheung & Rensvold, 2002). Thus, on the basis that the CFI showed that the MLQ operates equivalently across the two sub-samples, it was seen as appropriate to specify one MLQ factor structure in a combined sample for the analysis in study 1.

Table 30. Invariance testing of MLQ across MBA and safety professional sample

<table>
<thead>
<tr>
<th>Model Comparison</th>
<th>( \chi^2 )</th>
<th>df</th>
<th>CFI</th>
<th>( \Delta \chi^2 )</th>
<th>( \Delta \text{df} )</th>
<th>( \Delta \text{CFI} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configural Model</td>
<td>446.92</td>
<td>290</td>
<td>.96</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measurement Parameters</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Invariant Model 1</td>
<td>458.98</td>
<td>306</td>
<td>.96</td>
<td>13.45</td>
<td>16</td>
<td>.0</td>
</tr>
<tr>
<td>Model 1 vs. Configural Model</td>
<td></td>
<td></td>
<td></td>
<td>( p = .64 )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Invariant Model 2</td>
<td>464.56</td>
<td>310</td>
<td>.96</td>
<td>5.75</td>
<td>4</td>
<td>.0</td>
</tr>
<tr>
<td>Model 2 vs. Model 1</td>
<td></td>
<td></td>
<td></td>
<td>( p = .22 )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Structural Parameters</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Invariant Model 3</td>
<td>481.07</td>
<td>316</td>
<td>.96</td>
<td>14.06</td>
<td>6</td>
<td>.0</td>
</tr>
<tr>
<td>Model 3 vs. Model 2</td>
<td></td>
<td></td>
<td></td>
<td>( p = .03 )</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. For MBA sample N = 394, for safety professional sample N = 144; df = degrees of freedom; estimates based on Maximum Likelihood Robust (MLR) estimation; \( \Delta \chi^2 \) = Satorra-Bentler scaled chi-squared difference test

\( a \) No invariance constraints
\( b \) All factor loadings invariant
\( c \) All factor loadings and residual covariances invariant
\( d \) All factor loadings, residual covariances, factor variances and factor covariances invariant.
To assess the measurement model for leader flexibility, team performance and leader self-efficacy, a three-factor model was tested (the model excluded the problematic leader flexibility item, which was eliminated from the analysis as described in section 7.4.3.1). Team performance and leader flexibility were specified by individual item indicators and the eleven items for leader self-efficacy were combined into three parcels. All indicators significantly loaded onto their factor and the model showed acceptable, although improvable fit ($\chi^2 (62) = 185.54$, CFI = .94, TLI = .93, RMSEA = .06, SRMR = .04). Inspection of the modification indices (MI) showed the largest MI for a residual error co-variance between two of the leader flexibility items (MI = 39.22). To reduce the number of parameters in the subsequent structural model when investigating relationships with the MLQ factors, it was decided to parcel the leader flexibility items. The model showed good fit ($\chi^2 (32) = 97.05$, CFI = .97, TLI = .95, RMSEA = .06, SRMR = .03).
## APPENDIX E

### STUDY 2 - MANUFACTURING SUB-SAMPLE JOB DESCRIPTIONS

Table 31. Job descriptions and commonly associated hazards and risk for manufacturing sub-sample in study 2

<table>
<thead>
<tr>
<th>Job Group</th>
<th>Role Description and Responsibilities</th>
<th>Frequent Risks and Hazards associated with:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process/Production</td>
<td>Setting-up, monitoring and controlling plant and equipment</td>
<td>Slips, trips and falls.</td>
</tr>
<tr>
<td>Operative</td>
<td>Preparation of raw materials for baking production</td>
<td>Colliding with machinery.</td>
</tr>
<tr>
<td></td>
<td>Working on production line (some operatives work in hot environments)</td>
<td>Finger traps in conveyors.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Burns from hot baking trays.</td>
</tr>
<tr>
<td>Hygiene Operative</td>
<td>Cleaning of production site and equipment cleaning, using a range of equipment and large machinery</td>
<td>Slips trips and falls.</td>
</tr>
<tr>
<td></td>
<td>Cleaning outside areas (e.g., silos, compactors)</td>
<td>Exposure to chemicals.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Working at height.</td>
</tr>
<tr>
<td>Packing Operative</td>
<td>Working on fast production line sorting and packaging goods</td>
<td>Slips, trips and falls.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Colliding with machinery.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Finger traps in conveyors.</td>
</tr>
<tr>
<td>Quality Analysis</td>
<td>Recording quality events and non-conformances with quality standards on production shifts</td>
<td>Slips, trips and falls.</td>
</tr>
<tr>
<td>Technician</td>
<td>Carrying out probe &amp; scale calibration</td>
<td>Colliding with machinery.</td>
</tr>
<tr>
<td></td>
<td>Completing fridge and temperature checks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mainly based in production/factory area</td>
<td></td>
</tr>
<tr>
<td>Electrical Engineer</td>
<td>Maintenance of factory production plant and machinery</td>
<td>Slips, trips and falls.</td>
</tr>
<tr>
<td></td>
<td>Often work unsupervised and out of hours</td>
<td>Colliding with machinery.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Working in live electrical panels</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Manual handling</td>
</tr>
<tr>
<td>Fork Lift Driver</td>
<td>Using mechanical handling equipment</td>
<td>Slips, trips and falls.</td>
</tr>
<tr>
<td></td>
<td>Work in hot and cold environments (baking area and frozen warehouse)</td>
<td>Colliding with machinery.</td>
</tr>
<tr>
<td></td>
<td>Often work unsupervised</td>
<td>Manual handling</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Working at low/high temperatures</td>
</tr>
<tr>
<td>Customer Service and</td>
<td>Processing orders from wholesale customers</td>
<td>No associated risks outside those normally experienced in an office environment</td>
</tr>
<tr>
<td>Sales</td>
<td>Acquiring customer accounts with wholesalers</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX F

STUDY 2 - EMPLOYEE QUESTIONNAIRE

Thank you for taking the time to participate in this survey. This questionnaire forms part of a research project at Manchester Business School on management and employee attitudes and we very much value your input.

The survey takes approximately **25 minutes** to complete and it is your decision whether to take part or not. If you decide to take part you, are still free to withdraw without giving a reason.

To allow matching of your responses with the answers from your other team members and manager, each survey link is personalised. All information in this questionnaire is treated with **strictest confidentiality**. Your company will receive a summary of the findings from this research, but no information from individual questionnaires will be revealed - the answers you give in this questionnaire will not be passed on to your manager or anybody else in your company.

Please answer as honestly as you can. Say what you feel, not what you think you should say - there are no right or wrong answers.

Each person taking part in the survey will be entered into a draw for a chance to win an £100 Amazon vouchers.

If you have any questions about this study, please email sara.guediri@mbs.ac.uk.
In your current work situation, rate the level of hazards that you are exposed to in your job role?

Very low hazard-level

The results of my work are likely to affect the safety of other people.

Strongly Disagree

Please tick the appropriate box to indicate your level of agreement.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am rarely worried about being injured on the job.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>In my job the chances of being involved in an accident are quite large.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I am sure it is only a matter of time before I am involved in an accident.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

All things considered, how satisfied are you with your job?

Very Unsatisfied
<table>
<thead>
<tr>
<th></th>
<th>Not at all</th>
<th>Once in a while</th>
<th>Sometimes</th>
<th>Fairly often</th>
<th>Frequently, if not always</th>
</tr>
</thead>
<tbody>
<tr>
<td>assists me in exchange for my efforts.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>outlines my responsibility to achieve performance targets.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>makes clear what I can expect to receive, when performance goals are achieved.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>shows satisfaction when I meet expectations.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**My field service manager**

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>fits his/her actions to the situation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>learns from experience</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>adjusts his/her style</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>acts differently depending on the situation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>is set in his/her ways</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>responds to changes in the situation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>is effective in different situations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**My field service manager**

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>uses leadership methods that are satisfying</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>works with me in a satisfactory way</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Management operates an open door policy on safety issues.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

Co-workers often give tips to each other on how to work safely.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

All safety procedures are carefully followed even if work is behind schedule or when we are tired or stressed.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

In this company, employees' safety is clearly considered to be of great importance (even if it means increased cost or slower production).

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

Sometimes I am not given enough time to get the job done safely.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>
I am involved in informing management of important safety issues.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

Management acts decisively when a safety concern is raised.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

There is good communication here about safety issues.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

I am involved with safety issues at work.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

This is a safer place to work than other companies I have worked for.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

I am strongly encouraged to report unsafe conditions.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

In my workplace management turn a blind eye to safety issues.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>
Some safety rules and procedures do not need to be followed to get the job done safely.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

Management acts only after accidents have occurred.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

I believe that safety issues are not assigned a high priority.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

Some health and safety rules and procedures are not really practical.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

Employees are not encouraged to raise safety concerns.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

I do not receive praise for working safely.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>
Corrective action is always taken when management is told about unsafe practices (even if it's costly).

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

Operational targets (e.g., production speed, keeping cost low) often conflict with safety measures.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

My manager does not always inform me of current safety concerns.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

I can influence health and safety performance here.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

Sometimes conditions here hinder my ability to work safely.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

Safety information is always brought to my attention by my manager.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

When people ignore safety procedures here, I feel it is none of my business.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>
In my workplace, management acts quickly to correct safety problems.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

Sometimes it is necessary to depart from safety requirements for production’s sake.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

There are always enough people available to get the job done safely.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

In my workplace, managers show serious interest in my safety (even when we are working under time pressure).

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

I am never involved with safety issues at work.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

Management considers safety to be equally as important as production.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

A no-blame approach is used to persuade people acting unsafely that their behaviour is inappropriate.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

Managers express concern if safety procedures are not followed (even for minor safety rules).

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

I cannot always get the equipment I need to do the job safely.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>
For how long have you been working at this company?

For how long have you been working in the oil and gas industry?

Please select your gender
- Male
- Female

Please select your age

We thank you for your time spent taking this survey.
Your response has been recorded.
APPENDIX G

STUDY 2 - MANAGER QUESTIONNAIRE

Thank you for taking the time to participate in this survey. This questionnaire forms part of a research project at Manchester Business School on management, employee attitudes and safety and we very much value your input.

The survey takes approximately 25 minutes to complete and it is your decision whether to take part or not. If you decide to take part you, are still free to withdraw without giving a reason.

In the following sections we are interested in your view about the safety practices of the employees in your team.
To allow matching your responses with the answers from your team members, each survey link is personalised - this will only be used to match responses for the purpose of this research.
All information in this questionnaire is treated with strictest confidentiality and your answers will not be passed on to your employees. Your company will receive a summary of the findings from this research, but no information from individual questionnaires will be revealed.

Each person taking part in the survey will be entered into a draw for a chance to win an €100 Amazon vouchers.

If you have any questions about this study, please email sara.guediri@mbs.ac.uk.

In the following sections we are interested in your view about the safety practices of the employees in your team. Please complete one block for each person in the team that you manage.

Please answer as honestly as you can. Say what you feel, not what you think you should say - there are no right or wrong answers.

Please select the name of the employee that you are rating.
Person you are rating:

For how long have you been this person's manager?

<table>
<thead>
<tr>
<th>This person...</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>uses all the necessary safety equipment to do his/her job</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>uses the correct safety procedures for carrying out his/her job</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>ensure the highest levels of safety when he/she carries out his/her job</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>This person...</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>goes out of his/her way to promote the safety programme within the company</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>puts in extra effort to improve the safety of the workplace</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>voluntarily carries out tasks or activities that help to improve workplace safety</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>This person...</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>carries out the core parts of his/her job well</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>completes core tasks well using the standard procedures</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>ensures tasks are completed properly</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>This person...</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>makes suggestions to improve the overall effectiveness of the company</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>voluntarily participates in changes that are helping to improve the overall effectiveness of the company</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>comes up with ways of increasing the efficiency within the organisation</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

[The above section was repeated for each subordinate.]
For how long have you been working in the Oil and Gas Industry?

For how long have you been working at this company?

Please select your gender

- Male
- Female

Please select your age

We thank you for your time spent taking this survey.
Your response has been recorded.
Confirmatory factor analyses were conducted to examine the factor structure of the MLQ in study 2. Item parcels were formed prior to the analysis following the same procedure as described in study 1. To assess a best fitting model, the five factor structures that were compared in study 1 (see Figure 40 in Appendix B), were tested in the present CFA. The results from the model comparison are displayed in Table 32. Model 5 emerged as best fitting, which specified transformational leadership through its original indicators as well as Contingent Reward, Management-By-Exception-Active formed as a single factor and a third factor that combined Management-By-Exception-Passive and passive leadership. This replicates the findings from study 1 on the factorial structure of the MLQ.

Post-hoc analysis
The above model showed improvable fit and inspection of modification indices (MI) revealed four large indices, which referred to residual covariances between item parcels of the same dimension (i.e., modification index between the two Laissez-Faire parcels MI = 68.69, between the two IS parcels MI = 53.58, between the two IC parcels MI = 33.67 and between the two IIa parcels MI = 27.55). This matched the results from study 1, where modification indices for the same error covariances were identified. As noted previously, item content overlap can lead to large modification indices and thus provides a rationale for post-hoc modifications (Byrne, 2012). In four separate steps, the identified error covariances were freed up with each post-hoc model showing significantly improved fit (see Table 32). The final model showed good fit with all fit statistics meeting their cut-off points (see model 10 in Table 32 and Figure 42).
Table 32. Results of MLQ confirmatory factor analyses for complete sample in study 2

<table>
<thead>
<tr>
<th>Model</th>
<th>$\chi^2$</th>
<th>df</th>
<th>CFI</th>
<th>TLI</th>
<th>SRMR</th>
<th>RMSEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1&lt;sup&gt;a&lt;/sup&gt;</td>
<td>608.18</td>
<td>152</td>
<td>.71</td>
<td>.68</td>
<td>.09</td>
<td>.14</td>
</tr>
<tr>
<td>Model 2&lt;sup&gt;b&lt;/sup&gt;</td>
<td>485.32</td>
<td>149</td>
<td>.79</td>
<td>.76</td>
<td>.09</td>
<td>.12</td>
</tr>
<tr>
<td>Model 3&lt;sup&gt;c&lt;/sup&gt;</td>
<td>419.83</td>
<td>149</td>
<td>.83</td>
<td>.80</td>
<td>.07</td>
<td>.11</td>
</tr>
<tr>
<td>Model 4&lt;sup&gt;d&lt;/sup&gt;</td>
<td>485.98</td>
<td>149</td>
<td>.79</td>
<td>.76</td>
<td>.08</td>
<td>.12</td>
</tr>
<tr>
<td>Model 5&lt;sup&gt;e&lt;/sup&gt;</td>
<td>414.32</td>
<td>149</td>
<td>.83</td>
<td>.80</td>
<td>.06</td>
<td>.10</td>
</tr>
<tr>
<td>Post-Hoc Modifications</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 6&lt;sup&gt;d&lt;/sup&gt;</td>
<td>332.92</td>
<td>148</td>
<td>.88</td>
<td>.87</td>
<td>.06</td>
<td>.09</td>
</tr>
<tr>
<td>Model 7&lt;sup&gt;e&lt;/sup&gt;</td>
<td>270.41</td>
<td>147</td>
<td>.92</td>
<td>.91</td>
<td>.06</td>
<td>.07</td>
</tr>
<tr>
<td>Model 8&lt;sup&gt;f&lt;/sup&gt;</td>
<td>230.18</td>
<td>146</td>
<td>.95</td>
<td>.94</td>
<td>.05</td>
<td>.06</td>
</tr>
<tr>
<td>Model 9&lt;sup&gt;e&lt;/sup&gt;</td>
<td>197.67</td>
<td>145</td>
<td>.97</td>
<td>.96</td>
<td>.05</td>
<td>.05</td>
</tr>
<tr>
<td>Model 10&lt;sup&gt;h&lt;/sup&gt;</td>
<td>173.61</td>
<td>144</td>
<td>.98</td>
<td>.98</td>
<td>.05</td>
<td>.04</td>
</tr>
</tbody>
</table>

Model Comparison

<table>
<thead>
<tr>
<th>Model 5 vs. Model 6</th>
<th>$\Delta \chi^2$</th>
<th>$\Delta$ df</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 6 vs. Model 7</td>
<td>81.40***</td>
<td>1</td>
</tr>
<tr>
<td>Model 7 vs. Model 8</td>
<td>62.02***</td>
<td>1</td>
</tr>
<tr>
<td>Model 8 vs. Model 9</td>
<td>56.24***</td>
<td>1</td>
</tr>
<tr>
<td>Model 9 vs. Model 10</td>
<td>26.11***</td>
<td>1</td>
</tr>
</tbody>
</table>

Note. ***p < .01; N = 160; all estimates based on Maximum Likelihood Robust (MLR) estimation; $\Delta \chi^2 =$ Satorra-Bentler scaled chi-square difference test, df = degrees of freedom

<sup>a</sup> Null model

<sup>b</sup> (1) Transformational leadership by IIa, IIb, IC, IS, IM, (2) Transactional leadership by MBEA, MBEP, CR, (3) LF

<sup>c</sup> (1) Transformational leadership by IIa, IIb, IC, IS, IM, CR, (2) Transactional leadership by MBEA, MBEP (3) LF

<sup>d</sup> (1) Transformational leadership by IIa, IIb, IC, IS, IM, CR (2) Transactional leadership by MBEA, CR (3) Passive leadership by MBEP and LF

<sup>e</sup> (1) Transformational leadership by IIa, IIb, IC, IS, IM, CR (2) MBEA, (3) Passive leadership by MBEP and LF

<sup>d</sup> Residual covariance between LF parcels

<sup>e</sup> Residual covariance between IS parcels

<sup>f</sup> Residual covariance between IM parcels

<sup>g</sup> Residual covariance between IC parcels

<sup>h</sup> Residual covariance between IIa parcels

IIa = Idealised Influence Attributed, IIb = Idealised Influence Behaviour, IC = Individualised Consideration, IS = Intellectual Stimulation, IM = Inspirational Motivation, MBEA = Management-By-Exception-Active, MBEP = Management-By-Exception-Passive, CR = Contingent Reward, LF = Laissez Faire.
Figure 42. Study 2 MLQ factor structure.

Figure relates to model 10 in Table 32; values indicate standardised parameters; all factor loadings and residual correlations significant at $p < .001$; CR1/CR2 = Parcel 1/Parcel 2 Contingent Reward, IS1/IS2 = Parcel 1/Parcel 2 Intellectual Stimulation, IM1/IM2 = Parcel 1/Parcel 2 Inspirational Motivation, IIA1/IIA2 = Parcel 1/Parcel 2 Idealised Influence Attributed, IIB1/IIB2 = Parcel 1/Parcel 2 Idealised Influence Behaviour, IC1/IC2 = Parcel 1/Parcel 2 Individualised Consideration, MBEA1/MBEA2/MBEA3 = Parcel 1/Parcel 2/Parcel 3 Management-By-Exception-Active, MBEP1/MBEP2 = Parcel 1/Parcel 2 Management-By-Exception-Passive, LF1/LF2 = Parcel 1/Parcel 2 laissez-fair.
APPENDIX I

STUDY 2 - MLQ FACTORIAL INVARIANCE ACROSS SUB-SAMPLES

In study 2, the data from the oil and gas sub-sample were merged with data from the manufacturing sub-sample to achieve a larger variety within safety salience measures and a larger sample size at the team-level to allow for multilevel modelling. To ensure that the MLQ factor structure that was identified above is equivalent across these two sub-samples, factorial equivalence of the MLQ was tested between the oil and gas sub-sample (company A) and the manufacturing sub-sample (company B). The baseline model identified in the complete sample showed acceptable fit, when separately tested for the two sub-samples (for oil and gas sub-sample $\chi^2 = 202.70; \text{CFI} = .93; \text{TLI} = .92; \text{RMSEA} = .08; \text{SRMR} = .08$; for manufacturing sub-sample $\chi^2 = 189.77; \text{CFI} = .96; \text{TLI} = .95; \text{RMSEA} = .06; \text{SRMR} = .07$). Several of the fit indices did not meet their recommended cut-off values, however this could be due to the small sample sizes of the respective two sub-samples (especially in the oil and gas sub-sample which consisted of $N = 69$). To test for measurement invariance this baseline model was used as the configural model against which more constrained models were tested (see Table 33). In the configural model the same structure with no sample-specific parameters was specified for the two sub-samples, factor means were constrained to zero and factor loadings and intercepts were not constrained equal (Bryne, 2012). In the next step, factor loadings were constrained equal (invariant model 1). Chi-square difference test was significant, however there was no change in the CFI value. Inspection of the modification indices (MI) showed the largest MI for a factor loading of one of the Management-By-Exception-Passive parcels on the passive leadership factor (MI = 6.66 in both sub-samples). When this factor loading was no longer constrained equal, chi-square difference reduced and became non-significant ($\Delta \chi^2 = 22.94, p = .09$). Next, residual covariances were constraint equal. The chi-square difference test and CFI indicated that these might not be invariant between the two sub-samples, although the change in CFI did not exceed the recommended value of .01. Inspection of the modification indices showed that the residual covariance between the Inspirational Motivation parcels might vary for the two sub-samples (MI = 10.4 in both sub-
samples). When this covariance residual was no longer constrained equal chi-square difference reduced to $\Delta \chi^2 = 4.58$, $p = .20$. Lastly, factor variances and invariances were constrained equal and model comparison showed that these remained equal across the two models. Thus, despite the indication for one unequal factor loading and for one unequal residual covariance, structural parameters were invariant between the two sub-samples. Therefore, although invariance testing indicted partial measurement invariance (Bryne, 2012), chi-square differences and CFI differences were small and as the analysis in study 2 used manifest rather than latent variable modelling, it was considered appropriate to pool the MLQ data from the two sub-samples together.

Table 33. Invariance testing across company A and company B sub-samples

<table>
<thead>
<tr>
<th>Model Comparison</th>
<th>$\chi^2$</th>
<th>df</th>
<th>CFI</th>
<th>$\Delta \chi^2$</th>
<th>$\Delta df$</th>
<th>$\Delta CFI$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Configural Model</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Invariant Model 1$^b$</td>
<td>392.24</td>
<td>288</td>
<td>.94</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 1 vs. Configural Model</td>
<td>29.95$^*$</td>
<td>16</td>
<td>.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Invariant Model 2$^c$</td>
<td>422.19</td>
<td>304</td>
<td>.94</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 2 vs. Model 1</td>
<td>18.35$^{**}$</td>
<td>5</td>
<td>.01</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Structural Parameters</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Invariant Model 3$^d$</td>
<td>446.69</td>
<td>309</td>
<td>.93</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 3 vs. Model 2</td>
<td>10.37$^{ns}$</td>
<td>6</td>
<td>.01</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. df = degrees of freedom; $\Delta \chi^2$ = Satorra-Bentler scaled chi-squared difference test
$^a$No invariance constraints
$^b$All factor loadings invariant
$^c$All factor loadings and residual covariances invariant
$^d$All factor loadings, residual covariances, factor variances and factor covariances invariant.
APPENDIX J

STUDY 2 - CONFIRMATORY FACTOR ANALYSIS FOR SAFETY CLIMATE AND INJURY LIKELIHOOD

In study 2, injury likelihood was assessed as a contextual variable representing an aspect of safety salience. However, others have conceptualised perceptions of risk as a dimension of safety climate. To test whether injury likelihood should be investigated separately as a safety salience measure or should be combined with the safety climate variable, CFA was performed. In the one-factor model the two injury likelihood items and all safety climate items (grouped into parcels) loaded onto a common factor. In the two-factor model, the two injury likelihood items formed a separate second factor. Comparing a two-factor model that specified safety climate and injury likelihood as two separate factors to a one-factor model, showed that a two-factor model had significant better fit (see Table 34). Thus, this finding suggested that injury likelihood and safety climate constitute two separate variables.

Table 34. CFA for safety climate and injury likelihood in study 2

<table>
<thead>
<tr>
<th>Model</th>
<th>$\chi^2$</th>
<th>CFI</th>
<th>TLI</th>
<th>RMSEA</th>
<th>SRMR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two-factor model</td>
<td>48.33</td>
<td>.94</td>
<td>.91</td>
<td>.08</td>
<td>.06</td>
</tr>
<tr>
<td>One-factor model</td>
<td>65.20</td>
<td>.90</td>
<td>.85</td>
<td>.11</td>
<td>.08</td>
</tr>
<tr>
<td>$\Delta \chi^2$</td>
<td>15.08***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta df = 1$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. $\Delta \chi^2$ = Satorra-Bentler scaled chi-squared difference test.
APPENDIX K

STUDY 2 RANDOM INTERCEPT MODELS

In multilevel modelling it is advised to gradually increase complexity of models (Aguinis et al., 2013). Therefore models with random-intercepts were tested as a preliminary step to testing the cross-level interactions. Safety salience measures (i.e., hazard exposure, injury likelihood, and impact on safety of others) were tested as moderators of the relationship between leadership variables (i.e., Management-By-Exception-Active, transformational leadership, leader flexibility and passive leadership) with study outcome criteria (i.e., leader satisfaction, job satisfaction, job performance, safety performance and safety climate). In the random-intercept models, all paths were simultaneously modelled at the team-level and the individual-level. Thus, the three safety salience measures were tested as individual-level moderators of the individual-level relationship between leadership and outcome criteria, and were also tested as team-level moderators of the team-level relationship between leadership and outcome criteria. Separate models were run for each potential moderator and each dependent variable to reduce multicollinearity and avoid non-identification and non-convergence issues. A summary of the results for the interaction effects from the respective random-intercept models is shown in Table 35. One important finding for the remainder of the analysis was that none of the safety salience measures interacted with any of the leadership variables for safety climate as the dependent variable. Thus, in the subsequent cross-level models in the second part of the analysis, safety climate was not included as a dependent variables.
Table 35. Summary of random-intercept models

<table>
<thead>
<tr>
<th>Moderator: Injury Likelihood</th>
<th>Individual-Level Dependent Variable</th>
<th>Team-Level Dependent Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Leader Satisfaction</td>
<td>Job Satisfaction</td>
</tr>
<tr>
<td>Management-By-Exception-Active x Injury Likelihood</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Transformational Leadership x Injury Likelihood</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Passive Leadership x Injury Likelihood</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Leader Flexibility x Injury Likelihood</td>
<td>p = .07</td>
<td>ns</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Moderator: Hazard Exposure</th>
<th>Individual-Level Dependent Variable</th>
<th>Team-Level Dependent Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Leader Satisfaction</td>
<td>Job Satisfaction</td>
</tr>
<tr>
<td>Management-By-Exception-Active x Hazard Exposure</td>
<td>p = .03</td>
<td>ns</td>
</tr>
<tr>
<td>Transformational Leadership x Hazard Exposure</td>
<td>ns</td>
<td>p = .09</td>
</tr>
<tr>
<td>Passive Leadership x Hazard Exposure</td>
<td>ns</td>
<td>p = .08</td>
</tr>
<tr>
<td>Leader Flexibility x Hazard Exposure</td>
<td>ns</td>
<td>ns</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Moderator: Safety of Others</th>
<th>Individual-Level Dependent Variable</th>
<th>Team-Level Dependent Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Leader Satisfaction</td>
<td>Job Satisfaction</td>
</tr>
<tr>
<td>Management-By-Exception-Active x Safety of Others</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Transformational Leadership x Safety of Others</td>
<td>p = .06</td>
<td>ns</td>
</tr>
<tr>
<td>Passive Leadership x Safety of Others</td>
<td>p = .02</td>
<td>p = .02</td>
</tr>
<tr>
<td>Leader Flexibility x Safety of Others</td>
<td>p = .002</td>
<td>ns</td>
</tr>
</tbody>
</table>

Note. p = significance for interaction terms in random-intercept models; ns = non-significant. In each model transformational leadership, Management-By-Exception-Active, passive leadership and leader flexibility were entered as independent variables.