

Chapter 1

Work, Health, Safety and Well-Being: Current State of the Art



Abstract This introductory chapter will present a review of the current state of the art in relation to employee health, safety and well-being (HSW). The work environment and the nature of work itself are both important influences on HSW. A substantial part of the general morbidity of the population is related to work. It is estimated that workers suffer 270 million occupational accidents and 160 million occupational diseases each year. The chapter will first define HSW. It will then review the current state of the art by outlining key HSW issues in the contemporary world of work, identifying key needs. It will then discuss the evolution of key theoretical perspectives in this area by linking theory to practice and highlighting the need for aligning perspectives and integrating approaches to managing HSW in the workplace.

Keywords Work · Health · Safety · Well-being · New and emerging risks · Social determinants · Perspective alignment

1.1 Introduction

This chapter focuses on the relationship between work, health, safety and well-being. The work environment and the nature of work itself are both important influences on health, safety and well-being (HSW). As a result, workplace health and safety or occupational health and safety have been key areas of concern for many years. Traditionally, more focus has been placed on safety concerns in the workplace while health concerns became more prominent with the changing nature of work. Well-being on the other hand, is increasingly being considered in relation to work and the workplace in recent years.

A good starting point in understanding this evolution in focus and thinking is definitions. According to the Oxford dictionary, safety is defined as the condition of being safe; freedom from danger, risk, or injury. Safety can also refer to the control of recognized hazards in order to achieve an acceptable level of risk. In terms of work, this mainly concerns physical aspects of the work environment. However, the

changing nature of work was associated with the emergence of new types of risk relating to psychological and social aspects of the work environment. This brought about greater focus on health at work. A very influential definition that shaped thinking and action in subsequent years was the World Health Organization definition of health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (World Health Organization [WHO], 1948). This definition promoted a more holistic view of health away from a mere focus on physical aspects towards considering social and mental health aspects. Although the WHO definition already referred to a state of well-being, definitions of well-being include additional dimensions to health, such as social, economic, psychological, and spiritual. Well-being refers to a good or satisfactory condition of existence; a state characterized by health, happiness, and prosperity. Obviously achieving this state is not relevant to the workplace or work alone but rather an overall evaluation of one's life across many areas. As such, actions to improve HSW can be taken within the work context and outside of it. Actions taken in the workplace represent workplace interventions that are implemented in the work setting and consider the characteristics of work environments and workers. On the other hand, actions taken outside the workplace represent public health interventions that are implemented in various settings (for example, in schools, communities or countries) and take into consideration the characteristics of particular populations.

A key question in terms of HSW interventions when it comes to the workplace concerns responsibility. While every individual is responsible for their own actions in various contexts of life, in a specific setting like the work environment, additional responsibility lies with the employer since the work environment will expose workers to particular work characteristics that might in turn pose a certain level of risk to their HSW. While employer responsibility might be formalized under law, this is not the case across countries or in relation to all possible types of risks to workers' HSW, and in particular new and emerging risks, or risks that are either new or gain in prevalence with the changing nature of work. Accordingly, it is important to consider not only legal duties that employers have towards their workforce but also ethical duties that will extend beyond legal compliance. In addition, while employers bear a legal responsibility towards their workforce, they also bear responsibility towards society. This has meant that enterprises have increasingly been held accountable towards society and that interventions in the workplace, whether legally required or not, are now being increasingly considered in terms of their impact beyond the workforce alone but rather society as a whole (see Chapters 3, 4, and 5). This represents a blurring of boundaries between traditional occupational safety and health and public health initiatives that have also resulted in greater emphasis on the concept of well-being in addition to health and safety.

At its first session in 1950, the Joint International Labour Organization (ILO)/World Health Organization (WHO) Committee on Occupational Health defined the purpose of occupational health. It revised the definition at its 12th session in 1995 to read as follows: occupational safety and health should aim at: *the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations*; the prevention amongst workers of departures from

health caused by their working conditions; the protection of workers in their employment from risks resulting from factors adverse to health; the placing and maintenance of the worker in an occupational environment adapted to his physiological and psychological capabilities; and, to summarize, the adaptation of work to man and of each man to his job. Almost 70 years later, the target set through this declaration seems ambitious in many parts of the world, both in developed and developing countries. To understand why, it is worth understanding the context underpinning developments in this area as well as current priorities and needs.

1.2 Changing Nature of Work

In recent years, globalization of the world's economies and its repercussions have been perceived as the greatest force for change in the world of work, and consequently in the scope of occupational safety and health, in both positive and negative ways. Liberalization of world trade, rapid technological progress, significant developments in transport and communication, shifting patterns of employment, changes in work organization practices, the different employment patterns of men and women, and the size, structure and life cycles of enterprises and of new technologies can all generate new types and patterns of hazards, exposures and risks. Demographic changes and population movements, and the consequent pressures on the global environment, can also affect safety and health in the world of work. Let us first consider key impacts on the changing nature of the work environment.

Different types of products and services, organizational structures and work processes, and tools and resources are used in the modern workplace. Three main drivers have been proposed in relation to these changes. The first is globalization, a term which refers to the integration of national and regional economies, which became more prevalent since the nineteenth century. According to the Organization for Economic Co-operation and Development (OECD, 2008), the rapid integration into world markets by six economies (Brazil, Russia, India, Indonesia, China and South Africa) was an important component of globalization during the past decades. Globalization has led to increased competition across organizations, to a shift in the type of business operations in which companies are engaged, and to extensive outsourcing of activities, primarily to low-wage countries. Flanagan (2006) examined the effects of globalization on working conditions (hours, remuneration and safety) and concluded that globalization has led to greater flexibility of the work process, with more part-time employment, temporary employment and independent contracting of staff (European Agency for Safety & Health at Work [EU-OSHA], 2007; Kawachi, 2008). Houtman and Van den Bossche (2006) confirmed these conclusions on the basis of Eurostat data, reporting that more employees in Europe hold a temporary employment contract and yet more people will work 'on call'. OECD reports also confirm these trends. They also highlight that average wage growth has not been equivalent to growth in labour productivity, which is also an outcome of the erosions of the bargaining power of workers in the process of globalization (OECD, 2008).

Organizational restructuring which has been on the increase due to economic crises in different parts of the world may have been partly a cause of this. Organizational restructuring is accompanied by job insecurity and can result in unemployment with subsequent negative impacts on HSW. However, restructuring should not only be considered a serious threat to individual HSW for those who lose their job (the 'direct victims') but also to their immediate environment (e.g. Kieselbach et al., 2009). In addition, evidence during the past two decades shows the impact of restructuring on the so-called 'survivors' as concerns health, well-being, productivity, and organizational commitment (Kieselbach et al., 2009).

The second key development is the tertiarization of the labour market, manifested in increased demand for staff in the services sector and reduced employment opportunities in industry and agriculture. This became apparent in the early years of the twentieth century but in recent decades may have been reinforced by globalization, since the outsourcing of manual labour to low-wage countries left predominantly the service economy elsewhere (EU-OSHA, 2007; Peña-Casas & Pochet, 2009).

The third key development relates to technological advancement and the emergence of the internet, which has led to many changes and innovations in work processes. Many forms of manual work have become obsolete and staff must offer different skills and qualifications (Joling & Kraan, 2008). Moreover, 'new work', a term which amongst others refers to telework, i.e. working from home or a location other than the traditional office, is now more widespread. This can result in blurring the borders between working and private life. Work can take place outside the traditional working hours as well as at home or when travelling. Hence, it may impinge on the need for rest and recuperation, or interfere with personal commitments. Also new forms of working methods such as lean production (a production practice according to which the expenditure of resources other than for the creation of value for the end customer is wasteful and should be eliminated, Womack & Jones, 2003), and just-in-time production (a production strategy that strives to improve a business' return on investment by reducing in-process inventory and associated costs, Womack & Jones, 2003) have been introduced (EU-OSHA, 2007; Kompier, 2006). Overall there has been concern of the effects new forms of work may have on the HSW of workers, organizations and communities (e.g. Benach, Amable, Muntaner, & Benavides, 2002; Benavides, Benach, Diez-Roux, & Roman, 2000; Quinlan, 2004; Quinlan, Mayhew, & Bohle, 2001; Sauter et al., 2002; Virtanen et al., 2005).

It is also important to mention the prevalence of small and medium-sized enterprises (SMEs) that are believed to be responsible for over 50% of new jobs created globally. Moreover, in most developing and emerging countries, they also employ more people than large enterprises do. However, occupational safety and health (OSH) is often less well managed in SMEs, creating working conditions that are less safe and posing greater risks to the health of workers than larger enterprises (Croucher, Stumbitz, Quinlan, & Vickers, 2013). In particular, SMEs have less time to devote to providing OSH training and information due to economies of scale, and have less expertise in HSW. Research also confirms a common lack of awareness of the cost implications of occupational accidents and diseases amongst SME owners

and managers, as well as a tendency for SMEs to be reactive, rather than adopting proactive and preventive strategies towards OSH (Croucher et al., 2013).

However, there are also changes in the workforce that are associated with HSW in the workplace. The next section considers the most important of these.

1.3 Workforce Changes

Alongside the factors changing the nature of work itself, changes can also be seen in the working population, with noteworthy trends being: (a) the ageing workforce; (b) the feminization of the workforce; and (c) increased immigration (Leka, Cox, & Zwetsloot, 2008). Let us now consider these issues in more detail.

1.3.1 Ageing

In industrialized countries, the share of people aged 60-plus has risen from 12% in 1950 to 22% and is expected to reach 32% (418 million) by 2050. In developing countries, the share of people aged 60-plus has risen from 6% in 1950 to 9% and is expected to reach 20% (1.6 billion) by 2050 (World Economic Forum [WEF], 2012). The global population is projected to increase 3.7 times from 1950 to 2050, but the number of 60-plus will increase by nearly 10%, and the 80-plus by about 26%. Women have a life expectancy of 4.5 years more than men and account for about 55% of the 60-plus group, rising to 64% of the 80-plus group, and 82% of the 100-plus group (WEF, 2012).

In response to these global trends, four strategies have been proposed: raising the normal legal retirement age; using international migration to ameliorate the economic effects of population ageing; reforming health systems to have more emphasis on disease prevention and health promotion; and rethinking business practices, encouraging businesses to employ more older workers, even on a part-time basis (WEF, 2012). According to the OECD (2013) most countries will have a retirement age for both men and women of at least 67 years by 2050, and this has already been implemented in many countries. This represents an increase from current levels of around 3.5 years on average for men and 4.5 years on average for women. The same report stresses that high levels of youth unemployment will lead to widespread poverty in old age as young people struggle to save for retirement.

Since population ageing in industrialized nations has been a prevalent trend in the past decades (Ilmarinen, 2006), lessons can be learned from it in relation to the workforce. Most reviews and meta-analyses in the scientific literature make clear that there is no consistent effect of age on work performance (e.g., Benjamin & Wilson, 2005; Griffiths, 1997; Salthouse & Maurer, 1996). Overall, older workers perform as well as younger workers. Furthermore, there are many positive findings with regard to older workers. For example, older workers demonstrate less turnover

and more positive work values than younger workers (Warr, 1994). They also exhibit more positive attitudes to safety and fewer occupational injuries (Siu, Phillips, & Leung, 2003) although there is some evidence that it is tenure (time on the job) that should be examined rather than age per se (Breslin & Smith, 2006).

However, the evidence from epidemiological and laboratory-based studies paints a less favourable picture of older people's performance. Such studies reveal age-related declines in cognitive abilities such as working memory capacity, attention capacity, novel problem-solving, and information processing speed. Age-related deterioration is also documented in motor-response generation, selecting target information from complex displays, visual and auditory abilities, balance, joint mobility, aerobic capacity and endurance (Kowalski-Trakofler, Steiner, & Schwerha, 2005). As workers get older, they suffer from more musculoskeletal disorders (Eurostat, 2010), and they are more likely to report work-related stress (Griffiths, 2007).

Recent models of ageing and work propose that certain mediating factors underpin the relationship between chronological age, work performance and behaviour and might function at three levels: individual, organizational and societal. At the individual level, for example, experience, job knowledge, abilities, skills, disposition, and motivation may operate (Kanfer & Ackerman, 2004). Other mediating variables may reflect organizational policies and practices: for example, age awareness programmes, supervisor and peer attitudes, management style, the physical work environment and equipment, health promotion, workplace adjustments, and learning and development opportunities (Griffiths, 1997). However, policies and systems implemented so far have, in most countries, not been adequately successful in keeping people healthier and in employment for longer (OECD, 2013).

A further level of exploration for the relationship between age and work performance might be provided by examining global markets, the wider employment context and worker protection (Johnstone, Quinlan, & Walters, 2005; Quinlan, 2004). As discussed, in developed countries there has been a decline in manufacturing and a recent export of some service sector work to developing countries. The way work is designed and organized has changed substantially with a growth in contingent or 'precarious' work and an increase in part-time work, home-based work, telework, multiple job-holding and unpaid overtime. These changes might make it increasingly difficult for older workers to gain or maintain employment, and such employment may entail inferior and unhealthy working conditions. These changes in work design and management have also been accompanied by changes in worker protection; for example, a decline in union density and collective bargaining, some erosion in workers' compensation and public health infrastructure and cutbacks in both disability and unemployment benefits – again contexts which are unlikely to favour vulnerable workers, such as older workers. As such older workers may be affected by increased exposure to certain occupational hazards; decreased opportunities to gain new knowledge and develop new skills; less support from supervisors, and

discrimination in terms of selection, career development, learning opportunities and redundancy (Chiu, Chan, Snape, & Redman, 2001; Maurer, 2001; Molinie, 2003).

1.3.2 Feminization

Pronounced gender differences in employment patterns can be observed as a result of a highly segregated labour market based on gender (Burchell, Fagan, O'Brien, & Smith, 2007; Fagan & Burchell, 2002; Vogel, 2003). Gender segregation refers to the pattern in which one gender is under-represented in some jobs and over-represented in others, relative to their percentage share of total employment (Fagan & Burchell, 2002). A growing body of evidence indicates that a high level of gender segregation is a persistent feature of the employment structure globally (e.g. Anker, 1998; Burchell et al., 2007; Rubery, Smith, & Fagan, 1999). Some scholars have argued that estimates suggest that gender segregation in the labour market is so pervasive, that in order to rectify this imbalance approximately 75% of women would have to change jobs or professions (Messing, 1998). Considering differences in employment patterns according to gender (and without taking into account sectors where both genders are represented, e.g. agriculture), women's jobs typically involve caring, nurturing and service activities for people, whilst men tend to be concentrated in managerial positions and in manual and technical jobs associated with machinery or physical products. Since men and women are differently concentrated in certain occupations and sectors, with different aspects of job content and associated tasks, they are exposed to a different taxonomy of work-related risks (Burchell et al., 2007; EU-OSHA, 2002). For example, women are more frequently exposed to emotionally demanding work, and work in low-status occupations with often restricted autonomy, as compared to men. This differential exposure can result in differential impacts on occupational ill health for men and women (EU-OSHA, 2002; OECD, 2012).

Furthermore, due to the gender division of labour, women and men play different roles in relation to children, families and communities with implications for their health (Premji, 2011). Even though women are increasingly joining the paid workforce, in most societies they continue to be mainly responsible for domestic, unpaid work such as cooking, cleaning and caring for children, and so they carry a triple burden (e.g. Loewenson, 1999). Women are also largely represented among unpaid contributing family workers, those who work in a business establishment for a relative who lives in the same household as they do (ILO, 2012). Balancing responsibilities for paid and unpaid work often leads to stress, depression and fatigue (Duxbury & Higgins, 2001; Manuh, 1998), and can be particularly problematic when income is low and social services and support are lacking. The lack of availability of child care may also mean that women must take their children to work where they may be exposed to hazardous environments.

1.3.3 *Immigration*

Increased migration of workers from developing countries to developed countries or from poorer to more affluent developed countries is still the norm and increasing. Migrant workers can be divided into highly-educated and skilled workers, both from developing and industrialized countries, and unskilled workers from developing countries (Takala & Hämäläinen, 2009). They can also be classified as legal and illegal (or regular and irregular) migrant workers who have a different status and, therefore, varying levels of access to basic social services (WHO, 2007). Often low-skilled and seasonal workers are concentrated in sectors and occupations with a high level of occupational health and safety risks (WHO, 2007).

Ethnic minority migrants have been found to have different conditions in comparison to other migrants, and to report lower levels of psychological well-being (Shields & Price, 2003). Women migrants represent nearly half of the total migrants in the world and their proportion is growing, especially in Asia. They often work as domestic workers or caregivers while men often work as agricultural or construction workers (ILO, 2012). In general, migrant workers tend to be employed in high risk sectors, receive little work-related training and information, face language and cultural barriers, lack protection under the destination country's labour laws and experience difficulties in adequately accessing and using health services. Common stressors include being away from friends and family, rigid work demands, unpredictable work and having to put up with existing conditions (Magana & Hovey, 2003). In addition, migrant workers' cultural background, anthropometrics and training may differ from those of nationals of host countries, which may have implications in relation to their understanding and use of equipment (Kogi, 1997; O'neill, 2000).

As can be understood so far, both the nature of work and of workplaces as well as workforce characteristics depend on wider socioeconomic and political influences. A large body of literature has summarized and examined these influences under the area of the social determinants of health. The following section briefly considers these determinants.

1.4 Social Determinants of Health, Safety and Well-Being

New forms of work organization and employment have to be considered within the wider picture of employment and working conditions across the world. Labour markets and social policies determine employment conditions such as precarious or informal jobs, child labour or slavery, or problems such as having high insecurity, low paid jobs, or working in hazardous conditions, all of which heavily influence health inequalities. Figure 1.1 shows various interrelationships between employment, working conditions and health inequalities.

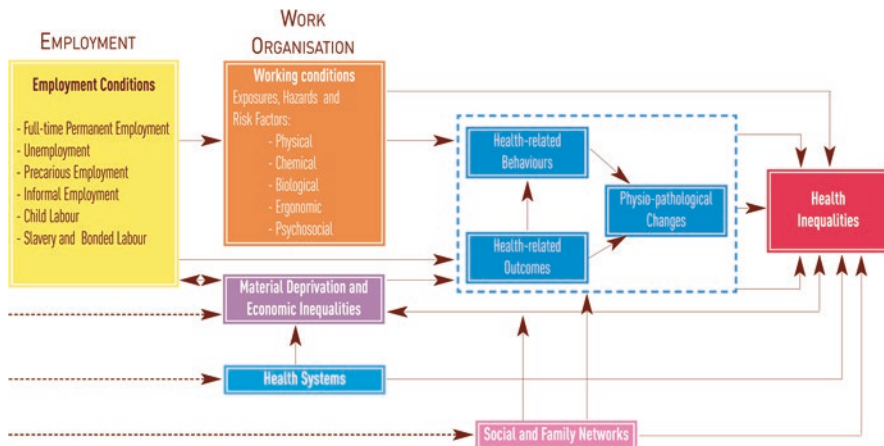


Figure 1.1 Model of employment, working conditions and health inequalities (Source: Adapted from Benach and Muntaner 2013)

Let us consider unemployment and associated job insecurity as social determinants of health. In 2012 the ILO estimated that there were almost 26 million unemployed people in the EU, 18 million of whom were from EU-17 countries. Overall, 197 million people were unemployed in 2012 with a quarter of the increase of four million in global unemployment being in the advanced economies, and three quarters being in other regions, with marked effects in East Asia, South Asia and Sub-Saharan Africa (ILO, 2013a). The same report also highlighted that in those regions where unemployment did not increase further, job quality worsened as vulnerable employment and the number of workers living below or very near the poverty line increased.

In the EU, the 2008 financial crisis resulted in unprecedented levels of youth unemployment, averaging 23% for the EU as a whole. The rates for young people (aged 15–24) not in employment, education or training are 22.4% in the South and peripheral EU countries, and 11.4% in the north and core of the EU (European Commission [EC], 2013). In a pattern intensified by the 2008 financial crisis, structural unemployment has been growing and unemployment varies from 17.3% in the South of the EU and peripheries in 2012, to 7.1% in the north and central countries (EC, 2013). A large proportion of jobs destroyed were in mid-paid manufacturing and construction occupations (European Foundation for the Improvement of Living & Working Conditions [Eurofound], 2013). As a consequence of reduced employment opportunities, poverty has increased in the EU since 2007. Household incomes are declining and 24.2% of the EU population is now at risk of poverty or exclusion. Children are particularly affected as unemployment and jobless households have increased, together with in-work poverty (EC, 2013). This has implications for quality of life and general population health beyond workplace health and safety due to the impact on personal finances. An ILO report summarized the potential impact of financial crises on organizations and health and safety as shown in Table 1.1.

Table 1.1 The financial crisis and its potential impact on safety and health at work

Financial crisis	Cutting costs Decreased public spending Decreased production Cutting jobs (downsizing) Shutting down of some facilities
	↓
Organizational changes	Re-prioritizing resources Reduction of “non-productive” functions Cutting OSH resources More part-time/temporary work More outsourcing/subcontracting Dismissing workers
	↓
Compromise in OSH measures	Loss of OSH professionals in enterprises Decline in OSH measures Aggravated OSH conditions in informal jobs Hazards from overwork/new tasks Longer working hours for some More insecurity Psychosocial stress from sudden unemployment
	↓
Increase in workplace accidents, diseases and fatalities and increase in ill-health from unemployment	

Source: Adapted from ILO (2013a)

The surge of unemployment creates tension and negatively impacts public perceptions for social welfare, job security, and financial stability. Increased job insecurity reflects the fear of job loss or the loss of the benefits associated with the job (e.g. health insurance benefits, salary reductions, not being promoted, changes in workload or work schedule). It is one of the major consequences of today’s turbulent economies and is common across occupations, and both private and public-sector employees (Ashford, Lee, & Bobko, 1989; Ferrie et al., 2001; Sverke, Hellgren, & Naswall, 2002). Several studies have shown that job insecurity has detrimental effects on the physical and mental health of employees, and on many organizational outcomes, including performance, job satisfaction, counterproductive behaviours, and commitment (e.g. Ferrie et al., 2001; Sverke et al., 2002).

Increased unemployment has given rise to different forms of flexible and temporary employment, also through the introduction of relevant policies such as flexicurity. Flexicurity is an integrated strategy for enhancing flexibility and security in the labour market. It attempts to reconcile employers’ need for a flexible workforce with workers’ need for security (EC, 2007). However, several studies have warned of the possible negative outcomes of new types of work arrangements, highlighting that they could be as dangerous as unemployment for workers’ health (Benach & Muntaner, 2007). For example, workers on fixed-term contracts are commonly found to have inadequate working conditions by comparison with permanent employees.

New forms of work organization and patterns of employment can be summarized in terms of flexible working practices including temporary and part-time employment, tele-working, precarious employment, and home working. Although these new practices can result in positive outcomes such as more flexibility, a better work-life balance, and increased productivity, research has also identified several potential negative outcomes. For example, teleworkers may feel isolated, lacking support and career progression (e.g. Ertel, Pech, & Ullsperger, 2001; Schultz & Edington, 2007). In addition, temporary, part-time and precarious employment can result in higher job demands, job insecurity, lower control and an increased likelihood of labour force exit (Benach et al., 2002; Quinlan, 2004; Quinlan et al., 2001). Workers engaged in insecure and flexible contracts with unpredictable hours and volumes of work are more likely to suffer occupational injuries (ILO, 2013a, 2013b). Although awareness and evidence in developing countries lags far behind those in the industrialized world, evidence has started to accumulate showing similar findings in developing countries (Kortum, Leka, & Cox, 2011).

These various complex relationships between the wider socio-economic context, employment and working conditions have resulted in a more complex profile of risk factors that may affect HSW in the workplace. New forms of work organization and the move towards a service based economy have also resulted in new and emerging risks affecting the workforce, organizations and society. These will be considered next.

1.5 New and Emerging Risks at Work

An ‘emerging OSH risk’ is often defined as any occupational risk that is both new and increasing (EU-OSHA, 2009). New means that the risk was previously unknown and is caused by new processes, new technologies, new types of workplaces, or social or organizational change; or, a long-standing issue is newly considered to be a risk due to changes in social or public perceptions; or, new scientific knowledge allows a long standing issue to be identified as a risk. A risk is increasing if the number of hazards leading to the risk is growing; or, the likelihood of exposure to the hazard leading to the risk is increasing (exposure level and/or the number of people exposed); or the effect of the hazard on workers’ health is getting worse (seriousness of health effects and/or the number of people affected) (Houtman, Douwes, Zondervan, & Jongen, 2017).

An article published on EU-OSHA’s OSH Wiki on new and emerging risks summarizes them as follows (Houtman et al., 2017):

- Emerging physical risks: (1) physical inactivity and (2) the combined exposure to a mixture of environmental stressors that increase the risks of musculoskeletal disorders (MSDs), the leading cause of sickness absence and work disability.

- Emerging psychosocial risks: (1) job insecurity, (2) work intensification, high demands at work, and (3) emotional demands, including violence, harassment and bullying.
- Emerging dangerous substances due to technological innovation: (1) chemicals, with specific attention to nanomaterials, and (2) biological agents.

1.5.1 Emerging Physical Risks

The growing use of computers and automated systems, aimed at optimizing productivity, has caused an increase in sedentary work or prolonged standing at work, resulting in an increase in physical inactivity. Work demands are also commonly cited as reasons for physical inactivity (e.g. Trost, Owen, Bauman, Sallis, & Brown, 2002) as well as an increase in travelling time to work (Houtman et al., 2017). Physical inactivity is associated with increased health risks such as coronary heart disease, type II diabetes, and certain types of cancers and psychological disorders (depression and anxiety) (Department of Health, 2004; WHO, 2002; Zhang, Xie, Lee, & Binns, 2004). Another important result of inactivity is obesity which can lead to several adverse health effects, such as back pain, high blood pressure, cardiovascular disorders, and diabetes (Houtman et al., 2017). In addition, sedentary jobs are associated with an increased prevalence of musculoskeletal complaints or disorders, e.g. neck and shoulder disorders (e.g. Korhonen et al., 2003), and upper and lower back disorders (e.g. Chen, McDonald, & Cherry, 2006). Such disorders may lead to sick leave and work disability (e.g. Steensma, Verbeek, Heymans, & Bongers, 2005). The established health risks associated with sedentary work are premature death in general, type II diabetes and obesity (Van Uffelen et al., 2010).

As concerns MSDs, there is a considerable body of research indicating that bio-mechanical or ergonomic risks in combination with psychosocial risks can generate work-related MSDs (e.g. Bongers, Ijmker, & Van den Heuvel, 2006; Briggs, Bragge, Smith, Govil, & Straker, 2009; EU-OSHA, 2005). Psychosocial risk factors at work have a greater effect on the prevalence of musculoskeletal complaints when exposure to physical risk factors at work is high rather than when it is low. In addition, factors such as low job control, high job demands, poor management support or little support from colleagues, as well as restructuring, job redesign, outsourcing and downsizing have been shown to be causally related to increased risks in MSDs (Houtman et al., 2017).

1.5.2 Emerging Psychosocial Risks

Job insecurity has been discussed earlier and is an important stressor resulting in reduced well-being (psychological distress, anxiety, depression, and burnout), reduced job satisfaction (e.g. withdrawal from the job and the organization) and

increased psychosomatic complaints as well as physical strains (e.g. Wagenaar et al., 2011). All these effects are negatively related to personal growth as well as to recognition and participation in social life (De Cuyper et al., 2008). Additionally, decreased well-being and reduced job satisfaction of employees negatively affects the effectiveness of the organization (Houtman et al., 2017).

There are several increasing demands workers are exposed to in the modern workplace including: quantitative (high speed, no time to finish work in regular working hours), qualitative (increased complexity), emotional (emotional load due to direct contact with customers i.e. service relationship situations), and often physical loads as well (Houtman et al., 2017). The widespread use of Information and Communication Technology (ICT) has led to work intensification. Developments in technology use in terms of mechanization, automation, and computerization, has led to the substitution of human activities by machines. On the other hand, the use of computers and smart phones with internet access provides easy access to all kinds of information but may also lead to the expectation from colleagues, supervisors and clients that one is always available and can be contacted (e.g. by email). ICT work may then lead to stress symptoms due to excessive working hours, workload and increasing complexity of tasks or isolation in home workers; information overload; pressure of having to constantly upgrade skills; human relationships replaced by virtual contacts; and physical impairments such as repetitive strain injuries and other MSDs due to using inadequate or ergonomically unadapted equipment (Houtman et al., 2017).

Psychosocial hazards such as high job demands and low control have been systematically found to be causally linked to cardiovascular heart disease (e.g. Backé, Seidler, Latza, Rossnagel, & Schumann, 2012; Eller et al., 2009), MSDs (e.g. Da Costa & Vieira, 2009) as well as mental health problems such as depression and anxiety (e.g. Bonde, 2008; Netterstrom et al., 2008). In addition, long term absence and disability are causally related to these types of risks (e.g. Duijts, Kant, Swaen, Brandt, & Van den Zeegers, 2007).

Furthermore, as the labour market shifts towards the service industry, emotional demands at work increase with harassment or bullying and violence contributing to this increase (Houtman et al., 2017). Those affected by violence and harassment in the workplace tend to report higher levels of work-related ill health. The proportion of workers reporting symptoms such as sleeping problems, anxiety and irritability is nearly four times greater among those who have experienced violence, bullying and harassment than amongst those who have not (Houtman et al., 2017).

1.5.3 Emerging Dangerous Substances

Nanotechnology has been defined as the design, characterization, production and application of structures, devices and systems by controlling shape and size at nanometre scale (EU-OSHA, 2013). Due to their small size, engineered nanomaterials (ENMs) have unique properties that improve the performance of many products.

Nanomaterials have applications in many industrial sectors (currently the main areas are materials and manufacturing industry including automotive, construction and chemical industry, electronics and IT, health and life sciences, and energy and environment).

A key issue of ENMs is the unknown human risks of the applied nanomaterials during their life cycle, especially for workers exposed to ENMs at the workplace. Workers in nanotechnology may be exposed to novel properties of materials and products causing health effects that have not yet been fully explored. The manufacture, use, maintenance and disposal of nanomaterials may have potential adverse effects on internal organs (EU-OSHA, 2013). Although there is a considerable lack of knowledge, there are indications that because of their size, ENMs can enter the body via the digestive system, respiratory system or the skin. Once in the body, ENMs can translocate to organs or tissue distant from the portal of entry. Such translocation is facilitated by the propensity of the nanoparticles to enter cells, to cross membranes and to move along the nerves (Iavicoli & Bocconi, 2010). The ENMs may accumulate in the body, particularly in the lungs, the brain and the liver. The basis for the toxicity appears to be primarily expressed through an ability to cause inflammation and to raise potential for autoimmune deficits, and may induce diseases such as cancer (Houtman et al., 2017).

Other dangerous substances concerns include diesel exposure and its link to lung cancer and non-cancer damage to the lung; and man-made mineral fiber exposure (classified as being siliceous or non-siliceous) and the link of their structure to inflammatory, cytotoxic and carcinogenic potential (Houtman et al., 2017). Another three chemical risks have been identified as emerging with a view to allergies and sensitizing effects. They are epoxy resins, isocyanates and dermal exposure (EU-OSHA, 2009). Epoxy resins have become one of the main causes of occupational allergic contact dermatitis. Skin sensitization of the hands, arms, face, and throat as well as photosensitization have also been reported. Isocyanates are powerful irritants to the mucous membranes of the eyes and of the gastrointestinal and respiratory tracts. Direct skin contact can cause serious inflammation and dermatitis. Isocyanates are also powerful asthmatic sensitizing agents (Houtman et al., 2017).

Finally, risks related to global epidemics are the most important biological risk issue. Pathogens such as the severe acute respiratory syndrome (SARS), Ebola, and Marburg viruses are new or newly recognized. In addition, new outbreaks of well-characterized outbreak-prone diseases such as cholera, dengue, measles, meningitis, and yellow fever still emerge (Houtman et al., 2017).

It should be stressed that the profile of risks in the workplace constantly changes and there are additive effects that exacerbate negative impacts. The following section provides an overview of key challenges in relation to HSW in the modern workplace while also acknowledging the lack of research in relation to some of the new and emerging risks identified earlier.

1.6 Overview of Health, Safety and Well-Being in the Modern Workplace

The ILO has published global estimates of fatal and non-fatal occupational (ILO, 2011) and fatal work-related diseases (ILO, 2013b). 2.3 million deaths occur annually across countries for reasons attributed to work. Over 350,000 are caused by occupational accidents while the biggest mortality burden comes from work-related diseases, accounting for about 2 million deaths. Globally, cardiovascular and circulatory diseases at 35% and cancers at 29% were the top illnesses responsible for 2/3 of deaths from work-related diseases, followed by occupational injuries at 15% and infectious diseases at 10%. As a result, approximately 6300 people die every day due to these causes: occupational accidents kill nearly 1000 people every day and work-related diseases provoke the death of approximately 5400 more individuals. There were also over 313 million non-fatal occupational accidents (requiring at least four days of absence from work) in 2010, meaning that occupational accidents provoke injury or ill health for approximately 860,000 people every day (ILO, 2013b).

Major industrial accidents are stark reminders of the unsafe conditions still faced by many. For example, the April 2013 collapse of the Rana Plaza building in Bangladesh resulted in the death of 1129 individuals and injured 2500 more, mostly factory workers making garments for overseas retail chains. The international community has since expressed concerns about market pressures which strive to keep basic production costs low, the role of national authorities, and the responsibilities of multinational enterprises and other stakeholders in supply chains towards the health and safety of workers. Hazardous sectors such as mining, construction, shipping, and in particular fishing continue to take a heavy toll on human lives and health. Meanwhile, the nuclear industry continues to pose serious problems regarding the radiological protection of site workers and the environment. In particular, the protection of emergency workers at the Fukushima Daiichi power plant in Japan has become a focus of international attention since the 2011 East Japan Earthquake.

Occupational health has recently become a much higher priority, in light of the growing evidence of the enormous loss and suffering caused by occupational diseases and ill health across many different employment sectors. Even though it is estimated that fatal diseases account for about 85% of all work-related fatalities, more than half of all countries do not provide official statistics for occupational diseases (ILO, 2013b). These therefore remain largely invisible, compared to fatal accidents. Moreover and as discussed previously, the nature of occupational diseases is changing rapidly, as new technologies and global social changes aggravate existing health risks and create new ones.

For example, long-latency diseases include illnesses such as silicosis and other pneumoconioses, asbestos-related diseases and occupational cancers that may take decades to manifest. Such diseases remain widespread, as they are often undiagnosed until they result in permanent disability or premature death. Pneumoconioses account for a high percentage of all occupational diseases. For example, in Latin

America, there is a 37% prevalence rate of silicosis amongst miners, and this figure reaches 50% among miners over the age of 50. In Vietnam, pneumoconioses account for 75.7% of all compensated occupational diseases (ILO, 2013b).

The use of asbestos has been banned in more than 50 countries, including all EU Member States, but the number of deaths from asbestos-related diseases is increasing in many industrialized countries because of exposure that occurred during the 1960s and later. In Germany and the UK, for example, the number of deaths from asbestos-induced mesothelioma has been increasing for some years and was expected to peak in 2015–16 (Health & Safety Executive [HSE], 2009).

Furthermore, MSDs are on the rise in many countries (ILO, 2013b). For example, in the Republic of Korea, the number of such cases increased sharply from 1634 in 2001 to 5502 in 2010. In the UK, MSDs represented about 40% of all work-related diseases. In Japan, pneumoconiosis and lower back pain were the most common problems among the 7779 reported cases of occupational diseases in 2011. In 2011, the World Health Organization reported that MSDs accounted for 4% of all years lost to disability, compared with 3.1% in 2000 (WHO, 2014). Meanwhile, in the United States skin diseases, hearing loss and respiratory conditions were the three leading diseases among the 224,500 reported cases of non-fatal occupational illness in 2009. Argentina likewise reported 22,013 cases in 2010, with noise-induced hearing loss, MSDs and respiratory diseases being the top three problems (ILO, 2013b).

The number of cases of work-related stress, violence and psychosocial disorders has also been increasing. These have often been attributed at least in part to recession-driven enterprise restructuring and redundancies which can be very damaging psychologically. European studies have shown that a large and rapid rise in unemployment has been associated with a significant increase in suicide rates (e.g. Lundin & Hemmingsson, 2009). Meanwhile, a review of mortality studies in 13 countries across the world has also shown an increase in cardiovascular mortality rates by an average of 6.4% in periods of crisis (Falagas, Vouloumanou, Mavros, & Karageorgopoulos, 2009).

The impact of the issues discussed in this section is presented in Chapter 3. On the basis of the available evidence, it is now recognized that a new paradigm of prevention is required, one that focuses on work-related diseases and not only on occupational injuries. Recognition, prevention and treatment of both occupational diseases and accidents, as well as the improvement of recording and notification systems are high priorities for improving the health of individuals and the societies they live in. Several perspectives and associated approaches have been taken to promote HSW in the workplace over the years as priorities change and new issues and knowledge emerge. The following section will provide an overview of some key perspectives that have led to the development of modern holistic models to promote HSW in the workplace.

1.7 Key Perspectives on Health, Safety and Well-Being

The field of occupational health and safety has been defined as the science of the anticipation, recognition, evaluation and control of hazards arising in or from the workplace that could impair the HSW of workers, taking into account the possible impact on the surrounding communities and the general environment (Alli, 2008). Given the broad scope of this definition, several disciplines are relevant to OSH that relate to control of the multitude of hazards in the workplace. Furthermore, since social, political, technological and economic changes are constantly impacting upon the workplace, the field of OSH has been evolving to address new and emerging issues in line with different perspectives. Some disciplines of relevance to OSH include engineering, ergonomics, toxicology, hygiene, medicine, epidemiology, psychology, sociology, education, and policy. These disciplines often diverge in terms of theoretical foundation and as a result emphasize different aspects in terms of understanding and dealing with OSH issues. However, in recent years there has been convergence in thinking about the work environment and a trend towards more holistic perspectives and approaches when considering HSW.

Indeed, while HSW issues were in the past approached from a mono-disciplinary perspective, multi-disciplinarity is now advocated as the necessary way forward. However, in practice OSH professionals often still employ mono-disciplinary perspectives in dealing with accidents and diseases in the workplace, seeking to protect individual workers rather than preventing negative impacts of the work environment and promoting positive outcomes. Solely focusing on ameliorating harm rather than promoting HSW has also been criticized in recent years by scholars emphasizing a salutogenic (health promoting) instead of a pathogenic (disease preventing) perspective. Let us now consider some of these approaches further in relation to safety, health and well-being.

1.7.1 Key Perspectives in Safety

It has been argued that occupational safety has developed and evolved through three ages: 1. a technical age, 2. a human factors age, and 3. a management and culture age (Hale & Hovden, 1998) (or as Hudson, 2007 described them through a technical wave, a systems wave and a culture wave). Several authors have since then suggested new ages in safety science.

The first age of safety concerned itself with the technical measures to guard machinery, stop explosions and prevent structures collapsing. It lasted from the nineteenth century through until after the Second World War and was interested in accidents having technical causes (Hale & Hovden, 1998). The period between the World Wars saw the development of research into personnel selection, training and motivation as prevention measures, often based on theories of accident proneness (see Hale & Glendon, 1987 for a review; Burnham, 2009 for the accident-prone

theory). This brought about the second age of safety, which developed separately to technical measures until the period of the 1960s and 1970s, when developments in probabilistic risk analysis and the rise and influence of ergonomics led to a merger of the two approaches in health and safety. There was a move away from an exclusive dominance of the technical view of safety in risk analysis and prevention, and the study of human error and human recovery or prevention came into its own (Hale & Hovden, 1998).

Just as the second age of human factors was ushered in by increasing realizations that technical risk assessment and prevention measures could not solve all problems, so were the 1980s characterized by an increasing dissatisfaction with the idea that health and safety could be captured simply by matching the individual to technology. In the 1990s management and culture were the focus of development and research, based on many influential thinkers such as Heinrich who published his ground-breaking safety management textbook in Heinrich, 1931, the sociotechnical management literature (e.g. Elden, 1983; Thorsrud, 1981; Trist & Bamforth, 1951), the social organizational theory of Lewin (1951), the loss prevention approach (Bird, 1974), and the introduction of participative management in safety (e.g. Simard & Marchand, 1995).

However, Reason (2000) contended that an over-reliance on OSH management systems and insufficient understanding of, and insufficient emphasis on, workplace culture, can lead to failure because “it is the latter that ultimately determines the success or failure of such systems” (p.5). Criticism of overreliance on systems was also influenced by the resilience engineering school that posited that instead of focusing on failures, error counting and decomposition, we should address the capabilities to cope with the unforeseen. The ambition is to ‘engineer’ tools or processes that help organizations to increase their ability to operate in a robust and flexible way.

Hopkins (2007) views safety culture as one aspect of organizational culture, or more particularly an organizational culture that is focused on safety. Further, culture is viewed as a group, not an individual, phenomenon; efforts to change culture, should, in the first instance, focus on changing collective practices (the practices of both managers and workers) and the dominant source of culture is what leaders pay attention to. Much of Hopkins’ work draws on Reason’s (1997) notion that a safe culture is an informed culture and Weick and Sutcliffe’s (2001, 2007) principles of collective mindfulness and high reliability organizations (i.e. organizations that are able to manage and sustain almost error-free performance despite operating in hazardous conditions where the consequences of errors could be catastrophic). Collective mindfulness is based on the premise that variability in human performance enhances safety whilst unvarying performance can undermine safety, particularly in complex socio-technical systems.

Glendon, Clarke, and McKenna (2006) argued that each of the first three periods of development build on one another and refer to this process of development as the fourth age of safety or the integration age where previous ways of thinking are not lost, but remain available to be reflected upon as multiple, more complex perspectives develop and evolve.

However, as the limitations of OSH management systems and safety rules that attempt to control behaviour have become evident, it has also been proposed that a fifth age of safety has emerged, the adaptive age; an age which transcends the other ages of safety. The adaptive age challenges the view of an organizational safety culture and instead recognizes the existence of socially constructed sub-cultures. The adaptive age embraces adaptive cultures and resilience engineering and requires a change in perspective from human variability as a liability and in need of control, to human variability as an asset and important for safety (Borys, Else, & Leggett, 2009). Resilience engineering is similar to collective mindfulness since it also focuses on the importance of performance variability for safety. However, what sets resilience engineering apart from collective mindfulness is the focus on learning from successful performance (Hollnagel, 2006), i.e. why things go right as well as why things go wrong (also called the Safety 2 approach (Hollnagel, 2014)).

One particular major development in the safety evolution was the move towards managing risks in the work environment. This implied that it is impossible to completely control all aspects of work to avoid negative outcomes, risks always remain. In an ever-changing work environment, a continuous assessment of risks is needed that will point to key risks that may pose a threat to workers' HSW. These then need to be managed following appropriate actions at various levels with the focus being on prevention.

The risk management paradigm has been hugely influential not only in terms of managing safety but also managing health as will be discussed in the following sections. Let us then consider it further next.

1.7.2 The Risk Management Paradigm

In the wake of the Chernobyl disaster in 1986, sociologist Ulrich Beck published 'Risikogesellschaft', later published in English as 'Risk Society: Towards a New Modernity' in 1992. Beck argued that environmental risks had become the predominant product of industrial society. He defined a risk society as "a systematic way of dealing with hazards and insecurities induced and introduced by modernization itself" (Beck, 1992, p.21). While according to British sociologist Anthony Giddens (1990), a risk society is a society that is increasingly preoccupied with the future (and also with safety), which generates the notion of risk. Giddens (1999) defined two types of risks as external risks (for example natural disasters) and manufactured risks (for example, those derived from industrial processes. As manufactured risks are the product of human activity, authors like Giddens and Beck argue that it is possible for societies to assess the level of risk that is being produced, or that is about to be produced, in order to mitigate negative outcomes (i.e. responsibility with managing these risks lies with society and more precisely with experts able to do so). One such area is OSH risk management.

Hazard, something that can cause harm if not controlled, is a key term in OSH risk management. The outcome is the harm that results from an uncontrolled hazard.

In the context of OSH, harm describes the direct or indirect degradation, temporary or permanent, of the physical, mental, or social well-being of workers. A risk is a combination of the probability that a particular outcome will occur and the severity of the harm involved (Nunes, 2016).

Hazard identification or assessment is an important step in the overall risk assessment and risk management process. Through this, hazards are identified, assessed and controlled/eliminated as close to source as reasonably as possible. As technology, resources, social expectations or regulatory requirements change, hazard analysis focuses control measures more closely towards the source of the hazard aiming at prevention. Hazard-based programmes may not be able to eliminate all risks to HSW but they avoid implying that there are ‘acceptable risks’ in the workplace (Nunes, 2016).

A risk assessment needs to be carried out prior to making an intervention. This assessment should identify hazards, identify all affected by the hazard and how, evaluate the risk, and identify and prioritize appropriate control measures. The calculation of risk is based on the likelihood or probability of the harm being realized and the severity of the consequences. The assessment should be recorded and reviewed periodically and whenever there is a significant change to work practices. The assessment should include practical recommendations to control the risk. Once recommended controls are implemented, the risk should be re-calculated to determine if it has been lowered to an acceptable level (Nunes, 2016).

Risk assessment and calculation is usually easier as regards physical risks but more complex as regards biological, and even more so psychosocial, risks. Despite this, the risk management paradigm has been applied to all these types of risks to HSW, and is used extensively both as concerns occupational injury and occupational health. It also represents the cornerstone of OSH legislation across countries. OSH management systems are based on this paradigm (see Chapter 6 for more details).

Following the PDCA (Plan-Do-Check-Act) cycle methodology (Deming, 1986), risk management is a systematic process that includes the examination of all characteristics of the work system where the worker operates, namely, the workplace, the equipment/machinery, materials, work methods/practices and work environment. The main goal of risk management is to eliminate or at least to reduce the risks that cannot be avoided or eliminated to an acceptable level. Risk management measures should follow the hierarchy of control principles of prevention, protection and mitigation. Worker participation is key in the process of risk management.

The risk management process should be reviewed and updated regularly, for instance every year, to ensure that the measures implemented are adequate and effective. Additional measures might be necessary if the improvements do not show the expected results (Nunes, 2016). Periodic risk management is also important since workplaces are dynamic due to changes in equipment, substances or work procedures, and new hazards might emerge. Another reason is that new knowledge regarding risks can become available, either leading to the need of an intervention or offering new ways of controlling the risk. The review of the risk management

process should consider a variety of types of information and draw them from a number of relevant perspectives (e.g. staff, management, stakeholders).

However, risk management has been criticized for focusing too heavily on avoiding (controlling) possible negative outcomes and not promoting positive and healthy work environments. This development in thinking has stemmed from a parallel move from pathogenic to salutogenic approaches in health and its management. This evolution in thinking about health and well-being will be considered next.

1.7.3 Key Perspectives in Health and Well-Being

Approaches in occupational health and occupational hygiene have evolved in line with developments in several disciplines, including safety engineering, medicine and psychology. The risk management perspective is the cornerstone of occupational hygiene as is evident by its definition. The International Occupational Hygiene Association (IOHA, n.d.) refers to occupational hygiene as the discipline of anticipating, recognizing, evaluating and controlling health hazards in the working environment with the objective of protecting worker health and well-being and safeguarding the community at large. Although occupational health definitions similarly place great focus on managing risk factors, they overall refer to the promotion and maintenance of health and well-being of employees. Similarly to the evolution of perspectives in safety, these definitions have been influenced by the evolution of thinking on health and well-being over the years (Schulte & Vainio, 2010).

Perspectives on health and illness started with a focus on pathogenesis, as pioneered and developed by Williamson and Pearse (1966) which is the study of disease origins and causes. Pathogenesis starts by considering disease and infirmity and then works retrospectively to determine how individuals can avoid, manage, and/or eliminate that disease or infirmity. The dose-response relationship of the change in effect on an organism caused by differing levels of exposure (or doses) to a stressor after a certain exposure time was influential in treating disease and illness (as was in chemical safety). This leads professionals using pathogenesis to be reactive because they respond to situations that are currently causing or threatening to cause disease or infirmity (Becker, Glascoff, & Felts, 2010).

A major shift came in 1979 with Antonovsky's concept of salutogenesis, the study of health origins and causes, which starts by considering health and looks prospectively at how to create, enhance, and improve physical, mental and social well-being (Antonovsky, 1979). The assumption of salutogenesis that action needs to occur to move the individual towards optimum health, prompts professionals to be proactive because their focus is on creating a new higher state of health than is currently being experienced (Antonovsky, 1996).

The difference between the biomedical model (based on pathogenesis) and health promotion which is now the cornerstone of public health (based on salutogenesis) is a move away from risk and disease towards resources for health and life

(Eriksson & Lindström, 2008), initiating processes not only for health but well-being and quality of life. Perceived good health is a determinant of quality of life.

According to Breslow (2006), the first era of public health involved combating communicable diseases while the second dealt with chronic diseases. Their focus was on developing and maintaining health since health provides a person the potential to have the opportunity and ability to move towards the life they want. To facilitate management of health in the first two eras, measurement of the signs, symptoms and associated risks of disease and infirmity were of paramount importance. In the third era of public health most people expect a state of health that enables them to do what they want in life. To facilitate management of an evolved health status, it is necessary to develop new health measures that must go beyond detecting pathogenesis and its precursors to measuring those qualities associated with better health (Breslow, 2006).

However, salutogenesis also presumes that disease and infirmity are not only possible but likely because humans are flawed and subject to entropy (Antonovsky, 1979). According to a salutogenic perspective, each person should engage in health promoting actions to cause health while they secondarily benefit from the prevention of disease and infirmity. Pathogenesis, on the other hand in a complementary fashion primarily focuses on prevention of disease and infirmity, with a secondary benefit of health promotion. Both approaches are needed to facilitate the goal of better health and a safer and more health enhancing environment. Pathogenesis improves health by decreasing disease and infirmity and salutogenesis enhances health by improving physical, mental, and social well-being. Together, these strategies will work to create an environment that nurtures, supports, and facilitates optimal well-being (Becker et al., 2010).

Around the same time when salutogenesis was introduced, in a 1977 article in *Science*, psychiatrist George L. Engel introduced a new medical model, the biopsychosocial model. The biopsychosocial model is a broad view that attributes disease outcome to the intricate, variable interaction of biological factors (genetic, biochemical, etc.), psychological factors (mood, personality, behaviour, etc.), and social factors (cultural, familial, socioeconomic, medical, etc.). It holds to the idea that biological, psychological, and social processes are integrally and interactively involved in physical health and illness. It was pioneering in advocating the premise that people's psychological experiences and social behaviours are reciprocally related to biological processes. As a result, interventions should address all these dimensions and not narrowly focus on limited perspectives (such as only the biological perspective for example).

More focus was now placed on psychological and social factors in the understanding of health and illness. Indeed, the traditional medical model of ill health was increasingly recognized as having achieved limited success in tackling occupational health conditions such as stress, anxiety, depression and MSDs (White, 2005). These challenges which have been shown to now have an increasing prevalence in the workplace (as discussed earlier), do not have a clear underlying physical basis nor do they demonstrate a linear relationship between injury, pain and disability. Instead, they appear to be strongly mediated by psychological and social factors.

Accordingly, Waddell (2004) categorized such conditions as ‘common health problems’. The challenges presented by common health problems contrasts with the past success of occupational medicine in dealing with conditions that have an identifiable cause and a clear relationship between dose and response (Waddell & Burton, 2006).

The psychological models that were developed within the fields of occupational, and occupational health psychology, mainly to make sense of the concept of stress, were similarly influenced by conceptualizations of health, illness and safety. Early models viewed stress either as a noxious stimulus in the environment (engineering models, derived from engineering) or a response to exposure to aversive of noxious characteristics of the environment (physiological models, derived from medicine). Contemporary models focus on the interaction between the environment and the individual and emphasize either explicitly or implicitly the role of psychological processes, such as perception, cognition, and emotion (psychological models). These appear to determine how the individual recognizes, experiences, and responds to stressful situations, how they attempt to cope with that experience and how it might affect their physical, psychological, and social health (Cox & Griffiths, 2010).

The risk management paradigm remains an influential perspective in dealing with new and emerging risks in the psychosocial work environment. However, while we are a long way from the challenge of work-related stress being tackled effectively, there has started to be a shift towards promoting well-being at work and not only preventing stress and its associated negative outcomes in terms of both health and safety. This shift has followed trends in public health (discussed earlier) and also psychology towards more positive concepts. The positive psychology movement, championed by Seligman and Csikszentmihalyi (2000), is an attempt to shift the emphasis in psychology away from a preoccupation with the pathological, adverse and abnormal aspects of human behaviour and experience. The positive psychology literature offers a number of perspectives that help with understanding how well-being can arise in work situations (Lunt et al., 2007). For example, the concept of flow was introduced by Csikszentmihalyi (1990) which can be defined as a subjective condition where an individual is fully absorbed in, and engaged with, the task he or she is carrying out, promoting an experience of competence and fulfillment.

As is evident from our discussion on perspectives on HSW so far, several useful models have been proposed from various disciplines with parallel developments can be observed across these disciplines. However, it should also be noted that often scholars and practitioners operate in silos, ignoring the interplay among the various approaches, and lessons that can be learned from one another.

The recent focus on well-being has brought about the question of whether approaches in the workplace should focus only on factors influencing the individual’s experience in the work environment or wider influences, considering more the social determinants of health discussed at the beginning of this chapter. In line with this thinking, some holistic models have emerged that recognize the interplay between workplace and non-workplace factors in determining HSW that will be discussed next.

1.7.4 Towards Holistic Models

The starting point in the development of holistic models of HSW is the recognition that safety and health are different to well-being. As discussed at the beginning of this chapter, well-being refers to a good or satisfactory condition of existence; a state characterized by health, happiness, and prosperity. In particular, three key concepts have been discussed as relevant to well-being: happiness, quality of life and resilience (Lunt et al., 2007). Layard (2005) defined happiness as feeling good; its inverse is feeling bad and wishing for a different experience. Factors that affect our levels of happiness include among others family relationships, our financial situation, work, community and friends, our health, personal freedom and personal values. Quality of life overlaps with contemporary interpretations of happiness. Quality of life is a subjective state that encompasses physical, psychological, and social functioning. A defining feature of quality of life is its basis on the perceived gap between actual and desired living standards. Resilience of individuals has been described as partly a context dependent characteristic, in that what enables resilience in one environment may be less adaptive in another (Lunt et al., 2007). Increasingly it is recognized that resilience is important at different organizational levels (teams, organizations) and that these different levels are to some degree interacting (e.g. Schelvis, Zwetsloot, Bos, & Wiezer, 2014).

It is also important to recognize that even though well-being at work may be primarily an employer's responsibility (as well as the worker's), well-being of the worker or workforce is also the responsibility of others in society (e.g. governments, insurance companies, unions, faith-based and non-profit organizations) or may be affected by non-work domains (Schulte et al., 2015 – see also Chapter 7). Indeed, the well-being of the workforce extends beyond the workplace, and public policy should consider social, economic, and political contexts. Schulte et al. (2015) also provide examples of holistic policy models aiming at the promotion of well-being in the workplace that include the WHO Healthy Workplace Model and the NIOSH Total Worker Health model (discussed in the next chapter).

To promote HSW holistically, there needs to be synergy and integration among the various perspectives. To achieve this, these perspectives need to be aligned considering current knowledge and existing needs, developing capabilities, and mainstreaming a strategic approach in policy and practice. The following chapter considers key policy approaches to managing HSW at the macro level (international, regional, national), meso level (sectoral), and micro level (organizational). Subsequent chapters further consider how alignment across perspectives can be achieved in policy and practice.

1.8 Conclusion

This chapter has provided an overview of the current state of the art in relation to HSW in the workplace as regards key determinants, outcomes and perspectives. With the changing nature of work and new characteristics of the workforce, new challenges are emerging in the workplace. Perspectives on how to address these challenges have changed in line with these developments as well as the evolution of knowledge and the impact of wider socio-economic and political factors. Emerging issues such as psychosocial factors, the increasing prevalence of non-communicable diseases, and the shift towards well-being (and not merely safety and health) demand new ways of thinking in addressing HSW in the workplace. Continuing to work in silos and adopting mono-disciplinary perspectives will not allow us to move forward in this complex landscape. A strategic alignment of perspectives and integrated approaches are needed. This book aims to promote a way forward by outlining and critically evaluating developments in HSW in the workplace, and providing a framework for action in policy and practice.

References

- Alli, B. (2008). *Fundamental principles of occupational health and safety*. Geneva, Switzerland: International Labour Organization.
- Anker, R. (1998). *Gender and jobs: Sex segregation of occupations in the world*. Geneva, Switzerland: International Labour Organization.
- Antonovsky, A. (1979). *Health, stress and coping*. San Francisco/London: Jossey-Bass.
- Antonovsky, A. (1996). The salutogenic model as a theory to guide health promotion. *Health Promotion International*, 11(1), 11–18.
- Ashford, S. J., Lee, C., & Bobko, P. (1989). Content, cause, and consequences of job insecurity: A theory-based measure and substantive test. *Academy of Management Journal*, 32(4), 803–829.
- Backé, E. M., Seidler, A., Latza, U., Rossnagel, K., & Schumann, B. (2012). The role of psychosocial stress at work for the development of cardiovascular diseases: A systematic review. *International Archives of Occupational & Environmental Health*, 85, 67–79.
- Beck, U. (1992). *Risk society: Towards a new modernity*. New Delhi, India: Sage.
- Becker, C. M., Glascoff, M. A., & Felts, W. M. (2010). Salutogenesis 30 years later: Where do we go from here? *International Electronic Journal of Health Education*, 13, 25–32.
- Benach, J., Amable, M., Muntaner, C., & Benavides, F. G. (2002). The consequences of flexible work for health: Are we looking at the right place? *Journal of Epidemiology & Community Health*, 56(6), 405–406.
- Benach, J., & Muntaner, C. (2007). Precarious employment and health: Developing a research agenda. *Journal of Epidemiology & Community Health*, 61(4), 276–277.
- Benach, J., & Muntaner, C. (2013). *Employment, work and health inequalities: A global perspective*. Barcelona, Spain: Icaria editorial.
- Benavides, F. G., Benach, J., Diez-Roux, A. V., & Roman, C. (2000). How do types of employment relate to health indicators? Findings from the second European survey on working conditions. *Journal of Epidemiology & Community Health*, 54(7), 494–501.
- Benjamin, K., & Wilson, S. (2005). *Facts and misconceptions about age, health status and employability*. Buxton, UK: Health and Safety Laboratory.
- Bird, F. (1974). *Management guide to loss control*. Atlanta, GA: Institute Press.

- Bonde, J. P. E. (2008). Psychosocial factors at work and risk of depression: A systematic review of the epidemiological evidence. *Occupational & Environmental Medicine*, *65*, 438–445.
- Bongers, P. M., Ijmker, S., & Van den Heuvel, S. (2006). Epidemiology of work related neck and upper limb problems: Psychosocial and personal risk factors (Part I) and effective interventions from a bio behavioural perspective (Part II). *Journal of Occupational Rehabilitation*, *16*, 279–302.
- Borys, D., Else, D., & Leggett, S. (2009). The fifth age of safety: The adaptive age? *Journal of Health & Safety Research & Practice*, *1*(1), 19–27.
- Breslin, F. C., & Smith, P. (2006). Trial by fire: A multivariate examination of the relation between job tenure and work injuries. *Occupational & Environmental Medicine*, *63*(1), 27–32.
- Breslow, L. (2006). Health measurement in the third era of health. *American Journal of Public Health*, *96*, 17–19.
- Briggs, A. M., Brage, P., Smith, A., Govil, D., & Straker, L. M. (2009). Prevalence and associated factors for thoracic spine pain in the adult working population: A literature review. *Journal of Occupational Health*, *51*, 177–192.
- Burchell, B., Fagan, C., O'Brien, C., & Smith, M. J. (2007). *Working conditions in the European Union: The gender perspective*. Luxembourg: Publications Office of the European Communities.
- Burnham, J. C. (2009). *Accident prone: A history of technology, psychology, and misfits of the machine age*. Chicago: The University of Chicago Press.
- Chen, Y., McDonald, J. C., & Cherry, N. M. (2006). Incidence and suspected cause of work-related musculoskeletal disorders, United Kingdom, 1996–2001. *Occupational Medicine*, *56*(6), 406–413.
- Chiu, W. C. K., Chan, A. W., Snape, E., & Redman, T. (2001). Age stereotypes and discriminatory attitudes towards older workers: An East-West comparison. *Human Relations*, *54*(5), 629–661.
- Cox, T., & Griffiths, A. (2010). Work-related stress: A theoretical perspective. In S. Leka & J. Houdmont (Eds.), *Occupational health psychology* (pp. 31–55). Chichester, UK: Wiley-Blackwell.
- Croucher, R., Stumbitz, B., Quinlan, M., & Vickers, I. (2013). *Can better working conditions improve the performance of SMEs? An international literature review*. Geneva, Switzerland: International Labour Organization.
- Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. New York: Harper and Row.
- Da Costa, B. E., & Vieira, E. R. (2009). Risk factors for work-related musculoskeletal disorders: A systematic review of recent longitudinal studies. *American Journal of Industrial Medicine*, *48*, 1–39.
- De Cuyper, N., De Jong, J., De Witte, H., Isaksson, K., Rigotti, T., & Schalk, R. (2008). Literature review of theory and research on the psychological impact of temporary employment: Towards a conceptual model. *International Journal of Management Reviews*, *10*, 25–51.
- Deming, W. E. (1986). *Out of the crisis*. MIT Center for Advanced Engineering Study.
- Department of Health (2004). *At least five a week: Evidence on the impact of physical activity and its relationship to health* (A report from the chief medical officer). London: Department of Health.
- Duijts, S. F. A., Kant, I. J., Swaen, G. M. H., Brandt, P. A., & Van den Zeegers, P. A. (2007). A meta-analysis of observational studies identifies predictors of sickness absence. *Journal of Clinical Epidemiology*, *60*, 1105–1115.
- Duxbury, L., & Higgins, C. (2001). *Work-life balance in the new millennium: Where are we? Where do we need to go?* Ottawa, Canada: CRPN.
- Elden, M. (1983). Democratization and participative research in the developing of local theory. *Journal of Occupational Behaviour*, *4*, 21–33.
- Eller, N. H., Netterstrom, B., Gyntelberg, F., Kristensen, T. S., Nielsen, F., Steptoe, A., & Theorell, T. (2009). Work-related psychosocial factors and the development of ischemic heart disease: A systematic review. *Cardiology in Review*, *17*(2), 83–97.

- Engel, G. L. (1977). The need for a new medical model: A challenge for biomedicine. *Science*, 196, 129–136.
- Eriksson, M., & Lindström, B. (2008). A salutogenic interpretation of the Ottawa Charter. *Health Promotion International*, 23(2), 190–199.
- Ertel, M., Pech, E., & Ullsperger, P. (2001). Working hours and health in flexible work arrangements. In C. Weikert, E. Torkelson, & J. Pryce (Eds.), *Occupational health psychology: Europe 2001*. Nottingham, UK: I-WHO Publications.
- Eurofound. (2013). *Women, men and working conditions in Europe*. Luxembourg: Publications Office of the European Communities.
- European Agency for Safety and Health at Work (EU-OSHA). (2002). *How to tackle psychosocial issues and reduce work-related stress*. Luxembourg: Publications Office of the European Communities.
- European Agency for Safety and Health at Work (EU-OSHA). (2005). *Priorities for occupational safety and health research in the EU-25*. Luxembourg: Publications Office of the European Communities.
- European Agency for Safety and Health at Work (EU-OSHA). (2007). *Expert forecast on emerging psychosocial risks related to occupational safety and health*. Luxembourg: Publications Office of the European Communities.
- European Agency for Safety and Health at Work (EU-OSHA). (2009). *OSH in figures: Stress at work – Facts and figures*. Luxembourg: Publications Office of the European Communities.
- European Agency for Safety and Health at Work (EU-OSHA). (2013). *Priorities for occupational safety and health research in Europe: 2013–2020*. Luxembourg: Publications Office of the European Communities.
- European Commission (EC). (2007). *Communication from the commission to the European Parliament, the council, the European economic and social committee and the Committee of the Regions – Towards common principles of Flexicurity: More and better jobs through flexibility and security*. Luxembourg: Publications Office of the European Communities.
- European Commission (EC). (2013). *Report on the current situation in relation to occupational diseases' systems in EU member states and EFTA/EEA countries, in particular relative to commission recommendation 2003/670/EC concerning the European schedule of occupational diseases and gathering of data on relevant related aspects*. Luxembourg: Publications Office of the European Communities.
- Eurostat. (2010). *Health and safety at work in Europe (1999–2007): A statistical portrait*. Luxembourg: Publications Office of the European Communities.
- Fagan, C., & Burchell, B. (2002). *Gender, jobs and working conditions in Europe*. Luxembourg: Publications Office of the European Communities.
- Falagas, M. E., Vouloumanou, E. K., Mavros, M. N., & Karageorgopoulos, D. E. (2009). Economic crises and mortality: A review of the literature. *The International Journal of Clinical Practice*, 63(8), 1128–1135.
- Ferrie, J. E., Martikainen, P., Shipley, M. J., Marmot, M. G., Stansfeld, S. A., & Smith, G. D. (2001). Employment status and health after privatisation in white collar civil servants: Prospective cohort study. *British Medical Journal*, 322(7287), 647–651.
- Flanagan, R. (2006). *Globalization and labor conditions: Working conditions and worker rights in a global economy*. New York: Oxford University Press.
- Giddens, A. (1990). *Consequences of modernity*. Cambridge, UK: Polity Press.
- Giddens, A. (1999). Risk and responsibility. *Modern Law Review*, 62(1), 1–10.
- Glendon, A. I., Clarke, S. G., & McKenna, E. F. (2006). *Human safety and risk management* (2nd ed.). Boca Raton, FL: CRC Press.
- Griffiths, A. (1997). Ageing, health and productivity: A challenge for the new millennium. *Work & Stress*, 11(3), 197–214.
- Griffiths, A. (2007). Healthy work for older workers: Work design and management factors. In W. Loretto, S. Vickerstaff, & P. White (Eds.), *The future for older workers: New perspectives* (pp. 121–137). Bristol: Policy Press.

- Hale, A. R., & Glendon, A. I. (1987). *Individual behaviour and the control of danger*. Amsterdam, The Netherlands: Elsevier.
- Hale, A. R., & Hovden, J. (1998). Management and culture: The third age of safety. A review of approaches to organizational aspects of safety, health and environment. In A. M. Feyer & A. Williamson (Eds.), *Occupational injury: Risk prevention and intervention* (pp. 129–158). London: Taylor & Francis.
- Health and Safety Executive (HSE). (2009). *RR728 – Projection of mesothelioma mortality in Great Britain* [Online]. Retrieved from: <http://www.hse.gov.uk/research/rrhtm/rr728.htm>. Accessed 15 Dec 2017.
- Heinrich, H. W. (1931). *Industrial accident prevention: A scientific approach*. New York: McGraw-Hill.
- Hollnagel, E. (2006). Resilience: The challenge of the unstable. In E. Hollnagel, D. D. Woods, & N. Leveson (Eds.), *Resilience engineering: Concepts and precepts* (pp. 9–18). Hampshire, UK: Ashgate.
- Hollnagel, E. (2014). *Safety I and safety II: The past and future of safety management*. Boca Raton, FL: CRC Press.
- Hopkins, A. (2007). *Lessons from Gretley: Mindful leadership and the law*. Sydney, Australia: CCH Australia.
- Houtman, I., Douwes, M., Zondervan, Z., & Jongen, M. (2017). Monitoring new and emerging risks. *OSH Wiki*. Retrieved from: https://oshwiki.eu/wiki/Monitoring_new_and_emerging_risks. Accessed 15 Dec 2017.
- Houtman, I., & Van Den Bossche, S. (2006). *Trends in quality of work in the Netherlands*. Hoofddorp, The Netherlands: TNO Work and Employment.
- Hudson, P. (2007). Implementing safety culture in a major multi-national. *Safety Science*, 45, 697–722.
- Iavicoli, S., & Boccuni, F. (2010). Challenges and perspectives of occupational health and safety research in nanotechnologies in Europe. *Industrial Health*, 269, 92–104.
- Ilmarinen, J. (2006). The ageing workforce—Challenges for occupational health. *Occupational Medicine*, 56(6), 362–364.
- International Labour Organization (ILO). (2011). *ILO introductory report: Global trends and challenges on occupational safety and health*. Geneva, Switzerland: International Labour Organization.
- International Labour Organization (ILO). (2012). *Global employment trends for women 2012*. Geneva, Switzerland: International Labour Organization.
- International Labour Organization (ILO). (2013a). *Protecting workplace safety and health in difficult economic times – The effect of the financial crisis and economic recession on occupational safety and health*. Geneva, Switzerland: International Labour Organization.
- International Labour Organization (ILO). (2013b). *The prevention of occupational diseases*. Geneva, Switzerland: International Labour Organization.
- International Occupational Hygiene Association (IOHA) (n.d.). *What is occupational hygiene?* Retrieved from: <http://ioha.net/faq/>. Accessed 25 Feb 2018.
- Johnstone, R., Quinlan, M., & Walters, D. (2005). Statutory occupational health and safety workplace arrangements for the modern labour market. *The Journal of Industrial Relations*, 47(1), 93–116.
- Joling, C., & Kraan, K. (2008). *Use of technology and working conditions in the European Union*. Luxembourg: Publications Office of the European Communities.
- Kanfer, R., & Ackerman, P. L. (2004). Aging, adult development, and work motivation. *Academy of Management Review*, 29(3), 440–458.
- Kawachi, I. (2008). Globalization and workers' health. *Industrial Health*, 46(5), 421–423.
- Kieselbach, T., Armgarth, E., Bagnara, S., Elo, A., Jefferys, S., Joling, C., et al. (2009). *Health in restructuring: Innovative approaches and policy recommendations*. Mering, Germany: Rainer Hampp Verlag.

- Kogi, K. (1997). Ergonomics and technology transfer into small and medium sized enterprises. *Ergonomics*, 40(10), 1118–1129.
- Kompier, M. A. J. (2006). New systems of work organization and workers' health. *Scandinavian Journal of Work, Environment & Health*, 32(6), 421–430.
- Korhonen, T., Ketola, R., Toivonen, R., Luukkonen, R., Hakkanen, M., Vii, X., & Juntura, E. (2003). Work related and individual predictors for incident neck pain among office employees working with video display units. *Occupational & Environmental Medicine*, 60(7), 475–482.
- Kortum, E., Leka, S., & Cox, T. (2011). Perceptions of psychosocial hazards, work-related stress and workplace priority risks in developing countries. *Journal of Occupational Health*, 53(2), 144–155.
- Kowalski-Trakofler, K. M., Steiner, L. J., & Schwerha, D. J. (2005). Safety considerations for the aging workforce. *Safety Science*, 43(10), 779–793.
- Layard, R. (2005). *Happiness: Lessons from a new science*. London: Penguin.
- Leka, S., Cox, T., & Zwetsloot, G. I. J. M. (2008). The European framework for psychosocial risk management (PRIMA-EF). In S. Leka & T. Cox (Eds.), *The European framework for psychosocial risk management: PRIMA-EF* (pp. 1–16). Nottingham, UK: I-WHO Publications.
- Lewin, K. (1951). *Field theory in social science: Selected theoretical papers*. New York: Harper & Row.
- Loewenson, R. H. (1999). Women's occupational health in globalization and development. *American Journal of Industrial Medicine*, 36(1), 34–42.
- Lundin, A., & Hemmingsson, T. (2009). Unemployment and suicide. *The Lancet*, 374, 270–271.
- Lunt, J., Fox, D., Bowen, J., Higgins, G., Crozier, S., & Carter, L. (2007). *Applying the biopsychosocial approach to managing risks of contemporary occupational health conditions: Scoping review*. Buxton, UK: Health & Safety Laboratory.
- Magana, C. G., & Hovey, J. D. (2003). Psychosocial stressors associated with Mexican migrant farmworkers in the midwest United States. *Journal of Immigrant Health*, 5(2), 75–86.
- Manuh, T. (1998). *Women in Africa's development: Overcoming obstacles, pushing for progress*. New York: United Nations.
- Maurer, T. J. (2001). Career-relevant learning and development, worker age, and beliefs about self-efficacy for development. *Journal of Management*, 27(2), 123–140.
- Messing, K. (1998). *One eyed science: Occupational health and women workers*. Philadelphia, PA: Temple University Press.
- Molinie, A. F. (2003). *Age and working conditions in the European Union*. Dublin, Ireland: European Foundation for the Improvement of Living and Working Conditions.
- Netterstrom, B., Conrad, N., Bech, P., Fink, P., Olsen, O., Rugulies, R., et al. (2008). The relation between work-related psychosocial factors and the development of depression. *Epidemiologic Reviews*, 30, 118–132.
- Nunes, I.L. (2016). Occupational safety and health risk assessment methodologies. *OSH Wiki*. Retrieved from: https://oshwiki.eu/wiki/Occupational_safety_and_health_risk_assessment_methodologies. Accessed 15 Dec 2017.
- O'neill, D. H. (2000). Ergonomics in industrially developing countries: Does its application differ from that in industrially advanced countries? *Applied Ergonomics*, 31(6), 631–640.
- Organization for Economic Co-Operation and Development (OECD). (2008). *Globalization and emerging economies*. Paris: Organization for Economic Co-Operation and Development.
- Organization for Economic Co-Operation and Development (OECD). (2012). *Sick on the job? Myths and realities about mental health and work*. Paris: Organization for Economic Co-Operation and Development.
- Organization for Economic Co-Operation and Development (OECD). (2013). *A good life in old age? Monitoring and improving quality in long-term care*. Paris: Organization for Economic Co-Operation and Development.
- Peña-Casas, R., & Pochet, P. (2009). *Convergence and divergence of working conditions in Europe: 1990–2005*. Dublin, Ireland: European Foundation for the Improvement of Working and Living Conditions.

- Premji, S. (2011). *Building healthy and equitable workplaces for women and men: A resource for employers and workers representatives*. Geneva, Switzerland: World Health Organization.
- Quinlan, M. (2004). Workers' compensation and the challenges posed by changing patterns of work: Evidence from Australia. *Policy and Practice in Health and Safety*, 2(1), 25–52.
- Quinlan, M., Mayhew, C., & Bohle, P. (2001). The global expansion of precarious employment, work disorganization, and consequences for occupational health: A review of recent research. *International Journal of Health Services*, 31(2), 335–414.
- Reason, J. (1997). *Managing the risks of organizational accidents*. Aldershot, UK: Ashgate.
- Reason, J. (2000, April). Beyond the limitations of safety systems. *Australian Safety News*, pp. 54–55.
- Rubery, J., Smith, M., & Fagan, C. (1999). *Women's employment in Europe: Trends and prospects*. London: Routledge.
- Salthouse, T. A., & Maurer, T. J. (1996). Aging, job performance, and career development. In J. E. Birren & K. W. Schaie (Eds.), *Handbook of the psychology of aging* (4th ed., pp. 353–364). San Diego, CA: Academic Press.
- Sauter, S. L., Brightwell, W. S., Colligan, M. J., Hurrell, J. J., Katz, T. M., Legrande, D. E., et al. (2002). *The changing organization of work and the safety and health of working people: Knowledge gaps and research directions*. Cincinnati, OH: National Institute for Occupational Safety and Health.
- Schelvis, R. M. C., Zwetsloot, G. I. J. M., Bos, E. H., & Wiezer, N. M. (2014). Exploring teacher and school resilience as a new perspective to solve persistent problems in the educational sector – a case of The Netherlands. *Teachers and Teaching: Theory and Practice*, 20(5), 622–637.
- Schulte, P., Guerin, R. J., Schill, A. L., Bhattacharya, A., Cunningham, T. R., Pandalai, S. P., et al. (2015). Considerations for incorporating “well-being” in public policy for workers and workplaces. *American Journal of Public Health*, 105(8), e31–e44.
- Schulte, P., & Vainio, H. (2010). Well-being at work – Overview and perspective. *Scandinavian Journal of Work Environment & Health*, 36(5), 422–429.
- Schultz, A. B., & Edington, D. W. (2007). Employee health and presenteeism: A systematic review. *Journal of Occupational Rehabilitation*, 17(3), 547–579.
- Seligman, M. E. P., & Csikszentmihalyi, M. (2000). Positive psychology: An introduction. *American Psychologist*, 55(1), 5–14.
- Shields, M., & Price, S. W. (2003). *The labour market outcomes and psychological well-being of ethnic minority migrants in Britain*. London: Home Office.
- Simard, M., & Marchand, A. (1995). A multilevel analysis of organizational factors related to the taking of safety initiatives by work groups. *Safety Science*, 21, 113–129.
- Siu, O. L., Phillips, D. R., & Leung, T. W. (2003). Age differences in safety attitudes and safety performance in Hong Kong construction workers. *Journal of Safety Research*, 34(2), 199–205.
- Steenma, I. A., Verbeek, J. H., Heymans, M. W., & Bongers, P. M. (2005). Prognostic factors for duration of sick leave in patients sick listed with acute low back pain: A systematic review of the literature. *Occupational & Environmental Medicine*, 62, 851–860.
- Sverke, M., Hellgren, J., & Naswall, K. (2002). No security: A meta-analysis and review of job insecurity and its consequences. *Journal of Occupational Health Psychology*, 7(3), 242–264.
- Takala, J., & Hämmäläinen, P. (2009). Globalization of risks. *African Newsletter on Occupational Health and Safety*, 19, 70–73.
- Thorsrud, E. (1981). *Organization development from a Scandinavian point of view*. Doct. 51/80. Oslo, Norway: Work Research Institute.
- Trist, E., & Bamforth, K. W. (1951). Some social and psychological consequences of the longwall method of coal-getting. *Human Relations*, 4, 6–38.
- Trost, S. G., Owen, N., Bauman, A. E., Sallis, J. F., & Brown, W. (2002). Correlates of adult participation in physical activity: Review and update. *Medicine and Science in Sports and Exercise*, 34, 1996–2001.

- van Uffelen, J. G., Wong, J., Chau, J. Y., van der Ploeg, H. P., Riphagen, I., Gilson, N. D., et al. (2010). Occupational sitting and health risks: A systematic review. *American Journal of Preventive Medicine*, 39(4), 379–388.
- Virtanen, M., Kivimäki, M., Joensuu, M., Virtanen, P., Elovainio, M., & Vahtera, J. (2005). Temporary employment and health: A review. *International Journal of Epidemiology*, 34(3), 610–622.
- Vogel, L. (2003). *The gender workplace health gap in Europe*. Brussels, Belgium: European Trade Union Institute.
- Waddell, G. (2004). Predicting long-term incapacity for work: The case of low back pain. *Occupational Health Review*, 111, 22–25.
- Waddell, G., & Burton, A. K. (2006). *Is work good for your health and well-being?* London: The Stationery Office.
- Wagenaar, A. F., Taris, T. W., Houtman, I. L. D., Van den Bossche, S., Smulders, P., & Kompier, M. A. J. (2011). Labour contract differences in the European Union, 2000–2005: Differences among demographic groups and implications for the quality of working life and work satisfaction. *European Journal of Work & Organizational Psychology*, 21, 169–194.
- Warr, P. (1994). Age and job performance. In J. Snel & R. Cremer (Eds.), *Work and aging: A European perspective* (pp. 309–322). London/Bristol, UK: Taylor & Francis.
- Weick, K. E., & Sutcliffe, K. M. (2001). *Managing the unexpected*. San Francisco: Jossey-Bass.
- Weick, K. E., & Sutcliffe, K. M. (2007). *Managing the unexpected* (2nd ed.). San Francisco: John Wiley & Sons.
- White, P. (2005). *Biopsychosocial medicine: An integrated approach to understanding illness*. Oxford, UK: Oxford University Press.
- Williamson, G. S., & Pearse, I. H. (1966). *Science, synthesis, and sanity: An inquiry into the nature of living*. Chicago: Henry Regnery.
- Womack, J. P., & Jones, D. T. (2003). *Lean thinking: Banish waste and create wealth in your corporation*. New York: Free Press.
- World Economic Forum (WEF). (2012). *Global population ageing: Peril or promise?* Geneva, Switzerland: Global Agenda Council on Ageing Society.
- World Health Organization (WHO). (1948). Preamble to the constitution of the World Health Organization. *Official Records of the World Health Organization*, 2, 100.
- World Health Organization (WHO). (2002). *The world health report: Reducing risks, promoting healthy life*. Copenhagen, Denmark: World Health Organization.
- World Health Organization (WHO). (2007). *Raising awareness of stress at work in developing countries: A modern hazard in a traditional working environment: Advice to employers and worker representatives, Protecting Workers' Health Series, No. 6*. Geneva, Switzerland: World Health Organization.
- World Health Organization (WHO). (2014). *World health statistics*. Geneva, Switzerland: World Health Organization.
- Zhang, M., Xie, X., Lee, A. H., & Binns, C. W. (2004). Sedentary behaviours and epithelial ovarian cancer risk. *Cancer Causes & Control*, 15(1), 83–89.