# 1

# The Psychology of Occupational Safety and Workplace health

Sharon Clarke, Tahira M. Probst, Frank Guldenmund, and Jonathan Passmore



Occupational health and safety remains a critical issue for academics and practitioners alike, given the impact that occupational accidents and work-related ill-health has on individuals, families, organizations, and societies worldwide. Despite the significant advances that have been made in disciplines such as occupational health psychology, safety science, and industrial ergonomics, workplace fatalities and deaths resulting from work-related diseases remain a global issue. The International Labour Organization (ILO, 2014) estimates that over 2.3 million fatalities are caused by occupational accidents and work-related diseases per annum; in addition, occupational injuries (requiring absence of three days or more from work) result from over 313 million non-fatal occupational accidents each year. Given the significant proportion of our lives that we spend working, research and practice into occupational safety and workplace health and well-being can also provide insight into ways in which the world of work can have positive benefits, in terms of satisfaction, challenge, and achievement.

This edited volume takes an integrative approach to health and safety in organizations, bringing together a collection of chapters from renowned contributors. Their fields of expertise range from personality and individual differences to risk management at a societal level. We examine key topics in the health and safety literature, both from the specific perspective of occupational safety (e.g., personality, social norms, and leadership) and workplace health and well-being (e.g., job demands, long work hours, and workplace aggression), and also from a consideration of the intersection of these two areas (e.g., safety workarounds and organizational climate). The first two parts of this volume consider those factors that influence occupational health and safety and the subsequent challenges; in the third part, we examine the practical implications for individuals and organizations, with a particular focus on the design and implementation of interventions

*The Wiley Blackwell Handbook of the Psychology of Occupational Safety and Workplace Health*, First Edition. Edited by Sharon Clarke, Tahira M. Probst, Frank Guldenmund, and Jonathan Passmore.  Published 2020 by John Wiley & Sons Ltd.

in organizations, and the broader context within which such interventions take place. Interventions are examined from a variety of perspectives, from the micro level (e.g., behavioral safety and training) through to a macro-level approach (e.g., psychosocial safety climate and organizational culture). In this part, we explore the challenges of managing health and safety in safety-critical environments (e.g., patient safety culture) and the wider context of the risk society.

The first part focuses on occupational safety. Traditionally, research and practice in occupational safety has been dominated by technical, engineering, and human factors approaches. In this volume, we examine the influences on occupational safety from a psychological perspective, considering factors at an individual, team, job, and organizational level that impact upon the work environment and employees' behavior. Recent research in this area has highlighted the importance of the psychological perspective and emphasized the range of factors that influence workplace safety (e.g., Clarke, 2010; Nahrgang, Morgeson, & Hofmann, 2011). This section comprises six chapters, which explore the following topics: personality and individual differences; behavior as a mediator of personality on safety outcomes; role of social norms at group level; safety leadership; role of coworker and leader trust; job design and safety behavior.

In Chapter 2, Smith, Jordan, and Wallace discuss how personality and other individual differences (e.g., cognition, age, and experience) influence an employee's ability to respond to organizational hazards. They provide a historical overview, from the early conceptualization of "accident proneness" (Greenwood & Woods, 1919), to the Big Five personality characteristics (Costa & McCrae, 1992) and their ability to predict safety behavior and safety outcomes, including accidents and injuries. Although a useful typology, Smith et al. discuss personality traits that fall outside of the Big Five, such as those comprising core self-evaluations (self-esteem, generalized self-efficacy, locus of control, and emotional stability; Judge, Locke, & Durham, 1997). They extend the discussion to consider the role of self-regulation, focusing on regulatory focus as a dual-path motivational phenomenon (Higgins, 1997) in which individuals tend to approach or avoid outcomes by applying promotion or prevention strategies; those who have a greater tendency toward prevention strategies also tend to have higher scores on safety performance. Their review is suggestive of motivational mechanisms underlying safety performance (a theme which is picked up repeatedly in the following chapters). A number of individual differences not only affect the safety-related behavior that people engage in, but also their ability to cope with stressors (e.g., hardiness). The chapter highlights how age and experience influence accident liability (e.g., a lack of "know-how" makes younger workers particularly vulnerable) and type of job (e.g., level of cognitive or physical demands) interacts with individual differences (e.g., physiological and psychological factors) to influence safety behavior and accident liability. Smith et al. emphasize the role of "mindfulness" as important but understudied in relation to safety (another theme which will reappear in later chapters of this volume).

In Chapter 3, Foster and Nichols consider the mediating effects of behavior on the relationship between personality and workplace safety. The chapter focuses on the complexities of this relationship, and considers how multiple personality traits and combinations of traits (including sub-facets of the Big Five) best predict safety-related behavior. They explore how different patterns of traits are associated with different behaviors, including a detailed examination of the six safety-related behaviors identified by Hogan and Foster (2013) as critical to a high level of safety performance and how personality relates to these behaviors. While some facets are important predictors of safety behaviors, others are essentially irrelevant. There are a number of underlying psychological mechanisms by which personality can influence safety, including its influence on individuals' response to stress

(as discussed in Part II of this volume). Based on their review, Foster and Nichols discuss how individual differences in personality should be taken into account in relation to the design and delivery of safety training (as discussed further in Part III of this volume). Although the authors have focused on safety in this chapter, they also highlight implications for the design of tailored interventions aimed at improving health and well-being: in terms of individual participation in health programs, such as health screening (see also Chapter 17 on Workplace Health Promotion in Part III).

Although individual-level factors have an important influence on employee behavior, this behavior takes place within a social and organizational context. Social psychological theories emphasize the importance of understanding this context as one cannot fully understand behavior, without consideration of the social context (Johns, 2006). In most organizational settings, this comprises coworkers, supervisors, and managers, each of whom has an influence on individuals' behavior. The following chapters consider the effects of the social context on safety behavior, in terms of social norms, leadership, and the role of interpersonal trust.

In Chapter 4, Silva and Fugas consider the influence of peer norms on safety and health at work. Whereas the previous two chapters in this part take the individual as the primary unit of analysis, in this chapter we shift to consider the group. Silva and Fugas draw on social and organizational psychology to discuss social influence, in terms of the subjective norms or pressure that people perceive from important others to exhibit, or not exhibit, a specific behavior. They distinguish between two types of norm – those that are descriptive (reflecting what is commonly done) and injunctive (reflecting what is approved/disapproved). There are affective and cognitive motivations for perceiving that one has to conform to group behavior. The reference groups are those that are psychologically significant to the individual's attitudes and behaviors. Silva and Fugas also discuss the difference between local norms and global norms, where the former are more proximal. It is important to understand the role of coworker norms not only in relation to occupational safety, but also workplace health and well-being. This chapter discusses the influence of social norms on a range of risk behaviors that affect health and safety, such as healthy eating, smoking, and risky driving behaviors. The authors review the empirical research, which has shown that coworkers' descriptive safety norms are a major differentiating variable in proactive safety behaviors. Coworkers' norms play a critical role in risk perception and management, determining which behaviors are safe or unsafe, and reinforcing those behaviors.

In Chapter 5, Wong, Kelloway, and Makhan focus on the role of supervisors and managers on employee safety behavior. They review the research evidence, which shows that leaders have a significant influence on workplace safety, and examine the effects of different leadership styles on safety outcomes, especially transformational leadership style (Bass, 1985). In addition, Wong et al. discuss the role of active transactional leadership as a positive influence in relation to safety (due to the increased emphasis on monitoring compliance and correcting errors before they lead to safety incidents); other complementary models of leadership, such as "empowering leadership" (a style of leadership associated with psychological empowerment; Martínez-Córcoles et al., 2011) which focuses on the role of leaders developing self-management skills in their subordinates; and the role of leader–member exchange (LMX) where a high LMX relationship between leader and subordinate facilitates the influence of leaders on employee safety behaviors. Wong et al. discuss mediating and moderating influences on how leadership impacts on occupational safety behavior, including safety climate, perceived organizational support, role stressors, and individual-level factors of trust and motivation. In terms of practical implications, the authors introduce the SAFER model of safety leadership, which provides explicit guidance in terms of leader behaviors.

In Chapter 6, Conchie, Woodcock, and Taylor discuss the importance of interpersonal trust in the creation of a safe work environment. They highlight that trust is important in increasing employee engagement in safety, willingness to comply with management requests, and propensity to take the initiative. Trust may also be misplaced and actually detract from the critical vigilance required for high levels of safety performance. In their review of the research evidence, Conchie et al. discuss trust as a mechanism for facilitating the effects of a transformational leader on employee behaviors, leading to employees engaging in safety-related behavior. They extend their discussion by considering not only trust in the leader, but also the employee being trusted by the leader. Trust is related to aspects of safety culture, such as open communication and organizational learning; a lack of trust can create a climate of blame and fear, which leads employees to be concerned about "covering their backs" and stifles organizational learning. They highlight the "fragility" of trust and the difficulties associated with rebuilding trust. Furthermore, Conchie et al. discuss strategies for rebuilding trust and their relative effectiveness in different circumstances.

In the final chapter of this part, we examine the influence of job-related and organizational factors on safety behavior. In Chapter 7, Chmiel and Hansez examine these broader contextual factors with particular reference to their influence on violations and errors. Reason's (1990) classification of human error, captures both unintentional actions (slips, lapses, and mistakes) and intentional deviations from safety procedures (violations); both types of unsafe act are associated with accident involvement and occupational injuries. The authors use the General Accident Case Scenario (Wagenaar, Hudson, & Reason, 1990) to illustrate how errors and violations relate to accident involvement and extend their discussion to consider the underlying psychological processes involved. In terms of antecedents, Chmiel and Hansez discuss General Failure Types (GFTs) as precursors of accidents and which fall into three categories: Physical environment; Human behavior; and Management. The effects of organizational and job related factors are mediated by psychological processes, including energy depletion (such as burnout), motivational processes (such as work engagement), instrumental processes, and social exchange. They argue that different types of behavior have different antecedents and psychological processes linking them.

The second part focuses on workplace health and well-being. Within the field of occupational health psychology, theories of occupational stress and the impact of stress on employees' health and well-being, constitutes a major area of research. The first chapter in this part (Taris & Schaufeli) focuses on one of most influential frameworks, the Job Demands-Resources (JDR) model (Demerouti et al., 2001), which conceptualizes job demands and job resources within the work environment, and how these factors affect health and well-being over time. Other stress theories are drawn upon to discuss the effects on health and well-being in this part; the chapter by Nielsen et al. draws on the transactional model of stress (Lazarus & Folkman, 1984) to examine the effects of workplace aggression, and chapters by Cangiano and Parker, and Halbesleben and Bellairs, both draw on conservation of resources (COR) theory (Hobfoll, 1989) to examine the effects of proactivity and safety workarounds respectively. In this part we address some of the contemporary challenges in the workplace that have an impact on health and well-being, including long work hours (O'Driscoll & Roche) and workplace aggression (Nielsen et al.). Although certain demands within the workplace can act to erode physical and psychological well-being, individual differences in how employees manage their jobs will also impact their health; for example, those who are more proactive tend to "craft" their jobs, with proactivity having the potential to both improve and damage health (as discussed by Cangiano & Parker).

In Chapter 8, Taris and Schaufeli provide a review of the research conducted in relation to the JDR framework, which links job demands and job resources to health, well-being, and other outcomes. The initial focus of the model was on burnout, but it has been extended to consider further outcome variables; there is empirical evidence to support the relationships predicted by the model in relation to burnout, such that high job demands are associated with high levels of fatigue and exhaustion, and lack of resources associated with withdrawal. The model was later revised to extend outcomes from the specific concept of burnout to strain more generally. Later development of the model also recognized that in relation to interactions between job demands and job resources, these may be mediated by a variety of different pathways, in contrast to the two specific pathways (strain and motivation) which mediated the main effects of job demands and job resources, respectively. In their review, Taris and Schaufeli note that although most empirical evidence is drawn from self-report cross-sectional data, more recently longitudinal studies have also provided support for the assumptions of the revised JDR model; however, they also highlight that over longer time periods where there is long-term stability in some variables, such as work engagement and job resources, the expected results have not been consistently demonstrated. The chapter discusses other extensions of the model, such as the inclusion of personal resources, as well as job resources; that is, extending the model to include individual-level factors, as well as environmental factors. Personal resources relate to resilience and the ability to impact upon the environment. Taris and Schaufeli discuss the different ways of incorporating personal resources into the JDR model including as a potential confound (as personal resources are related to both work characteristics and work outcomes). Finally, the chapter provides some practical discussion of how the JDR model can be used as the theoretical basis for interventions in organizations, and also the development of individual-level strategies to improve the content of one's job to make it more interesting and enjoyable (such as job crafting, Wrzesniewski & Dutton, 2001).

In Chapter 9, O'Driscoll and Roche discuss the relationship between work hours and well-being. They consider not only how many hours are spent working, but also how work is done. In their review of the research evidence, they highlight that there is no simple relationship between work hours and well-being, but a complex relationship, which can be mitigated by a number of factors. They note that there is an overall global trend toward working longer hours. Physical health may be affected as longer work hours mean greater exposure to job demands, reduced time available for recovery, as well as activities that contribute to a healthy lifestyle, such as fitness and exercise. Indeed, O'Driscoll and Roche highlight that research evidence suggests a significant association between long work hours and a variety of health symptoms and increased risk of developing serious health problems; although buffering effects come from control over work hours and social support. O'Driscoll and Roche also consider how changes in technology have affected our working lives, and so our health and well-being. For example, mobile technology may allow increases in autonomy and flexibility, but also allows more work to be undertaken in non-work hours, leading to the blurring of work and non-work boundaries. In addition, working in virtual teams across time zones can lead to negative health effects. The chapter discusses ways of coping with the effects of long work hours, including job crafting and mindfulness.

In Chapter 10, the impact of exposure to workplace aggression on health and well-being is discussed by Nielsen, Hoel, Zapf, and Einarsen. The chapter focuses on workplace aggression, defined in terms of experienced or enacted negative behaviors, rather than the intention to cause harm, which is often difficult to identify. This applies to psychological aggression, which includes abusive supervision, incivility, bullying, and social

undermining. Nielsen et al. review a robust body of research evidence which suggests that exposure to workplace aggression leads to short-term experience of stress emotions, and in the longer term, to negative effects on health and well-being, including anxiety, depression, burnout, and physical symptoms. As mental health issues can also act as an antecedent of exposure to aggression, this can lead to a negative cycle of ongoing health problems. Nielsen et al. extend their discussion by considering mediating and moderating effects on the relationship between workplace aggression and health, including state negative affect and perceived victimization at an individual level, and perceived justice at an organizational context. Moderating variables examined include: individual characteristics and personality (such as core self-evaluations), coping strategies, and job resources (such as social support and leadership).

In Chapter 11, Cangiano and Parker consider proactivity, where employees undertake self-initiated and future oriented actions to change and improve themselves or their work environment. The chapter focuses specifically on the relationship between proactivity and health. Cangiano and Parker describe proactive behavior as anticipating and taking control of the situation; thus, it is a way of behaving rather than a set of behaviors. The underpinnings of proactivity are motivational: linking to both self-determination theory (Ryan & Deci, 2000) and the motivation to develop autonomy, competence, and relatedness; and also broaden-and-build theory (Fredrickson, 2001) and the motivation of positive energized feelings, vigor, and work engagement. Cangiano and Parker develop and discuss a model that considers both the potential benefits and costs of proactivity in terms of individual health and well-being, via two pathways, one motivational and the other resource-depletion. They argue that the first pathway can lead to a positive gain spiral, which enhances resilience and ability to cope with stressors, leading to better health and well-being; however, the second pathway may lead to depletion of resources, resistance from supervisors and coworkers, and destructive criticism which erodes self-efficacy. Cangiano and Parker extend their model through the consideration of the moderating role of feedback and extrinsic motivation. From an organizational perspective, proactive employees need to be supported in order to avoid potential negative impacts on health and well-being.

Most research on the JDR model has focused on outcomes related to employee health and well-being, but the model has also been considered as a framework for understanding occupational safety (Nahrgang et al., 2011). Although the relationship between occupational safety and employee well-being is rarely examined, the chapter by Halbesleben and Bellairs considers one psychological mechanism (safety workarounds) underlying the relationship between burnout and safety outcomes. At an organizational level, both health and safety outcomes share common antecedents, in terms of organizational structure and climate. The chapter by Guediri and Griffin considers organizational climate in relation to occupational health, safety and well-being, including a discussion of facet-specific climates and how these climates relate to each other.

Previous chapters in this part have considered some of the major job and individual-level factors that act as antecedents to workplace health and well-being, and the psychological mechanisms involved in this relationship. In Chapter 12, Halbesleben and Bellairs consider the behavioral impact of employee well-being on occupational safety. The chapter reviews the research that has linked exposure to work stressors directly to accidents and injuries, and also indirectly via negative health and well-being. Halbesleben and Bellairs develop a model that highlights two pathways for linking well-being to safety behavior – one motivational pathway and one health-impairment pathway. The chapter focuses on safety workarounds as the behavioral mediator between employee well-being and safety outcomes. Workarounds, which involve working in a way that was not originally designed

or intended, can have both positive and negative consequences. Organizational antecedents relate to HRM issues, such as staffing and individual-level factors also play a role, particularly self-efficacy. Halbesleben and Bellairs suggest that a loss spiral may develop over time, as the experience of work injuries leads to a decline in health and well-being, which in turn increases vulnerability to injuries.

Chapter 13 by Guediri and Griffin broadens the discussion by considering the role of organizational factors and their influence on health and safety in the workplace. Organizational climate is defined as a summary profile of formal and informal policies, practices and procedures; it reflects the "atmosphere" within an organization. Guediri and Griffin discuss the need to integrate micro and macro approaches to health and well-being. Organizational climate is related to employee well-being, with the research evidence suggesting that leadership and job-related aspects of climate are most strongly associated. The chapter highlights a number of specific climates that have been linked to health and well-being, and the role of strategic climates, and whether these can come into conflict. Guediri and Griffin also consider the role of organizational climate in relation to safety, and differentiate between safety culture and safety climate. With a focus on the latter, they discuss the development of this concept, including the research work on measurement, and stability across samples and over time. They review the research evidence that safety climate acts as a leading indicator; with longitudinal studies demonstrating the effects of safety climate on safety outcomes, particularly at a group level. The chapter also reviews research that integrates occupational health and safety variables.

The third and final part picks up on the challenges discussed in the preceding two sections, which consider some of the most significant factors that influence health and safety in organizations. In Part III we consider the different approaches that are adopted for the design and implementation of interventions. These may be implemented at an individual level, by targeting workplace behavior. The first chapter (Geller & Robinson) in this part discusses behavioral safety, which is a specific approach based on reinforcement theory; the second chapter (Burke & Smith Sockbeson) examines safety training, which aims to improve knowledge and motivation, and so behavior. Both of these approaches tackle the direct antecedent of accidents and injuries at work – the behavior of employees "at the sharp end." Behavioral safety and safety training remain the most popular interventions undertaken by companies to improve organizational safety performance. Another point of leverage is at group level; given the discussion on social context and importance of relationship with supervisor, Luria looks at group-level safety climate and supervisor interventions. A large number of interventions have been developed to improve workplace health and well-being – these range from those targeted at changing specific behaviors (e.g., physical exercise, stress management) to those that aim to remove stressors from the workplace (e.g., job redesign). The chapter on workplace health promotion (Day & Helson) considers interventions that target individual behavior, as well as contextual factors. A broad approach that addresses the role of managerial and organizational factors is discussed in relation to concept of "psychosocial safety climate" (Zadow & Dollard).

In Chapter 14, Geller and Robinson discuss behavioral safety as a means for improving occupational safety in organizations. This approach is based on the principles of applied behavioral science, which relate to the work of the behavioral psychologist, B.F. Skinner. The chapter provides an overview of research and practice in the area of behavior-based safety (BBS). The authors discuss the BBS approach to improving safety, where the focus is on changing specific behaviors, so that unsafe behaviors are replaced with safe ones. Internal states, such as attitudes and beliefs, are not the target of the intervention, but

often change in line with behaviors. Although the focus is on changing behavior, the methodology of behavioral analysis can be used to identify factors influencing behavior in the work environment, including managerial and organizational factors. The chapter discusses examples of the effective use of BBS as a safety intervention and the challenges of maintaining behavioral change in the long-term.

Chapter 15 (Burke & Smith Sockbeson) reviews safety training interventions, most of which are designed to change safety knowledge and/or safety motivation, in order to change subsequent behavior (often defined in terms of compliance and participation). The chapter discusses the effectiveness of training across different outcomes (knowledge, motivation, performance) and types of delivery (more and less engaging). Although there is a smaller evidence base, Burke and Smith Sockbeson also consider the effectiveness of training in terms of health and safety outcomes. In an extension of their discussion, they examine moderators of the relationship between safety training and safety-related outcomes, including unit level safety climate, and broader aspects of culture. The implications for the design of training interventions are discussed, such as the relative costs associated with more engaging training versus benefits in terms of safety outcomes. Further issues include the length of time over which training affects behavior, and the spacing of refresher training.

In Chapter 16, Luria focuses on group-level safety climate, and discusses group processes from a multilevel perspective. Organizational safety climate captures the top-down pro-safety influences in the organization and measures employee perceptions regarding safety policies, procedures, and practices in the work environment. Employees are able to perceive safety climate at both organizational and group levels; climate is reflected in employees' shared perceptions at these different levels. The chapter discusses a multilevel model of safety climate, in which group-level climate mediates the effects of organizational climate on employees' behavior. Luria discusses the psychological processes by which shared perceptions develop and highlights the important role played by coworkers, in relation to sense-making processes, and leaders, in relation to sense-giving processes. The discussion is extended through consideration of mediators and moderators of the relationship between safety climate and safety outcomes; the existence of different facet-specific climates and how these co-exist; and the implications for safety. The chapter also covers context-specific safety climates, such as road safety. There is a focus on interventions targeted at supervisors' behavior, which in turn influences group-level climate and employees' safety behavior. A review of the research on such interventions has shown that this is a promising approach.

Previous chapters have looked at interventions designed specifically to improve safety in the workplace. Most of these have been focused at changing employee behavior by directly targeting behavior (through BBS programs) or the immediate antecedents of safety knowledge and motivation (through training). More recently, there has been interest in group-level interventions which target leader behavior and subsequently group-level climate. Similar approaches have been adopted in relation to workplace health promotion (WHP), and these programs are discussed within Chapter 17 by Day and Helson. These include smoking cessation, alcohol consumption, stress reduction, and promoting healthy behaviors and lifestyles (such as healthy eating, physical fitness, and exercise). The effectiveness of these programs in the improvement of health and well-being is reviewed. Although targeted at individual level, such programs have more wide-ranging effects, including work outcomes, potentially decreasing job stress and improving work culture. Programs are not just targeted at changing at-risk behavior, but also at health promotion and prevention, e.g., companies offering health screening. As discussed previously (in Chapter 13), it is important to recognize the broader context and consider organizational factors in relation to health. Day and Helson note that organizational-level changes are less well documented in the literature, but generally multi-component programs are most

effective. The chapter reviews the business case for WHP and examines factors that influence the success of WHP in organizations, in terms of individual, program, and organizational characteristics.

As discussed in previous chapters, an organizational approach can be effective in managing workplace health and safety. In Chapter 18, Zadow and Dollard define psychosocial safety climate (PSC) as the organizational context preceding the development of risky work conditions that lead to poor psychological health; PSC extends existing work stress theories and provides guidance for the design of interventions. Zadow and Dollard argue that PSC defines the organizational context and management practices that precede the individual job demands and job resources (as articulated in the JDR model), meaning that it is possible to intervene at the organizational level to impact employees' psychological well-being and health. PSC has a direct effect on adverse work conditions, and also moderates the effects of work environment on health and well-being. Zadow and Dollard advocate the need for interventions to address the cause of the adverse work conditions using a primary prevention approach to target the organizational context, and discuss how to design interventions based on these principles and provide some examples of these interventions in practice. These focus on a participatory approach; for example, the use of workgroups to develop action plans as part of an overall socially coordinated workplace stress reduction system, endorsed by upper management.

Finally, we focus on health and safety in high-risk environments and safety-critical organizations, where there are particular challenges to managing health and safety. Firstly, Guldenmund discusses the concept of organizational safety culture, which is critical to high reliability organizations (HROs; Weick & Sutcliffe, 2007). Safety culture has been largely considered in relation to occupational safety, but there are also different forms of safety, such as patient safety (in healthcare organizations) and process safety (in some industrial organizations, such as oil and gas) to be taken into account in such discussions. Safety culture is discussed in relation to healthcare and patient safety (Bishop, Fleming, & Flin). Operating in high-risk environments is characterized by uncertainty; as discussed by Grote, managing uncertainty is essential for safety-critical organizations. Taking a broader perspective on risk management, the final chapter (Glendon) considers a range of contemporary risk issues.

In Chapter 19, Guldenmund discusses the nature of safety culture (which was introduced earlier in Chapter 13, where the concept of organizational safety culture was differentiated from the similar, but distinct concept of organizational safety climate). Safety culture is an especially important concept for understanding how to develop and maintain organizational safety in high-risk environments, where high safety standards are critical (such as nuclear power plants, oil and gas platforms, aviation, etc.). Guldenmund discusses different safety culture models and the use of safety culture assessments. He distinguishes between different perspectives on culture – that it is something that an organization "is," reflecting its fundamental values and beliefs, and something it "has," which can be measured, and can be changed. Safety culture is understood as that part of organizational culture that is concerned with organization members' specific meanings, symbols and behaviors around safety. The chapter highlights different methodologies for safety culture assessment, for example approaches include qualitative methodologies, such as case studies and grounded theory, which produce "rich" descriptions. Such assessments provide insight into the nature of a company's underlying safety culture, which may be compared with its own mission statements, or to industry norms. Questionnaires can be used to identify dimensions and so pinpoint the company in the cultural space. Some approaches advocate structural and behavioral changes to move the company's culture toward a more generative or mature safety culture. The chapter considers ways of influencing safety culture.

Healthcare organizations are responsible not only for the occupational health and safety of their employees, but also the well-being and safety of their patients. Chapter 20 by Bishop, Fleming, and Flin, discusses the concept of "patient safety culture," which is defined as an integrated pattern of individual and organizational behavior, based upon shared beliefs and values, that continuously seeks to minimize patient harm that may result from the processes of care. Bishop et al. discuss the dimensions of patient safety culture, and ways in which these may be developed in healthcare organizations, for example, effective communications and teamwork. They also discuss common barriers to improving safety culture, such as a "blame and shame" culture and the importance of a systems approach to the improvement of safety culture, such as ensuring continuity of care. The chapter presents safety culture measurement tools that are used in practice and reviews research conducted using these instruments.

In high-risk environments, the concept of uncertainty is an important one, and critical for understanding how individuals, teams, and organizations function effectively and safely. In Chapter 21, Grote defines uncertainty as "the absence of information and more specifically, the difference between the amount of information required to perform a task and the amount of information already possessed by the organization." She argues that the focus has been on risk, but this has shifted to uncertainty, with the recognition that organizations, especially those in safety-critical environments, need to have both stability and flexibility. Safety culture depends on systems of meanings, so can provide stability, in situations characterized by uncertainty. However, effective safety management means that an organization needs to have the flexibility to respond to situations, not only by reducing or maintaining uncertainty, but in some circumstances, increasing uncertainty (e.g., speaking up in a critical situation). The chapter considers work on uncertainty at individual, team, and organizational levels.

The final chapter takes a broader perspective, locating our discussions around health and safety within the context of risk management, and drawing on the concepts of uncertainty and safety culture, as discussed in the previous three chapters. In Chapter 22, Glendon discusses how a risk management approach has impinged upon the wider societal and governmental context within which organizations operate, and highlights the importance of risk management in an increasingly risk-averse society. The chapter discusses ways in which organizations can better manage decision-making around risk (e.g., through the use of storytelling) and strategies for effective risk communication and managing risk behaviors. Glendon notes that transportation is a key area in relation to risk management, and risk-related problems (e.g., fatigue, shift work, regulation) can be common across different forms of transportation. The chapter addresses current and future challenges for risk management.

## References

Bass, B. M. (1985). *Leadership and performance beyond expectations*. New York, NY: Free Press.

Clarke, S. (2010). An integrative model of safety climate: Linking psychological climate and work attitudes to individual safety outcomes using meta-analysis. *Journal of Occupational and Organizational Psychology*, *83*(3), 553–578.

Costa, P. T., Jr., & McCrae, R. R. (1992). Four ways five factors are basic. *Personality and Individual Differences*, *13*(6), 653–665.

Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied Psychology*, *86*(3), 499–512.

Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American Psychologist*, *56*(3), 218.

Greenwood, M., & Woods, H. M. (1919). The incidence of industrial accidents upon individuals with special reference to multiple accidents. Report no. 4. Industrial Fatigue Research Board, London.

Higgins, E. T. (1997). Beyond pleasure and pain. *American Psychologist*, *52*, 1280–1300.

Hobfoll, S. E. (1989). Conservation of resources: A new attempt at conceptualizing stress. *American Psychologist*, *44*(3), 513.

Hogan, J., & Foster, J. (2013). Multifaceted personality predictors of workplace safety performance: More than conscientiousness. *Human Performance*, *26*(1), 20–43.

International Labour Organization (2014). *Safety and health at work: A vision for sustainable prevention*. http://www.ilo.org/safework/info/publications/WCMS_301214/lang–ja/index.htm (accessed May 10, 2015).

Johns, G. (2006). The essential impact of context on organizational behavior. *Academy of Management Review*, *31*(2), 386–408.

Judge, T. A., Locke, E. A., & Durham, C. C. (1997). The dispositional causes of job satisfaction: A core evaluations approach. *Research in Organizational Behavior*, *19*, 151–188.

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal and coping*. New York, NY: Springer.

Martínez-Córcoles, M., Gracia, F., Tomás, I., & Peiró, J. M. (2011). Leadership and employees' perceived safety behaviors in a nuclear power plant: A structural equation model. *Safety Science*, *49*(8–9), 1118–1129.

Nahrgang, J. D., Morgeson, F. P., & Hofmann, D. A. (2011). Safety at work: A meta-analytic investigation of the link between job demands, job resources, burnout, engagement, and safety outcomes. *Journal of Applied Psychology*, *96*(1), 71–94.

Reason, J. T. (1990). *Human error*. Cambridge: Cambridge University Press.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68.

Wagenaar, W. A., Hudson, P. T. W., & Reason, J. T. (1990). Cognitive failures and accidents. *Applied Cognitive Psychology*, *4*(4), 273–294.

Weick, K. E., & Sutcliffe, K. M. (2007). *Managing the unexpected: Assuring high performance in an age of complexity*. San Francisco, CA: Jossey-Bass.

Wrzesniewski, A., & Dutton, J. E. (2001). Crafting a job: Revisioning employees as active crafters of their work. *Academy of Management Review*, *26*(2), 179–201.