The Interaction Between S.A.F.E.R. Leadership and Safety Management Systems

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A Thesis Submitted to
Saint Mary's University, Halifax, Nova Scotia
In Partial Fulfillment of the Requirements for
the Degree Master of Science in Applied Psychology

May 2023, Halifax, Nova Scotia

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Date: May 9th , 2023

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Abstract

This study investigated the relationship between safety management systems (SMSs), SAFER leadership and safety-related behaviour. In particular, this study examined whether an indirect effect of SMSs on safety-related behaviour via safety control and autonomous motivation existed and whether this indirect effect was conditional on SAFER leadership. Surveys were conducted with 400 participants. Results indicated that safety control mediated the relationship between SMSs and compliance and participation, whereas autonomous motivation did not. Although SAFER leadership moderated the relationship between SMSs and safety control, it did not moderate the entire mediation model. These results support the utility of SAFER leadership and also added novel findings to the literature on safety control. Despite these significant findings, a key limitation of this study is that it relies on cross-sectional, perceptual data. Overall, this thesis highlights the importance of SAFER leadership, SMSs, and safety control in promoting safety behaviours.

May 9th, 2023

Acknowledgements

I would like to express my deepest gratitude and appreciation to my supervisor, Dr. Kevin Kelloway, for his invaluable guidance and unwavering support throughout this process. Your expertise has been instrumental in shaping this work and I am truly fortunate to have such an exceptional mentor.

I would also like to thank my committee for their insightful feedback and suggestions. To Dr. Mark Fleming, for your expertise in safety, and to Dr. Nicolas Roulin, for your extraordinary attention to detail. Your input has significantly improved this thesis and I am grateful for the time and effort you've invested in evaluating my work. I would also like to thank my external examiner, Dr. Mike Teed, for the thoughtful questions posed during my defence.

To my cohort, thank you for your camaraderie. These last two years have resulted in connections that I am grateful for, and I am thankful for meeting and learning from each and every one of you. To my friends and family, thank you for your ongoing patience and continuous support over the last two years. This accomplishment would not have been possible without your support, and despite the distance between us, you are all always close in my heart.

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According to the World Health Organization, almost two million people die from work-related injuries and diseases every year (WHO, 2021). However, fatalities, while severe, are relatively infrequent and only represent a small percentage of workplace incidents. Looking beyond fatalities, the number of individuals injured at work is much higher. To illustrate, in 2020, there were 924 fatalities in Canadian workplaces, and in addition to these fatalities, there were also 253,397 lost time claims due to injuries sustained at work (Association of Workers Compensation Boards of Canada [AWCBC], 2020). These numbers only represent a fraction of the total number of workplace injuries in Canada as the AWCBC only draws data from the provincially regulated Canadian Workers Compensation Boards, meaning that any claims that were not submitted to these entities are not included in those statistics (AWCBC, 2020). Therefore, in actuality, the number of Canadians injured at work may be much higher.

Workplace injuries have a significant societal impact, having a large economic burden and a high human cost (ILO, 2003). Therefore, research into what factors contribute to creating a safe workplace is of utmost importance. This thesis examined to two factors paramount to workplace safety: leadership and safety management systems (SMSs). Although there is an abundance of research on leadership and its impact on safety outcomes in the workplace (Clarke, 2013), and on the role of SMSs (Robson et al., 2007), there is relatively little research on the relationship between these two variables and how they interact. Leadership is a fundamental piece of an SMS (Skeeper & Mbohwa, 2015), meaning it is unlikely that leadership and SMSs exist independently from each other. Therefore, the goal of this research was to examine the relationship between these variables to better understand the factors impacting organizational safety.

Safety Management Systems

An SMS can best be described as a system of policies, practices, and functions that aid in the management of risk (Fernández-Muñiz et al., 2007). Similarly, Yorio et al. (2015) described SMSs as the institutionalization of strategic elements meant to achieve health and safety objectives. Regardless of how an SMS is described, an essential characteristic of an SMS is that it creates a systematic approach to safety by outlining sets of processes and procedures for identifying, managing, and preventing safety incidents in the workplace.

From an organizational perspective, the purpose of an SMS often revolves around the ideas of compliance and control (Li & Guldenmund, 2018). From a control perspective, the purpose of an SMS is to establish a control process for managing risk. On the other hand, organizations may view SMSs from a compliance perspective, basing the creation of an SMS on regulatory standards for a particular industry (Li & Guldenmund, 2018). While both these perspectives focus on the reduction of risk, the compliance perspective focuses on developing an SMS that meets a particular standard of risk control, and the control perspective focuses on what controls need to be established to effectively manage risk (Li & Guldenmund, 2018).

In general, the research around SMSs suggests that they are an effective way to enhance safety in the workplace. For instance, SMSs have been recognized to have a positive effect on safety performance (Fernández-Muñiz et al.,2009). SMSs have also been associated with improved working conditions (Da Silva & Amaral, 2019) and improved worker attitudes toward safety (Remawi et al., 2011). However, while SMS research generally indicates an association with positive outcomes (Robson et al., 2007), it is important to highlight that researching SMSs can be challenging given the different approaches to measurement used.

Measuring SMSs

There are often methodological inconsistencies in SMS research (Robson et al., 2007). For instance, there are some discrepancies on how many elements should be included as part of an SMS. In its most generic form, an SMS should consist of two components: a risk control system and a learning system (Li & Guldenmund, 2018). These two components can be broken down into smaller elements. The exact number of elements within an SMS can vary across studies, with some suggesting 12 core elements, and others suggesting six or fewer (Arocena & Nunez, 2010; Fernández-Muñiz et al., 2007; Yanar et al., 2019). However, the essence of an SMS is that it should be constructed to address the people, the workplace, and the management strategies within an organization (Makin & Winder, 2008). Although there is no "proper" number of elements to include while measuring an SMS, there are two main approaches researchers generally takes when assessing SMSs.

Approaches to Measuring SMSs

The first approach examines SMSs from a management perspective, asking managers to provide information on various aspects of organizational practices (e.g., training policies), while the second approach examines the workers, asking for worker's perceptions of the organization's SMS (Yorio et al., 2015). Yorio and colleagues (2015) note that the management perspective assumes a structural approach to SMSs, while a worker approach assumes more of a perceptual approach. While both approaches seek to measure the same system, they have some differences in terms of strengths and weaknesses.

Utilizing a management perspective for assessing SMSs creates a relatively narrow viewpoint, as it neglects the experiences of frontline workers. While focusing on intermediate positions between management and employees (i.e., safety officers) may mitigate this issue

(Fernández-Muñiz et al., 2007), there is still a potential possibility that management may be disconnected from the actual practices of frontline workers. Additionally, SMSs can be described as having human performance as the center of an SMS (Wachter & Yorio, 2014) and as being more than just a compilation of paperwork, reflecting *actual* practices rather than just policy (Mearns et al., 2003). As such, other researchers have looked at SMSs from a perceptual point of view.

Examining SMSs from a worker's perspective can potentially allow for a better understanding of what behaviours are taking place within an organization. While workers themselves may not have knowledge of the exact elements of the SMS, having first-hand experience with an organization means they would have perceptions of how effective the organization is at managing risk (Yorio et al., 2015). Thus, worker perceptions can be used as an accurate indicator of an SMS's performance (Yorio et al., 2015). Given that worker perceptions can be an accurate indicator of SMS performance, this research examined SMSs at a worker level. Using this approach allowed for a more accurate description of the impact of an SMS in practice, which is something a management perspective would not be able to provide.

SMSs and Safety Climate

It has been argued that using worker perceptions of an SMS is equivalent to measuring the safety climate of an organization (Yorio et al., 2015). This is because workers may not be perceiving the SMS correctly as the policies that surround an SMS are within the realm of management (Yorio et al., 2015). Because of this, measuring worker perceptions actually measures their interpretations of the SMS rather than the SMS itself, which falls closely in line with the definition of safety climate.

While these constructs are similar, safety climate and the perception of SMS performance are conceptually distinct constructs. Safety climate is a perception of an organization (McDonald et al., 2000) and the processes that exist within an organization (Guldenmund, 2010). Contrarily, a worker's perception of an SMS is the perception of how effective an organization is in implementing strategies and processes for managing risk (Yorio et al., 2015). Using perceptual measures to assess the effectiveness of an SMS is more specific to the policies and processes in place within an organization, while climate is more general.

Similar to climate, perceptions of SMSs play a key role in worker attitudes and safety. When individuals perceive that leadership and management are committed to safety, they are more likely to perceive a positive safety climate (Barling & Hutchinson, 2000). Given that leadership plays a key role in perceptions of climate, it is likely that leadership is also associated with SMS performance. Therefore, the next section of this thesis will discuss the role of leadership in safety behaviours.

Leadership and Safety

Leadership is an important part of any SMS (Yanar et al., 2019). Leadership plays a key role in any workplace, and it is well established that leadership can impact workers' behaviours. Leaders, in particular, have an important role in influencing an organization's safety (Flin & Yule, 2004). To understand why leaders play such a critical role in impacting their followers' behaviours, social learning theory can be used.

This theory, proposed by Bandura (1969), suggests that individuals learn through observing others and through reinforcement. Thus, leaders play an important role in establishing a standard for safety behaviours through role modelling and reinforcing desirable behaviours.

Although role modelling is important, the reinforcement of behaviours is key, as reinforcement establishes the basis for an individual's motivation to perform a particular behaviour.

The form of behavioural reinforcement that leaders rely on can vary. For instance, reinforcement can be positive, where individuals are rewarded (e.g., praise, monetary incentives, etc.) for performing desired behaviours. Reinforcement can also be negative, where a form of punishment (e.g., reprimands) is given for performing undesirably. The manner and extent to which leaders rely on different forms of reinforcement vary across leadership styles, and some forms of reinforcement may be more effective than others. Therefore, it is imperative to examine how different leadership styles and behaviours impact individuals' safety behaviours.

In general, safety-related leadership behaviours can be taxonomized into five different categories, change-oriented, relational-oriented, task-oriented, passive, and destructive (Lyubyhk et al., 2022). These types of leadership contribute to safety outcomes in differing ways. Given that this research is focused on positive leadership characteristics, only the constructive leadership behaviours (change-, relational- and task-oriented leadership) will be considered below.

Change-Oriented Leadership

Change-oriented leadership is associated with leaders who inspire change over time and innovative thinking (Lyubyhk et al., 2022). This form of leadership has been one of the most widely studied. Transformational leadership would fall under this taxonomy. Transformational leadership is characterized by four main behaviours that culminate in the leader inspiring and stimulating followers to achieve positive outcomes in the workplace (Bass & Riggio, 2005). These four main behaviours are idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration (Bass, 1999). According to Bass, idealized influence can be described as leaders serving as role models to their followers, emulating the

ideals and values they seek to instill in their followers. Inspirational motivation involves leaders articulating their vision to their followers, while individual consideration is a behaviour that involves leaders supporting their followers' individual needs and valuing their unique contributions (Bass, 1999). Lastly, intellectual stimulation involves leaders encouraging their followers to think creatively. This form of leadership motivates individuals through empowerment and invoking positive emotions toward particular tasks (Wang et al., 2016). This form of leadership has been associated with positive safety outcomes in the workplace, including increased employee safety participation (Clarke, 2013).

In addition to transformational leadership, a safety-specific form of transformational leadership has also been established. This form of leadership was introduced by Barling et al. (2002) and is similar to transformational leadership in the fact it describes the same four components of leadership but differs in the sense that it describes those components in their relation to safety-related behaviours. For instance, a leader may demonstrate inspirational motivation by articulating their desire to set a high standard of safety performance in the workplace (Mullen & Kelloway, 2010). In essence, leaders who practice this form of leadership are still demonstrating transformational leadership behaviours, but the behaviours themselves revolve around inspiring followers to perform their tasks safely (as opposed to inspiring them to achieve other goals). The research conducted on safety-specific transformational leadership indicates that it is conceptually distinct from transformational leadership, accounting for variance beyond transformational leadership in predicting safety-related outcomes (Mullen & Kelloway, 2010). It is also thought to be more predictive of safety-related outcomes in certain contexts than general transformational leadership (Nguyen et al., 2022).

Task-Oriented Leadership

Task-oriented leadership can be conceptualized as leadership behaviours that focus on achieving certain outcomes within the organization (Lyubyhk et al., 2022). Behaviours associated with this form of leadership involve clarifying goals and expectations and monitoring performance (Yukl et al., 2002). Transactional leadership would be considered a form of task-oriented leadership. Transactional leadership is characterized by leaders rewarding their followers for achieving their goals (Bass et al., 2003). These leaders motivate their followers by rewarding them for meeting their expectations or punishing them for not meeting certain standards. This form of leadership is distinct from transformational leadership and has been positively associated with perceived safety climate and behaviours such as safety compliance (Clarke, 2013). Overall, task-oriented forms of leadership are considered to be one of the most important contributors to the prediction of safety outcomes in the workplace (Lyubyhk et al., 2022).

Relational-Oriented Leadership

Relational-oriented leadership is associated with building and maintaining relationships with subordinates (Lyubyhk et al., 2022). This form of leadership encompasses a variety of behaviours, including recognizing achievements and contributions and providing support and encouragement (Yukl et al., 2002). Authentic leadership would be an example of this form of leadership. This form of leadership has been associated with a variety of positive safety-related outcomes (Borgerson et al., 2014). Relational-oriented leadership styles are associated with supporting, developing, recognizing, and empowering followers (Yukl et al., 2002). Although relational-, task-, and change-oriented leadership are all considered unique styles, they are not mutually exclusive, as leaders often exhibit combinations of these styles (Lyubyhk et al., 2022).

S.A.F.E.R. Leadership

SAFER leadership can be considered a combination of relational-, task-, and change-oriented leadership styles. This model of leadership is tied to specific behaviours, making it more practical for leaders in the workplace (Wong et al., 2015). This model identifies five key interrelated behaviours instrumental to good safety leadership. It is important to note that this model is not tied directly to one form of leadership style, rather it could be considered to be more related to a general theory of effective safety leadership (Wong et al., 2015).

Speaking About Safety. Communication plays a paramount role in safety management. In general, the likelihood of injuries occurring increases when hazards are not adequately communicated in the workplace, and there is a positive relationship between safety communication levels and safety climate (Pandit et al., 2019). Safety communication is a behaviour that can be improved with safety-specific training, which is demonstrated by Kines and colleagues (2010) in their intervention study focusing on construction workers. The results of this study also suggested that when supervisors engage in more safety communication behaviours, it is associated with an increased level of safety in the workplace (Kines et al., 2010).

Acting Safely. It is well-established that individuals learn from observing others (Bandura, 1969), and this is true for safety as well. In general, research indicates that leaders' behaviours and their modelling of safe behaviours influence the safe behaviours of their workers (Grill & Nielson, 2019). Thus, a leader must not only encourage individuals to act safely but also demonstrate those behaviours themselves.

Focusing on Maintaining Safety Behaviours. In addition to acting and speaking safely, leaders must also focus on maintaining safety behaviours. In other words, they must demonstrate

consistency. Inconsistent leadership has been associated with negative safety outcomes in the workplace (e.g., safety participation; Mullen et al., 2011).

Engaging Others in Safety Initiatives. Facilitating employee engagement is also a key leadership behaviour. Leaders play a predominant role in influencing their follower's engagement levels (Breevaart et al., 2013; Tims et al., 2010). In the realm of safety, employee engagement is important as there is a positive relationship between employee engagement and safety performance. For instance, according to Yuan et al. (2015), engagement may partially mediate the relationship between safety performance and job characteristics.

Recognizing Safety Behaviours. Recognition plays a key role in facilitating safety behaviours. Recognition itself has a positive effect on employee performance (Hussain et al., 2019). While recognition can exist in several forms (e.g., praise), it does not necessarily need to be monetary. Recognition in the form of feedback and reinforcement may also suffice (Austin et al., 1996).

The behaviours outlined by SAFER leadership fall closely in line with the three forms of constructive leadership behaviours. In particular, many of the SAFER leadership behaviours are related to task-oriented styles that focus on clarifying role objectives (e.g., speaking about safety, acting safely, etc.). Other behaviours, such as engaging others in safety initiatives, is more closely related to change-oriented styles. Additionally, providing recognition would be aligned with relational-oriented leadership styles. These behaviours have all been associated with positive outcomes in the workplace, with relational-oriented styles and task-oriented styles explaining the most variance in safety outcomes in the workplace (Lyubykh et al., 2022).

Leadership, SMSs, Motivation and Control

Ideally, both an SMS and an effective safety leadership style would interact to motivate workers to perform their tasks safely. Motivation can be defined as an internal force that moves oneself toward the pursuit of a consequence (Mitchell & Daniels, 2003). Motivation differs from behaviour in the sense that it drives behaviour, meaning that behaviour is actually the outcome of motivation (Mitchell & Daniels, 2003). To better understand what influences motivation, the self-determination theory of motivation can be used.

Self-determination theory suggests that individuals are motivated by three innate needs: autonomy, competence, and relatedness (Gagné & Deci, 2005). Autonomy refers to an individual's need to feel in control of their actions, while competence refers to an individual's need to appeal to their sense of self-efficacy. Relatedness, on the other hand, refers to an individual's need to feel connections within a group setting. These three needs are central to the type of motivation an individual may feel.

Safety Motivation

In general, motivation can be conceptualized as extrinsic and intrinsic (Deci et al., 2017). Intrinsic motivation is where the desire to do the task lies within doing the task itself and extrinsic motivation is where outside rewards or consequences motivate the behaviour (Deci et al., 2017). These types of motivation can be further divided into two categories: controlled or autonomous. Autonomous motivation is a type of motivation that is self-directed and is often associated with intrinsic motivation (Deci et al., 2017).

Controlled motivation, on the other hand, is when individuals are motivated to complete a task by the direction of others. It is important to note that while extrinsic motivation is often considered to be controlled motivation, under certain circumstances it can be autonomous (Deci

et al., 2017). Overall, the types of motivation can be classified into six categories (amotivation, external, introjected, identified, integrated, and intrinsic) that exist on a spectrum, where on one side individuals rely on completely external motivation and on the other side they rely on completely internal motivation (See Figure 1: Gagné & Deci, 2005; Scott, 2014).

Figure 1

Types of Motivated Behaviour
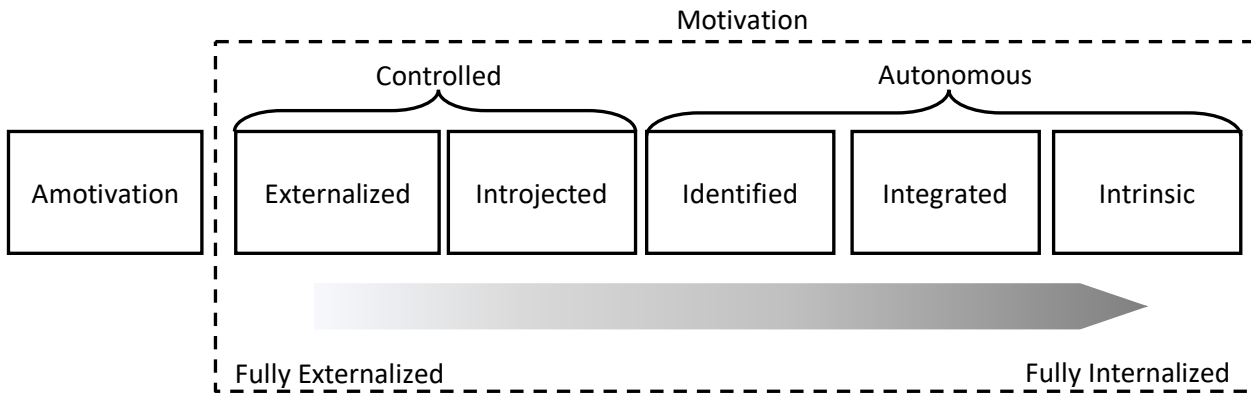
Note. Types of controlled and autonomous behaviours. (Scott, 2014)

In the context of safety, the challenges surrounding safety motivation are unique. Safety itself is often defined by the absence of negative consequences (Reason, 2000). Thus, the motivation for behaving safely is seen as the absence of an injury. SMSs and leaders often place artificial rewards or punishments to encourage individuals to behave safely. However, these often relate to extrinsic motivation, which is often associated with less persistence and performance over time (Deci et al., 2017). Therefore, by appealing to the innate needs suggested by self-determination theory, it may help increase workers' sense of intrinsic motivation, and in turn, their performance.

Safety Control

One way to increase a worker's sense of intrinsic motivation may be through increasing their sense of control over their own safety. Safety control is the degree to which individuals feel

as though they are capable of avoiding injuries and acting safely at work and has been associated with the reduction of workplace incidents (Huang et al., 2006; Huang et al., 2004). Safety control can be conceptualized as having two different parts. On one hand, individuals must feel as though they are capable and possess the self-efficacy to control the likelihood of being involved in a workplace incident. On the other hand, individuals must also feel as though they have the autonomy and agency in the workplace to behave safely and make decisions that impact their own safety. Control and autonomy are closely related, with autonomy being a specialized type of control (Ganster, 2011). These feelings may relate directly to the innate needs for autonomy and competence posed by self-determination theory.

Safety control is thought to be directly related to safety performance and is also thought to partially mediate the relationship between supervisors' safety support and safety performance (Snyder et al., 2011). Additionally, other research suggests that safety control mediates the relationship between safety climate and safety outcomes (Huang et al., 2006). Both these findings, while significant, fail to take into consideration the interaction between leadership and the larger context in which leadership exists. Therefore, this study intends to improve on these previous studies by examining the interaction between leadership and SMS performance and their relationship to safety control and motivation.

The Current Study

Despite SAFER leadership being a practical model on which leaders can base their behaviours, only a handful of studies to date have investigated the model. Thus, the primary purpose of the current study was to clarify the relationship between SMS performance and SAFER leadership. I proposed that there is a conditional indirect relationship between SMS performance and safety outcomes, where there is an indirect effect of SMS performance on

outcomes via safety control and autonomous motivation and that this effect is conditional on

SAFER leadership. For a visualization of the hypotheses proposed in this research, see Figure 2.

Figure 2

Conceptual Model
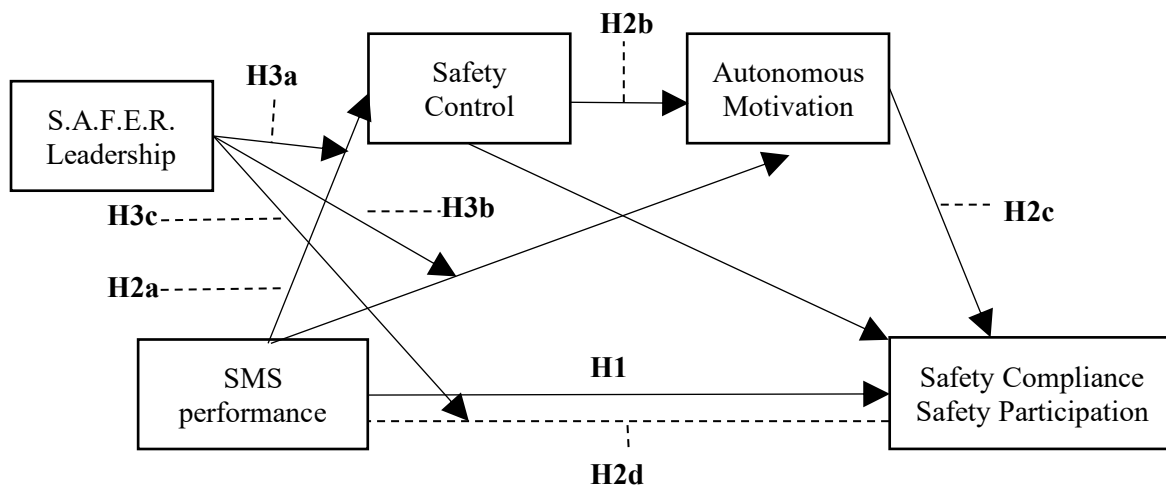
Note. This figure illustrates the model proposed in this study in its entirety.

SMS As a Predictor of Safety-Related Outcomes and Behaviours

SMS performance has been positively associated with safety performance (Fernández-Muñiz et al., 2009) and improved worker attitudes toward safety (Remawi et al., 2011). As such, it is predicted that similar relationships will be observed in this study. As such, I hypothesized the following.

Hypothesis 1: A direct effect of SMS performance on safety outcomes would exist where individuals who reported an effective SMS would also report higher rates of participation and compliance.

The Mediating Role of Safety Control and Autonomous Motivation

Previous research indicates that safety control partially mediates the relationship between supervisor safety support and safety performance and the relationship between safety climate and safety outcomes (Huang et al., 2006; Snyder et al., 2011). It is predicted that a similar relationship will exist between SMSs, safety control, and outcomes, where safety control and autonomous motivation will sequentially mediate the relationship between SMS performance and outcomes. Given that self-efficacy and autonomy are thought to be directly related to motivation (Jungert et al., 2012), An effective SMS may motivate individuals to perform safely by increasing a sense of safety control by developing a worker's sense of self-efficacy and autonomy.

In particular, an effective SMS should facilitate a worker's sense of self-efficacy by having sets of policies and practices meant to ensure that workers have an adequate amount of safety knowledge (e.g., training) and the necessary tools needed to address hazards in the workplace (e.g., personal protective equipment). Additionally, an SMS should also promote a sense of autonomy where the established practices and policies in the workplace allow for workers to act safely and to make decisions that directly impact their safety (e.g., having the autonomy to refuse unsafe working conditions). By developing these two elements of control (autonomy and self-efficacy), workers may be more motivated to perform tasks safely.

As such, I proposed the following hypotheses:

Hypothesis 2a: SMS performance would be directly and positively related to safety control; those who perceive their organization's SMS as effective would also have a greater sense of safety control.

Hypothesis 2b: Safety control would be directly and positively associated with the measure of autonomous safety motivation; individuals who report higher feelings of control would also report higher rates of motivation.

Hypothesis 2c: Safety motivation would be directly and positively related to both safety participation and safety compliance; individuals who report more motivation would also report higher rates of participation and compliance.

Hypothesis 2d: Safety control and safety motivation would sequentially mediate the relationship between SMS performance and safety compliance and safety participation.

The Moderating Role of SAFER Leadership

Leadership is often embedded within a larger context (Fousani & Wisse, 2022). While there is little research examining the interaction between leadership and SMSs, it has been suggested that leadership is critical for any effective SMS (Skeeper & Mbohwa, 2015). Given that leadership is embedded in a larger context, it is thought that leadership and SMS performance would interact to impact the relationship between SMS performance and safety control and the indirect relationship between SMSs and outcomes.

Leadership is a consistent predictor of organizational safety outcomes (Mullen et al., 2011). While an abundance of literature has established the predictive roles of both SMSs and leadership separately, few have examined how they may interact. As posited by social learning theory, leadership behaviours are powerful in the sense that behavioural modeling and consequences are effective in encouraging or deterring certain behaviours (Latham & Saari, 1979). When leaders provide support for safety policies, it can strengthen the relationship between safety policies and safety outcomes in the workplace (Huang et al., 2004). Overall, leadership practices may inform worker's SMS-related behaviours, where leaders can bolster the

legitimacy of the SMS (e.g., through enforcement) or undermine it (e.g., through not adhering to it). These practices may impact worker's behavioural responses to SMSs, which may ultimately increase or reduce the efficacy of SMSs in promoting safety behaviours. Therefore, I proposed, in addition to the indirect effects of safety control and safety motivation, there would also be a moderating effect of SAFER leadership:

Hypothesis 3a: SAFER leadership would moderate the relationship between SMSs and safety control such that the relationship between SMS and safety control would be stronger in instances of strong leadership.

Hypothesis 3b: SAFER leadership would moderate the relationship between SMS and autonomous motivation such that the relationship between SMS and autonomous motivation would be stronger in instances of strong leadership.

Hypothesis 3c: SAFER leadership would moderate the indirect effects of safety control and autonomous motivation such that higher SAFER leadership would be associated with stronger effects of the mediators.

Safety Outcomes

While traditionally safety research has used direct outcome measures as a method for assessing safety in the workplace (i.e., number of incidents, lost workdays etc.; see Jones & Wuebker, 1988 as an example of this), outcome measures do not adequately measure safety performance (Li & Guldenmund, 2018). Safety outcome measures suffer from the major drawback of being underreported. An estimated two-thirds of workplace accidents are not reported (Education and Labour Committee, 2008). There are several reasons for this, such as employees not having knowledge of reporting in the workplace, employers discouraging reporting, poorly constructed safety incentives, etc. (Education and Labour Committee, 2008).

Consequently, it may be more accurate to look at behaviours associated with safety outcomes, rather than the outcomes themselves. Thus, this research focuses on self-reported behaviours of safety performance.

For the purpose of this research, safety performance can be conceptualized as two separate dimensions: safety compliance and safety participation (Griffin & Neal, 2000). According to Griffin and Neal, compliance can be described as any core safety activity that individuals complete to work in a safe manner (i.e., wearing personal protective equipment), while participation reflects engagement in voluntary safety-related activities.

Method

Participants

I recruited 400 participants from Prolific Academic. These participants were individuals working in Canada and the United States that were over the age of 18, employed for at least the last two months, and had a direct supervisor. After individuals who failed the attention checks were removed, the final sample was 391 participants. Participants ranged from 29 to 63 years old, with the average age being 36.9 years old. Participants reported being at their current position for an average of 5 years, with tenure ranging from less than 1 year to 32 years. Participants reported being in a variety of industries, for a description of the industries, refer to Table 1.

Table 1

Description of Participant Industries

	Male		Female	
Industry	Frequency	%	Frequency	%
Goods-producing sector (e.g., agriculture, forestry, fishing, mining, oil & gas, hunting, trapping)	4	1.7	2	1.3

Utilities	4	1.7	2	1.3
Construction	14	6.1	2	1.3
Manufacturing	27	11.7	8	5.3
Services-producing sector (e.g., retail)	17	7.4	9	5.9
Trades	2	0.9	0	0
Transportation	7	3	6	3.9
Finance, insurance, real estate, rental and leasing	25	10.8	16	10.5
Professional, scientific and technical services	51	22.1	18	11.8
Business, building and other support services	6	2.6	7	4.6
Education	16	6.9	25	16.4
Healthcare and social assistance	21	9.1	31	20.4
Information, culture, and recreation	7	3	3	2
Arts, entertainment, and recreation	4	1.7	2	1.3
Accommodation and food services	1	0.4	6	3.9
Public administration	11	4.8	3	2
Other	13	5.6	12	7.9
Total	**230**		**152**	

Note. N=391.

Procedure

Participants were recruited on Prolific Academic, an online recruitment platform. During a 20-minute survey, participants were asked to consider the last two months of work. Three attention checks were distributed throughout the survey and participants were compensated $5 (CAD) for their time.

Measures

Safety Compliance

To measure safety participation, the Safety Compliance Scale (3 items: $\alpha = .86$) developed by Neal et al. (2000) was used. This scale consists of three items, including *"I use all*

the necessary safety equipment to do my job". This measure uses a 5-point Likert scale (*1 = strongly agree, 5 = strongly disagree*; Griffin & Neal, 2000; see the Appendix for survey items).

Safety Participation

To measure safety participation, the Safety Participation Scale (3 items: α = .90) developed by Neal et al. (2000) was used. This scale consists of three items, including *"I promote the safety program within the organization*". This measure uses a 5-point Likert scale (*1 = strongly agree, 5 = strongly disagree*: Griffin & Neal, 2000; see the Appendix for survey items).

Safety Motivation

To measure safety motivation, the Self-Determined Safety Motivation Scale (14 items: α = .88) developed by Scott (2016) was used. This scale has been validated and is considered both reliable and valid (Lecours et al., 2018, Scott et al., 2014). It measures five types of motivation and has 14 items. Items are measured on a 5-point Likert scale (*1 = not at all for this reason, 5 = exactly for this* reason). Items for the Safety Motivation Scale can be found in the Appendix . For the purpose of this study, this measure was simplified to only consider autonomous forms of motivation (Scott, 2016), which was computed by using the subscales for identified, introjected and intrinsic motivation (10 items).

Safety Control

To measure safety control, Snyder et al.'s (2011) safety control scale was used (7 items: α = .81). This consists of seven items that reflect an individual's perceived control over their safe behaviour, including "*I am capable of taking action to prevent injuries or accidents to myself at work"* (See the Appendix for all survey items). This measure uses a 5-point Likert scale (*1 = strongly agree, 5 = strongly disagree*).

SAFER. Leadership

The *S.A.F.E.R. Leadership Scale*(15 items: α = .96)*,* developed by Ozbilir (2021), was used to assess individuals' supervisor behaviours. It consists of 15 items assessing their supervisor's behaviours regarding each facet of SAFER leadership. This measure uses a 7-point Likert scale (*1 = never, 7 = always).* An example of an item in this measure is *"My supervisor talks about safety-related problems at work*". The additional items for this scale can be found in the Appendix. This scale has been validated on a sample of 300 blue-collar workers, demonstrating both convergent and concurrent validity (Ozbilir, 2021). Although SAFER leadership is considered to represent five distinct behaviours, this measure is considered to be unidimensional, likely because individuals perceive leadership as one general set of behaviours (Ozbilir, 2021).

Organizational Performance Metric

To measure SMS performance, the scale developed by consultants from various health and safety associations was used (IWH, 2016; 8 items: α = .89). This scale has been validated using a sample of over 800 workplaces (IWH, 2011). This scale is touted as a practical assessment of a workplace's SMS and demonstrates high reliability (Yanar et al., 2020). This scale is measured on a 5-point Likert scale and asks participants how often their organization engages in certain practices (*1 = 0%-20% of the time, 5 = 80%-100% of the time;* IWH, 2011). An example item from this scale is *"Formal safety audits at regular intervals are a normal part of our business".* The additional items for this scale can be found in the Appendix. This measure is thought to be one of the most comprehensive, parsimonious measures of workplace safety performance (Shea et al., 2016, Yanar et al., 2019). Overall, this scale was chosen as it is unique

in the fact that unlike other scales measuring SMSs, this one has been well validated, is not organizationally specific, and has been demonstrated to be very practical for organizations.

Results

Intercorrelations and descriptive statistics for all study variables are presented in Table 2. The mean scores were calculated for all study variables, for the score to be calculated, 75% of the scale had to be completed by the participant. Listwise deletion was used to deal with missing data. Any participants who failed one or more attention checks were removed, resulting in 8 cases being removed, resulting in a final sample size of 391.

Prior to testing the hypotheses, the data were screened for participant inattention, data entry errors, outliers, linearity, normality, and multicollinearity. There were no extreme outliers, except for the variable of safety compliance. These outliers were kept in the sample as they represented natural variations in the data and were not influential, as indicated by Cook's distance. The Shapiro-Wilk test of normality indicated a violation of normality for all variables. However, this is likely due to Shapiro Wilk being sensitive to small deviations of normality in large sample sizes (Ghasemi & Zahediasl, 2012). The visual inspections of histograms and P-P plots indicated that the sample was approximately normally distributed for each variable. Inspections of the scatterplots indicated that the data was homoscedastic and linear. The Durban-Watson statistics were close to 2, indicating that the variables were not autocorrelated. Lastly, the variance inflation factor statistic was less than 10, indicating the absence of multicollinearity.

Table 2

*Item Descriptive Statistics and Inter-Item Correlations*

			Correlations					
Variable	*M*	*SD*	1	2	3	4	5	6
1. Safety Participation	3.28	1.16	**0.90**	.47	.61	.55	.60	.50

	M	SD	1	2	3	4	5	6
2. Safety Compliance	4.24	0.79	.41**	**0.86**	.55	.51	.48	.46
3. Safety Control	3.86	0.72	.52**	.46**	**0.81**	.44	.53	.57
4. Autonomous Motivation	3.56	0.85	.49**	.44**	.37**	**0.88**	.60	.56
5. SAFER	4.18	1.51	.56**	.44**	.47**	.55**	**0.96**	.79
6. SMS performance	3.40	1.02	.45**	.40**	.48**	.50**	.73**	**0.89**

Note. Uncorrected correlations are presented on the lower triangle. The upper triangle depicts the disattenuated correlation, which has been corrected for measurement error , N=391.

**p < .001*

Using Jamovi, a path analysis was conducted to assess the relationships between variables (See figure 3 for a visual of the model). Given that when creating a model, Jamovi provides coefficients for all variable relationships (beyond the relationships specified by the hypotheses), these additional paths will be reported as exploratory findings. For ease of reporting, results will be discussed by outcome rather than by hypothesis. A summary of the results as they pertain to the hypotheses is presented at the end of the results section. Maximum likelihood estimation was used to estimate model parameters. The proposed model demonstrated acceptable fit, $\chi^2(2, N = 391) = 3.64$, $p = .16$, CFI= .99; RMSEA = .05, p =.43, accounting for 44% of the variance in participation ($r^2 = .44$) and 32% of the variance in compliance ($r^2 = .32$). For path coefficients, see table 4.

Figure 3

Path Model
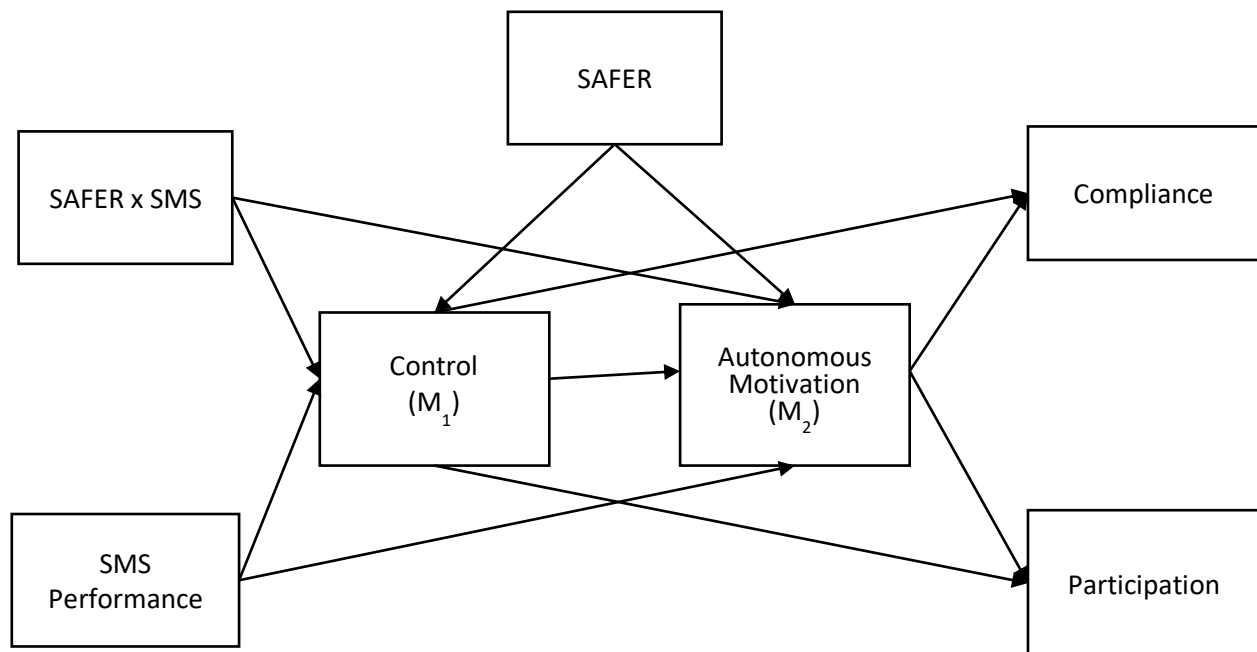
Note. Path diagram tested in Jamovi. To maintain the clarity of the figure, the direct paths between SMS performance and compliance and participation are not depicted.

Safety Control

In line with Hypothesis 2a, SMS performance was a significant predictor of safety control, $\beta = .50$, $p < .001$, *BCa* 95% CI [.19, .52]. SAFER leadership also significantly predicted safety control, $\beta = .52$, $p < .001$, *BCa* 95% CI [.11, .38].

Contrary to hypothesis 3a, there was a significant negative interaction between SAFER leadership and SMS performance in predicting safety control, $\beta = -.45$, $p = .04$, *BCa* 95% CI [-.07, -.00], suggesting that SAFER leadership moderates the relationship between SMS performance and safety control. Since Jamovi does not provide information on the nature of the interaction, Process Model Hayes (2018) was used to further probe the interaction.

The analysis indicated that at -1SD of SAFER, the effect of SMS was positive and significant, $b = .25$ ($SE=.04$), BCa 95% CI [.15, .35]. At mean levels of SAFER, the effect of SMS was positive and significant, $b = .19$ ($SE=.03$), BCa 95% CI [.10, .28]. At +1SD of SAFER, the effect of SMS was positive and significant, $b = .14$ ($SE=.05$), BCa 95% CI [.02, .25]. See figure 4 for a depiction of the interaction. The Johnson-Neyman technique indicated that the strength of the relationship between SMS performance and safety control decreased at higher levels of SAFER leadership. The association between SMS performance and safety control became nonsignificant when SAFER leadership was 6.12 standard deviations above the mean. This relationship was in direct contradiction to the hypothesis, which has specified a positive relationship.

Figure 4

Interaction Between SAFER leadership and SMS Performance
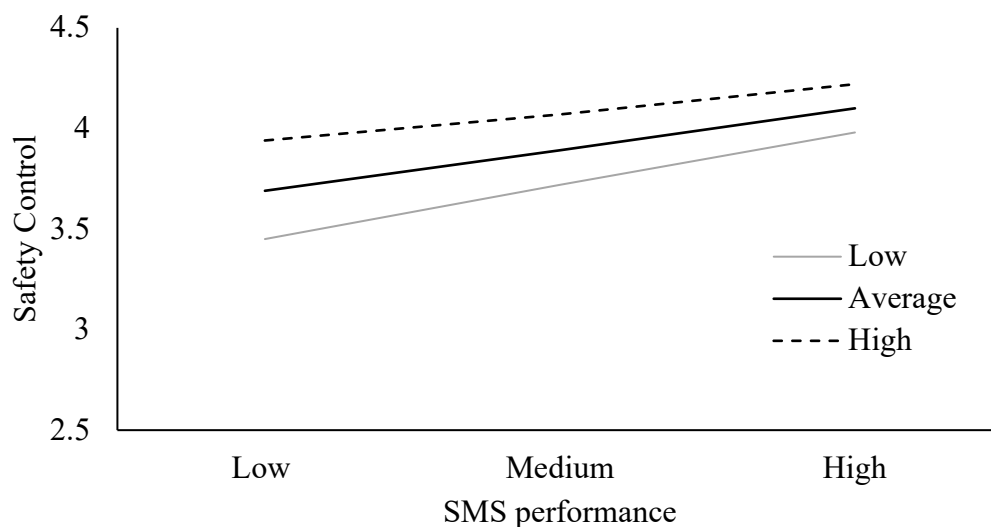
Note. Figure 4 depicts the levels of perceived safety control at different levels of SAFER leadership.

Autonomous Motivation

In line with hypothesis 2b, there was a positive and significant relationship between safety control and autonomous motivation, β = .11, *p* = .02, *BCa* 95% CI [.02, .24]. SMS performance did not directly predict autonomous motivation, β = .12, *p* = .27, *BCa* 95% CI [-.08, .29], and neither did SAFER leadership, β = .28, *p* = .06, *BCa* 95% CI [-.00, .31]. Contrary to hypothesis 3b, the interaction between SAFER and SMS performance was nonsignificant for autonomous motivation, β = .14, *p* = .51, *BCa* 95% CI [-.02, .05].

Safety Participation

Direct Effects

Autonomous motivation was positively associated with safety participation, β = .22, *p* < .001, *BCa* 95% CI [.18, .42], thereby supporting Hypothesis 2c. Safety control was also positively related to participation, β = .31, *p* < .001, *BCa* 95% CI [.17, .34]. SAFER leadership also positively and significantly predicted safety participation, β = .33, *p* < .001, *BCa* 95% CI [.17, .42]. However, SMS performance did not directly predict safety participation, β = -.06, *p* = .31, *BCa* 95% CI [-.20, .06], which contradicts Hypothesis 1.

Indirect Effects

Contrary to Hypothesis 2d, the indirect relationship through both safety control and autonomous motivation was nonsignificant, β = .01, *p* = .06, *BCa* 95% CI [-.00, .03]. However, the indirect relationship between SMS performance and safety participation through safety control was significant, β = .16, *p* < .001, *BCa* 95% CI [.08, .27], while the indirect relationship through autonomous motivation was not, β = .03, *p* = .28, *BCa* 95% CI [-.03, .09].

Conditional Indirect Effects

Contrary to hypothesis 3c. there was no evidence for of moderated mediation for any of the indirect paths. Although the conditional indirect effect of SMS performance on participation through control was significant, β = -.14, *p* = .05, *BCa* 95% CI [-.04, -.00], upon probing the indirect effect in Haye's process, it was nonsignificant, *BCa* 95% CI [-.01, .02]. The conditional indirect path through autonomous motivation was nonsignificant, β = .03, *p* =.52, *BCa* 95% CI [-.01, .02], and so was the conditional indirect effect through all the mediators, β = -.01, *p* =.14, *BCa* 95% CI [-.00, .00].

Safety Compliance

Direct Effects

In line with Hypothesis 2c, autonomous motivation was positively and significantly associated with compliance, β = .23, *p* < .001, *BCa* 95% CI [.12, .31]. However, contrary to Hypothesis 1, SMS performance did not directly predict safety compliance, β = .24, *p* = .52, *BCa* 95% CI [-.06, .13]. However, SAFER leadership did, β = .13, *p* = .03, *BCa* 95% CI [.00, .13], and so did safety control β = .29, *p* < .001, *BCa* 95% CI [.21, .43].

Indirect Effect

Contrary to Hypothesis 2d, the indirect relationship through both control and autonomous motivation was also nonsignificant, β = .01, *p* =.06, *BCa* 95% CI [-.00, .21]. However, the indirect relationship between SMS performance and safety compliance through safety control was significant, β = .14, *p* < .001, *BCa* 95% CI [.05, .18], but the indirect relationship through autonomous motivation was not, β = .01, *p* = .28, *BCa* 95% CI [-.02, .06].

Conditional Indirect Effects

Contrary to Hypothesis 3c, the conditional indirect effect through all the mediators was nonsignificant, β = -.01, *p* =.14, *BCa* 95% CI [-.00, .00]. The conditional indirect effects SMS

performance on compliance through safety control was nonsignificant, $\beta = -.14$, $p = .052$, *BCa*

95% CI [-.02, .00], and so was the conditional indirect path through autonomous motivation, $\beta =$

$.03$, $p = .52$, *BCa* 95% CI [-.01, .03]. For a summary of hypotheses and results, see Table 3.

Table 3

Summary of Hypothesis Testing

H₁	SMS performance would be directly and positively related to participation and compliance.	Not supported
H₂ₐ	SMS performance would be directly and positively related to safety control.	Supported
H₂ᵦ	Safety control would be directly and positively associated with the measure of autonomous safety motivation.	Supported
H₂c	Autonomous motivation would be directly and positively related to both safety participation and safety compliance.	Supported
H₂d	Safety control and safety motivation would sequentially mediate the relationship between SMS performance and safety compliance and safety participation.	Partially Supported
H₃ₐ	SAFER leadership would moderate the relationship between SMSs and safety control such that the relationship between SMS and safety control would be stronger in instances of strong leadership.	Not Supported
H₃ᵦ	SAFER leadership would moderate the relationship between SMS and autonomous motivation such that the relationship between SMS and autonomous motivation would be stronger in instances of strong leadership.	Not Supported
H₃c	SAFER leadership would moderate the indirect effects of safety control and safety motivation, such that higher SAFER leadership would be associated with stronger effects of the mediators.	Not Supported

Table 4

Coefficients for the Direct and Indirect Model Paths

Predictor	Control		Autonomous Motivation		Participation		Compliance	
	b	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
Direct Effects								
SMS (X)	<u>.36**</u>	.08	.10	.10	<u>-.07</u>	.06	<u>.03</u>	.05
SAFER (W)	.25**	.07	.16	.08	.26*	.04	.07*	.03
Control (M₁)	--	--	<u>.13*</u>	.06	.51**	.07	.32**	.05
Autonomous Motivation (M₂)	--	--	--	--	.30**	.06	<u>.22**</u>	.05
SMS × SAFER	<u>-.04*</u>	.02	.01	.02	--	--	--	--
Indirect Effects								
SMS→Control→Outcome					.18**	.05	.11**	.03
SMS→AM→Outcome					.03	.03	.02	.02
SMS→Control→M→Outcome					<u>.02</u>	.01	<u>.01</u>	.01
Moderated Indirect Effects								
SMS × SAFER→Control→Outcome					<u>-.02*</u>	.00	<u>-.01</u>	.01
SMS × SAFER→AM→Outcome					-.00	.01	-.00	.00
SMS × SAFER→Control→AM→Outcome					<u>-.00</u>	.00	<u>-.00</u>	.00

Note. In addition to the hypothesized relationships (underlined), exploratory findings are also presented. AM: Autonomous Motivation

**p < .001 *p < .05

Discussion

In the present study, the relationships between SMS performance, SAFER leadership, safety control and safety related behaviours were explored. Contrary to what was hypothesized, SAFER leadership was a significant negative moderator of the relationship between SMS performance and safety control. Although SAFER leadership was significantly associated with most variables in the model, contrary to predictions, there was no evidence of moderated mediation. Partial support was generated for the mediation model where safety control was a significant mediator of the relationship between SMS performance and both participation and compliance, but the full mediation model that included autonomous motivation was not significant.

One of the objectives of this research was to explore the role of SAFER leadership and SMSs in influencing individuals' sense of safety control, autonomous motivation, and safety-related behaviours. While previous literature established the role of SAFER leadership as a predictor of safety climate (Serban, 2022), this research sought to determine the extent to which SAFER leadership interacted with SMSs.

Factors Influencing Safety Control

Both SAFER leadership and SMS performance were positively associated with individuals' perceptions of safety control. While this positive relationship between SAFER and control was not explicitly hypothesized in the current model, it is theoretically in line with the literature that suggests that leadership characteristics can either bolster or undermine individuals' perception of control (Sawhney & Cigularov, 2019). Given that organizational policies can also influence control in a variety of ways, such as through task timing, task method and task

boundaries (Wall et al., 1990), it follows that perceptions of SMS performance would be associated with individuals' sense of control.

These main effects were qualified by an interaction where SAFER leadership moderated the relationship between SMS performance and safety control. However, contrary to predictions, the relationship between performance and control was weaker in the presence of SAFER leadership. While both SAFER leadership and SMS performance exert similar effects on perceived safety control, neither interacted in a way that contributed additional value. This relationship between variables could be characterized as a substitution effect (Gardner et al., 2015). In other words, it may be that leadership behaviours are more influential than organizational practices when it comes to the variable of control, meaning that SAFER leadership overshadows the effects of SMS performance. This finding directly contradicts research that indicates safety leadership strengthens the relationship between safety culture and performance outcomes (Asad et al., 2021).

One possible explanation for this finding is that individual experiences of leadership contribute to perceived SMS performance. According to Schein (2010), leadership is a key part of organizational culture as leaders have multiple mechanisms through which they can impact the perceptions of the organization (e.g., how leaders allocate resources). Leadership is critical to how individuals perceive job characteristics such as autonomy (Fernet et al., 2015). Since leader behaviours can shape how individuals experience their work environment, when individuals perceive high levels of SAFER leadership, their perceptions of leadership may overshadow or take precedence over any perceptions of SMS performance.

It should be noted that there was significant overlap between SAFER and SMS performance. A certain amount of overlap is to be expected between these two constructs as

leaders may be directly influential to individual's perceptions of the SMS. There may be some degree of bias where individuals may be interpreting their leaders' enforcement of the SMS as a leadership behaviour rather than an SMS characteristic. Studies that examine leadership characteristics and similar organizational characteristics (e.g., safety climate) demonstrate similar relationships, with strong positive correlations between the two constructs (Birkelend Nielson et al., 2013; Chen & Chen, 2014). Chen and Chen (2014) reported a strong positive relationship between morality leadership and SMS practices ($r = .54$), and Birkelend Nielson and colleagues (2013) reported a similar relationship between authentic leadership and safety climate ($r = .49$). Although this study reported a slightly stronger relationship than the aforementioned research, one possible explanation for the stronger correlation between SAFER leadership and SMS performance is that the measures used were contextualized to safety contexts.

Factors Influencing Autonomous Motivation

In line with the predictions, safety control was positively associated with autonomous motivation. This could be due to the measure of safety control reflecting a sense of self-efficacy. Perceptions of self-efficacy and motivation are intrinsically linked such that when individuals feel as though they are able to perform an action, they are more likely to do so (Schwarzer, 2014). When individuals have a higher sense of control, they may experience higher levels of autonomous motivation.

It should be noted that unlike with safety control, autonomous motivation was not significantly associated with SAFER leadership or SMS performance. While this study did not specify any predictions in regards to this finding, this finding is particularly interesting given that various forms of leadership, such as transformational leadership, are often positively associated

with intrinsic motivation (Xue et al., 2022). This finding is likely due to the experience of motivation being qualitatively different than the experience of perceived safety control.

Control and autonomous motivation have key differences as internal processes. Autonomous motivation is thought to be more trait-like than state-like (Wasserman & Wasserman, 2020), while control is more state-like (Conner & Norman, 2022). A trait differs from a state in the sense that a trait describes a general tendency to act a certain way, while a state is more context specific (Wasserman & Wasserman, 2020). Thus, SAFER leadership and SMS performance may not impact the trait-like nature of autonomous motivation as it is a more deeply ingrained internal process than control.

These findings could suggest that the relationship between autonomous motivation and SAFER and SMS may be indirect through safety control. Organizational policies would not impact motivation in the same way they would impact control. Organizations can create policies that directly impact a sense of control (e.g., by limiting autonomy; Wall et al., 1990); however, the impact of organizational policies would only indirectly impact sense of motivation (e.g., through increasing sense of safety control). These findings suggest that when trying to increase motivation, it may be more effective to use strategies that increase individuals' sense of control rather than through general leadership strategies.

Factors Impacting Participation and Compliance

Besides the moderating effect of SAFER leadership on the relationship between SMS performance and safety control, contrary to the hypotheses, SAFER leadership did not moderate any potential mediation paths in the model. While there are many possibilities to explain why moderated mediation did not occur, it could be due to the relationship between SMS performance and leadership. Perceptions of organizational culture and leadership are closely

linked (Schein, 2010). It may be that there is a "halo effect", where a positive vision of the leader resulted in a positive vision of the organization. It may be that participants could not separate perceptions of SMS performance with SAFER leadership.

Although there was no evidence of moderated mediation for safety participation and safety compliance, safety control mediated the relationship between SMS performance and both compliance and participation. This finding is supported by literature that suggests that safety control mediates the relationship between safety climate and safety-related outcomes (Huang et al., 2006). One explanation for this finding is that safety control may be contributing to an unmeasured variable in this study: empowerment.

Empowerment is rooted in feelings of power and autonomy (Rowlands, 1995); therefore, perceiving a sense of control may empower individuals to act safely. This idea is supported by literature that suggests that perceptions of control may be a source for feelings of empowerment (Keller & Dansereau, 1995). This finding is especially relevant given that empowerment is a strong predictor of injury rates in the workplace. In a study by Turner and colleagues (2021), researchers found that empowerment was the best predictor of injury rates within an organization, even after controlling for other organizational practices. If safety control is a source of empowerment, it could be an explanation for the positive relationship between safety control and safety-related behaviours.

Limitations

There are several key limitations that should be noted. This study relied on self-report data, which is limited as it only draws on the perceptions of one individual. There is the potential that individuals' perceptions are vulnerable to biases (e.g., the halo effect). In particular, for the variable of SMS performance, it focused on perceived organizational safety performance rather

than organizational practices. Although there are benefits to this approach, it may not provide a full understanding of the SMS. While perceived SMS performance is useful, it would be helpful to examine if perceived practices differ from actual practices. Therefore, future studies should seek to gather data from a variety of sources, such as observer reports and organizational data.

It should also be noted that there was significant overlap between SAFER and SMS performance, suggesting that common method bias may be a concern. This overlap was investigated further with Harman's single factor test (Harman, 1960) which indicated that the two constructs shared 51% of variance. While this surpasses the common heuristic of 50%, this analysis assumes a single source of bias contributing to the variance and does not consider the correlation between the two constructs. Moreover, in reality, many sources of bias exist, which calls into question the significance of common method variance (Spector, 2006). It should be noted that there is an expected amount of overlap between these two constructs. Leaders may be directly influential to individuals' perceptions of the SMS, as individuals may be interpreting their leaders' enforcement of the SMS as a leadership behaviour rather than an SMS characteristic. Moreover, the mere existence of the interaction between SMS performance and SAFER suggests that the constructs are distinct enough to meaningfully interact with each other.

This research looked at safety-related behaviours rather than safety outcomes or accident history. While safety participation and safety compliance are both considered related to injuries in the workplace (Clarke, 2006), they are not necessarily substitutes for injury data. However, the benefits of using safety-related behaviours outweigh the drawbacks. While it is well documented that injuries are often under-reported in the workplace, even self-report data can have its challenges. Namely, individuals' ability to recall injuries, especially minor ones, is poor and diminishes over time (Lovalekr et al., 2017; Moshiro et al., 2005). Given the time interval

specified in this study was two months, the longer recall period could have exacerbated this limitation. Moreover, more common injuries and incidents such as strains and repetitive lifting are not always acute events; musculoskeletal injuries can be chronic and occur over time (CCOHS, 2023). However, in the future, researchers should consider using longitudinal data with shorter time intervals to maximize recall accuracy (e.g., daily diary studies) and take care to differentiate between acute and chronic injuries.

Finally, the results of this study may not be entirely generalizable to the population. Participants were recruited off Prolific. Prolific users do not necessarily represent an accurate representation of the population as they differ in several ways. For example, participants from Prolific are more highly educated than the average population (Peer et al., 2017). This is especially relevant to this study given that education may impact the career workers pursue (Iverson & Erwin, 1997). Moreover, job characteristics were not considered in this study which may have impacted the findings. For instance, whether individuals were working remotely or not was not a variable that was considered in this study which may impact prevalence or the nature of injuries individuals experience at work. For instance, remote work has been associated with an increase in musculoskeletal injuries (Dos Santos et al., 2021). While participants were recruited from a variety of industries, it is still possible that the sample is skewed in some manner.

Theoretical and Practical Contributions

Despite these limitations, this thesis contributes to the literature in several ways. Firstly, it contributes to the sparse literature on safety control. Most of the literature on safety control focuses on the impact it has on injury rates (Huang et al., 2006) or general safety performance (Snyder et al., 2016). This research examined safety control's association with safety-related behaviours. More specifically, it focused on both safety compliance and safety participation.

These behaviours tap into qualitatively different aspects of safety-related behaviours, with compliance reflecting compulsory behaviours and participation reflecting voluntary behaviours.

The findings of this research suggest that control may be a key factor in proactive safety behaviours. While it may seem counterintuitive to increase individuals' sense of perceived control in the workplace, considering that safety management principles often seek to impose strict rules and regulations in an attempt to prevent human error (Grote, 2020), bolstering a sense of control may help improve safety outcomes. Research posits that autonomy in the workplace is associated with improved safety compliance and lower accident rates (Turner et al., 2021; Zacharatos et al., 2005). Given the broad range of benefits that increased autonomy and perceived control can have in the workplace, organizations should begin looking into how they may bolster these feelings while maintaining high levels of safety performance.

In addition to novel findings related to safety control, this research also contributes to the literature on SAFER leadership. SAFER was significantly associated with all variables in this study, indicating that the measure is tapping into leadership behaviours that are pertinent to subordinates' perceptions of control and behavioural intentions. SAFER leadership training may be useful for organizations to not only impact safety related behaviours, but also perceptions of safety control. While there are limited empirical studies on the impact of SAFER-based training programs, current research has found SAFER-based training to be very effective in improving safety leadership (Kelloway & Mullen, 2016). Given that perceptions of SAFER leadership may overshadow perceptions of organizational performance, future research should attempt to further determine the extent to which SAFER leadership impacts other safety-related behaviours and outcomes.

Conclusion

Overall, this research contributes to the field of occupational safety by providing insight into how both contextual and personal characteristics impact safety-related behaviours in the workplace. Most notably, it presents novel findings on the effect of safety control on safety-related outcomes. Additionally, this research further supports the utility of SAFER leadership as a predictor of safety-related outcomes. This research also provides novel contributions to the role of safety control and autonomous motivation in promoting safety-related behaviours. Despite these findings, more research is ultimately needed to further understand how contextual factors like leadership and SMS performance interact with individual characteristics to influence safety-related behaviours in the workplace.

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Appendix

Demographics

Exclusion Criteria (Forced-Choice)

1. Are you 18 years or older?

   a. *Yes*

   b. *No (Redirected to thank-you page)*

2. Have you been employed for the last two months or longer?

   a. *Yes*

   b. *No (Redirected to thank-you page)*

Additional Demographics

1. What country do you primarily reside in?

   a. Canada

   b. USA

   c. Other

2. What country do you primarily work in?

   a. Canada

   b. USA

   c. Other

3. How long have you been employed for? Please enter your tenure in whole numbers (e.g.,

   1 *year 8 months*).

   a. _____ *years* _____ *months*

4. What is your age? Please enter your age in whole numbers (e.g., 32)

   b. _____ *years*

5. What gender do you identify as?

    c. Male

    d. Female

    e. Non-binary

    f. Transgender

    g. Other

    h. Prefer not to answer

6. How would you describe your ethnic background?

    i. White (e.g., German, Irish, English, Italian, Polish, French, etc.)

    j. Hispanic or Spanish origin (e.g., Latinx, Mexican, Cuban, etc.)

    k. Black (e.g., African American, Jamaican, Haitian, Nigerian, Somalian, etc.)

    l. Asian (e.g., Chinese, Filipino, Vietnamese, Korean, Japanese, etc.)

    m. North American Indigenous (e.g., Mi'kmaq, Maliseet, Cree, Innu, etc.)

    n. Middle Eastern or North African (e.g., Lebanese, Iranian, etc.)

    o. Pacific Islander (e.g., Native Hawaiian, Samoan, Fijian, etc.)

    p. Some other ethnicities or origins

7. What level of education have you completed?

    q. Less than grade 12

    r. Grade 12

    s. Some college or university

    t. Completed college or university (i.e., bachelor's degree)

    u. Master's degree

    v. Doctoral degree

   w. Other

 8. What industry do you work in?

   x. Goods-producing sector (e.g., agriculture, forestry, fishing, mining, oil & gas, hunting, trapping)

   y. Utilities

   z. Construction

   aa. Manufacturing

   bb. Services-producing sector (e.g., retail)

   cc. Transportation

   dd. Finance, insurance, real estate, rentals, and leasing

   ee. Professional, scientific, and technical services

   ff. Business, building and other support services (e.g., administration)

   gg. Education

   hh. Healthcare and social assistance

   ii. Information, culture, arts, and recreation

   jj. Accommodation and food services

   kk. Public administration

   ll. Other.

Accident History

Occupational Injury

Please indicate the number of times you have experienced each type of injury you have experienced at work in the last two months.

 _ Fractures

_ Head injuries (e.g., concussion, etc.)

_ Bruises/crushing

_ Sprains, strain, or dislocation (e.g., back injuries, repetitive strain injuries)

_ Cuts or puncture (e.g., needle pricks, etc.)

_ Injuries resulting from exposure to chemicals or other hazards (e.g., burns, scalds, etc.)

_ Open wound

_ Eye injury

_ Other (Please Specify): _____

Occupational Incidents

In the last two months, please indicate the number of times you have experienced the following incidents at work:

_ Slip, trip or fall

_ Struck by/against an object (e.g., tools, machinery, vehicles)

_ Overexertion (e.g., lifting objects that are too heavy)

_ Repetitive strain

_ Electrical contact

_ Exposure to hazardous material (e.g., fire, chemical, loud noises)

_ Violence (e.g., biting, scratching, hitting, etc.)

_ Other

Other Incident Related Questions

1. If you experienced any injury at work, did you report it?

    a. *Yes*

    b. *No*

c. *I did not experience an injury at work in the last two months*

2. How common do injuries occur in your workplace?

1	2	3	4	5
Never	Rarely	Sometimes	Often	Regularly

Attention Check (to be dispersed throughout the survey).

1. Please select strongly disagree.

2. Please select strongly agree.

3. Please select neutral.

Safety Attitudes

In the last two months, please indicate the extent to which you have felt the following…

1	2	3	4	5
Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree

Safety Participation (Neal et al., 2000).

1. I promote the safety program within the organization

2. I put in extra effort to improve the safety of the workplace

3. I voluntarily carry out tasks or activities that help to improve workplace safety

Safety Compliance (Neal et al., 2000).

1. I use all the necessary safety equipment to do my job

2. I use the correct safety procedures for carrying out my job

3. I ensure the highest levels of safety when I carry out my job

Safety Control (Snyder et al., 2011)

1. I am able to change unsafe practices at work.

2. I am able to modify work conditions in order to make them safer.

3. I am capable of taking action to prevent injuries or accidents to myself at work.

4. I am able to change the unsafe behavior of others at work.

5. My job allows me to control whether I am safe at work.

6. I have control over whether I use safety equipment (e.g., protective eyewear).

7. I have control over whether or not I engage in safe work behaviors.

Safety motivation (Scott et al., 2014)

Why do you work safely?

1	2	3	4	5
Not at all for this				Exactly for this
reason				reason

1. Because I risk losing my job if I don't

2. In order to avoid being criticized by others (e.g., supervisor, colleagues, family, clients)

3. In order to get a reward

4. Because other people (e.g., supervisor, colleagues, family, client) pressure me to work safely

5. Because otherwise I will feel guilty

6. Because I feel bad about myself when I don't work safely

7. Because I would be ashamed of myself if I didn't work safely

8. Because I personally value safety

9. Because I value working in a safe environment

10. Because putting effort into working safely is important to me

11. Because I believe it is important to put effort into working safely

12. Because I enjoy working safely

13. Because safety interests me

14. Because I take pleasure in working safely

Organization Related Measures

Organizational Performance Metric (IWH, 2016)

Please answer the questions in regard to the percentage of time that each practice takes place in your workplace.

0	1	2	3	4
0%-20%	20%-40	40%-60%	60%-80%	80%-100%

1. Formal safety audits at regular intervals are a normal part of our business.

2. Everyone at this organization values ongoing safety improvement in this organization.

3. This organization considers safety at least as important as production and quality in the way work is done.

4. Workers and supervisors have the information they need to work safely.

5. Employees are always involved in decisions affecting their health and safety.

6. Those in charge safety have the authority to make the changes they have identified as necessary.

7. Those who act safety receive positive recognition.

8. Everyone has the tools and/or equipment they need to complete their work safely.

Safety Climate (Kelloway & Calnan, 2014)

Please indicate your level of agreement or disagreement with the statements below regarding safety at your organization.

1	2	3	4	5
Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree

1. My coworkers value their own safety

2. My coworkers believe safety is a top priority

3. My coworkers believe in working safely

4. My coworkers look out for each other's safety

5. My coworkers always wear their safety equipment

6. My coworkers always work as safely as possible

7. My supervisor emphasizes the importance of safety on a routine basis

8. My supervisor enforces all safety policies and practices

9. My supervisor always acts in a safe manner while on the job

10. My supervisor prioritizes safety above all else

11. My supervisor motivates me to work safely

12. My supervisor is a good safety role model

13. There is an effective health and safety committee at the workplace

14. Incidents are always reported

15. All reported incidents are formally documented

16. Internal health and safety inspections are done on a routine basis

17. Safety issues are dealt with effectively in my workplace

18. I have access to all of the health and safety resources that I need

Leadership Related Measures

In the last two months, indicate how frequently your direct supervisor demonstrated the

following behavior…

1	2	3	4	5	6	7
Never	Rarely	Occasionally	Sometimes	Frequently	Usually	Always

S.A.F.E.R Leadership Scale (Ozbilir, 2021)

My supervisor…

1. Talks about safety related problems at work

 2. Talks about how to prevent accidents

3. Communicates a positive vision of workplace safety

4. Complies with the safety protocols he/she describes

5. Pays attention to safety rules and regulations

6. Practices what he/she preaches when it comes to safety

7. Demonstrates a commitment to a safe workplace

8. Monitors for any unsafe actions

9. Motivates employees to be safe

10. Encourages employees to suggest new ways to improve safety

11. Asks employees to share their perspectives on safety

12. Encourages employees to report any challenges related to safety

13. Praises employees when they are being safe

14. Recognizes employees who perform their jobs safely

15. Praises employees who prioritize safety

Safety-specific Transformational Leadership (Barling, Kelloway & Loughlin, 2002)

In the last two months, please rate the extent your direct supervisor performed these behaviours at work.

1	2	3	4	5
Never	Rarely	Sometimes	Often	All of the time

1. Expresses satisfaction when I perform my job safely

2. Makes sure that we receive appropriate rewards for achieving safety targets on the job

3. Provides continuous encouragement to do our jobs safely

4. Shows determination to maintain a safe work environment

5. Suggests new ways of doing our jobs more safely

6. Encourages me to express my ideas and opinion about safety at work

7. Talks about his/her values and beliefs of the importance of safety

8. Behaves in a way that displays a commitment to a safe workplace

9. Spends time showing me the safest way to do things at work

10. Would listen to my concerns about safety on the job

Safety-specific passive leadership (Kelloway, Mullen, & Francis, 2006)

1. Avoids making decisions that affect safety on the job.

2. Fails to intervene until safety problems become serious.

3. Waits for things to go wrong before taking action.