Chapter 22
Designing Age-Friendly Workplaces: An Occupational Health Perspective

James W. Grosch and Juliann C. Scholl

You can't help getting older, but you don't have to get old.
—George Burns (1896–1996)

22.1 Introduction

A far-reaching demographic trend affecting the United States and many other countries is clear: the workforce will continue aging to unprecedented levels, with many workers remaining beyond a time when just recently they would have retired. This change in age structure is partly due to longer life expectancy, lower fertility rates, and expected changes in social and economic policy, and reflects remarkable advances in medicine, technology, and public health. However, important challenges remain, and one such challenge is how to design work to maximize the safety, health, well-being, and productivity of an aging workforce. In recent years, there has been an emphasis on how individuals and, in some cases, workers can be proactive when it comes to the aging process. Constructs such as "healthy aging" (Creagan, 2013), "successful aging" (Rowe & Kahn, 1997; Zacher, 2015), "active ageing" (WHO, 2002), and "productive aging" (e.g., Butler & Gleason, 1985; Schulte, Grosch, Scholl, & Tamers, 2018) have been advanced. Although these constructs may differ somewhat in their emphases and assumptions, they share an overriding belief that the adverse effects of growing older are not immutable, but can be delayed and managed if appropriate actions are taken.

The findings and conclusions of this chapter are those of the authors and do not necessarily represent the views of the National Institute for Occupational Safety and Health.

J. W. Grosch (✉) · J. C. Scholl
National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, Cincinnati, OH, USA
e-mail: jkg9@cdc.gov; xhn3@cdc.gov

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The focus of this chapter is on the work environment and the nature of work itself, and how both can be designed to maintain or enhance the health and productivity of workers throughout the working life (also see Chap. 8, this volume). Although the goal at the individual level is ultimately the same (e.g., successful aging), the locus of influence is considered to exist primarily in the workplace. This emphasis on the environmental context of aging has a rich history in gerontology and has contributed significantly to the improvement of the lives of older adults across a variety of settings (e.g., Wahl, Iwarsson, & Oswald, 2012).

This chapter begins with a brief discussion of the economic and social impact of occupational injuries and illnesses, and then examines the link between chronological age and selected occupational health outcomes. The goal is to provide an overview of the challenges and opportunities that come with an aging workforce. Next, four guiding principles of an occupational health perspective on aging are described to serve as a framework for intervention efforts. Finally, the concept of age-friendly environments is explored by reviewing two domains outside of the workplace (aging in place, age-friendly communities/cities), and then shifting the focus to practical issues that arise in designing age-friendly workplaces.

22.2 The Burden of Occupational Injuries and Illnesses

Although not easily measured, the economic and social consequences of occupational injury and illness are considerable. In one of the most comprehensive analyses to date in the USA, Leigh (2011) reported annual direct (medical) and indirect (lost productivity) costs of $250 billion, with fatal and non-fatal work-related injuries accounting for $192 billion, and fatal and non-fatal work-related illnesses accounting for $58 billion. The total cost of $250 billion exceeds the costs for cancer ($219 billion), stroke ($174 billion), and diabetes ($63 billion).

Other approaches to quantifying burden have focused on a single type of health outcome in the workplace. Liberty Mutual, for example, annually releases a Workplace Safety Index identifying the top ten causes of disabling workplace injury and their direct costs to industry. According to the 2018 report, total direct costs of workplace injuries were $58.5 billion, with the top three causes being overexertion, falls on same level, and falls to lower level (Liberty Mutual Insurance, 2018). Goh, Pfeffer, and Zenios (2016) analyzed mortality and health costs associated with workplace stress. Combining health and employment data from multiple sources, they estimated that workplace stress contributes to at least 120,000 deaths per year and results in health expenditures of between $125 and $190 billion a year, or 5–8% of national spending on health care. The biggest factor driving health costs was high work demands, followed by lack of insurance and work-family conflict.

Globally, according to the International Labor Organization, there are 2.3 million deaths each year due to work-related injuries (0.3 million) and work-related illnesses (2.0 million; Takala et al., 2014). Three of the biggest killers are work-related cancer (32%), work-related circulatory diseases (23%), and occupational accidents

(18%). Depending on the country, the costs of work-related injury and illness range between 1.8 and 6.0% of the GDP.

Despite these compelling cost estimates, occupational health experts argue that they significantly underestimate the true burden on society (e.g., Dembe, 2001; Schulte et al., 2017). For example, the Leigh (2011) analysis did not account for costs due to labor turnover and retraining, presenteeism (working while sick), reduced ability to succeed at work in the future, depression or diseases of the nervous system (e.g., dementia), loss of other employment opportunities, and underreporting of injuries and illnesses. In addition, diminished worker health can have negative effects that extend beyond the workplace to affect the family (e.g., impaired relationships or increased risk of poverty), local community (e.g., inability to participate in civic life), and society (e.g., loss of human potential). Although a formidable task, there is a clear need to develop more comprehensive models for estimating burden. This need becomes accentuated when considering the impact of an aging workforce on the incidence of workplace injury and illness.

22.3 Aging and Changes in Occupational Safety and Health Outcomes

As the workforce ages, it is important to understand the changes in occupational safety and health that are likely to occur. A basic tenet of a life span perspective is that aging is associated with both losses and gains (Santrock, 2015). Although many of us are very much aware of the losses that come with age, the gains that occur may be less salient and perhaps even taken for granted. Table 22.1 presents a summary of selected outcomes that research suggests either worsen or improve with age.

This listing of variables is not exhaustive, but intended to provide a picture of the types of changes that occur with aging. Many of the variables that tend to worsen with age reflect the underlying decline in physiological functioning and increased vulnerability that accompany the normal aging process, although there is

Table 22.1 Selected occupational safety and health outcomes that tend to either worsen or improve with age[a]

Outcomes that tend to *worsen* with age	Outcomes that tend to *improve* with age
Rate of fatal injuries	Overall rate of non-fatal injuries
Slips, trips, and falls	Job satisfaction
Musculoskeletal disorders in physically demanding jobs	Organizational citizenship behaviors
Return to work following injury/illness	Diversity of knowledge and experience
Chronic health conditions (including neurodegenerative diseases)	Presenteeism
Skills obsolescence	Counterproductive work behaviors
Tolerance of shiftwork schedules	Conscientiousness

[a]Based on reviews conducted by: Grosch, Hecker, Scott, and Scholl (in press); National Research Council and the Institute of Medicine (2004); Ng and Feldman (2008); Yeomans (2011)

considerable individual variability as to when and how these changes take place. In the case of musculoskeletal disorders, age is a significant predictor when combined with a work environment high in physical demands (e.g., repeated lifting; Grosch & Pransky, 2009). In other words, workplace exposure needs to be considered in determining the relationship between age and musculoskeletal health. Skills obsolescence, or the degree to which a worker lacks new knowledge or skills, has also been linked to increasing age, although it is unclear whether it is age per se that matters, or other factors associated with age, such as a lack of training opportunities, a change in motivation, or the organizational culture's perspective regarding updating skills and the use of new technologies (Van Loo, De Grip, & De Steur, 2001).

In terms of improvements, a common thread appears to be the underlying change in crystallized intelligence (knowledge and skills acquired through experience) and emotional health that gradually improve with age. Growing older is associated with greater institutional and job-relevant knowledge as well as more positive attitudes and behaviors regarding work. These findings are consistent with those from the adult development literature examining changes in motivation, emotional regulation, values, and goals across the life span (e.g., Carstensen, Issacowitz, & Charles, 1999; Kanfer & Ackerman, 2004; Kooij, De Lange, Jansen, Kanfer, & Dikkers, 2011; Chap. 11, this volume). Another improvement in Table 22.1 is the overall decline in non-fatal injuries, although some sub-categories, such as slips, trips, and falls, tend to increase. This decline most likely reflects a number of factors including accumulated experience dealing with workplace hazards, increased cautiousness and awareness of the work environment, and reduced exposure to hazardous working conditions because of greater seniority and ability to select one's work activities.

Given the improvements and declines summarized in Table 22.1, it should come as no surprise that some work outcomes show little, if any, association with age. One notable example is job performance, which most studies find differs little between younger and older workers (Silverstein, 2008; Warr, 1994). An exception, however, may exist for jobs with extremely high physical or cognitive demands (Yeomans, 2011). Lower performance might also be found among older workers who internalize negative stereotypes of older adults (Levy, 2003, 2009; Stein, Blanchard-Fields, & Hertzog, 2002). Reasons for the lack of a consistent relationship include the fact that many jobs do not require individuals to perform at maximum physical or cognitive capacity, and the ability of older workers to employ strategies or practices that compensate for any losses occurring with age (Silverstein, 2008). Another workplace variable that fails to show a consistent relationship with age is absenteeism (Hackett, 1990; Yeomans, 2011).

In summary, the implications of aging for worker health and functioning are complex and do not necessarily follow from laboratory research. It should be noted that many of the studies conducted on aging and work rely on cross-sectional research designs in which data are collected from workers at a single point in time. This type of study, although much easier to conduct than following workers over several years, has been criticized for overestimating age-related changes (Hofer & Sliwinski, 2001). In addition, many of the relationships depicted in Table 22.1 are fairly modest

in magnitude and may be moderated by factors such as workplace accommodations, employee engagement, and the healthy worker effect (Pransky, Benjamin, Savageau, Currivan, & Fletcher, 2005). It is also true that relationships with age do not always follow a simple linear pattern, but can be curvilinear, such as in some studies of workers' compensation claims that have found higher rates for middle-aged workers versus lower rates for younger and older workers (SHARP, 2007).

Figure 22.1 depicts three hypothetical trajectories of aging (optimal, normative, and unhealthy) that may occur across the working life. Each trajectory is presented for variables that tend to improve with age ("gains") and variables that tend to worsen ("losses"). Although in real-world settings age-related change is rarely this smooth and consistent, Fig. 22.1 illustrates the basic goal of an age-friendly workplace: to minimize the losses or declines that occur with aging and maximize the gains or improvements (optimal aging).

In the case of minimizing losses, an important outcome is to delay functional limitations, disability, and other serious health conditions so that they occur later in the working life, if at all. This "compression of morbidity" (Fries, 1980) means that workers will experience a longer period of time when they are healthy. The gap between unhealthy and normative aging in Fig. 22.1 reflects a combination of genetic factors and adverse workplace exposures and their accumulation over time. It may be difficult to modify genetic factors, but substantive improvements to the workplace can help shift the trajectory from unhealthy towards normative or even optimal aging. In the case of maximizing gains, the goal is to build upon improvements in areas such as job-related expertise and organizational citizenship behavior through, for example, training, lifelong learning, and mentoring programs so that workers can continue to achieve their full potential and to make important contributions to the organization as they grow older.

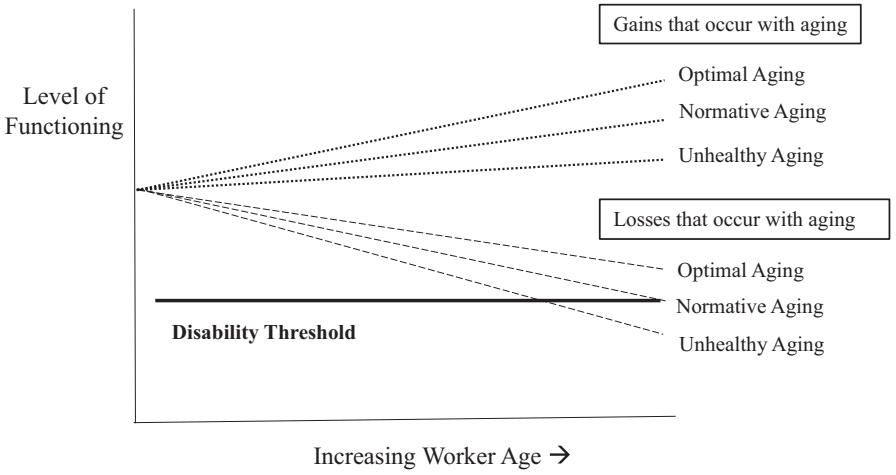

Fig. 22.1 Hierarchy of controls from the NIOSH *Total Worker Health*® perspective (NIOSH, 2016; figure available at: https://www.cdc.gov/niosh/twh/letsgetstarted.html)

22.4 An Occupational Health Perspective

Given the changes outlined above, and the goal of minimizing losses and maximizing gains, an occupational health prospective provides a general framework for designing age-friendly workplaces. Four guiding principles of this approach include (a) emphasis on primary prevention, (b) workplace safety as a foundation, (c) shared responsibility and benefits, and (d) a holistic, multi-level approach.

Emphasis on Primary Prevention A fundamental goal in occupational health is to stop the occurrence of an injury or illness before it ever happens. This can be accomplished by preventing exposure to occupational hazards (e.g., loud noise, harmful chemicals, and stressful working conditions) that lead to injury or illness, or taking steps such as educating workers or mandating safety and health practices that prevent the exposure from taking place. For an aging workforce, primary prevention becomes especially important since an injury or illness is more likely to be severe (or even fatal) and requires a longer recovery period (Mitchell, 1988).

The Hierarchy of Controls (NIOSH, 2016) provides a conceptual guide for determining effective and feasible solutions for controlling occupational hazards. The most effective strategy in the model is elimination or removal of the hazard followed, respectively, by substitution (replace hazard), engineering controls (isolate workers from hazard), administrative controls (change the way workers do their job), and the use of personal protective equipment. Recently, this model has been expanded by the NIOSH *Total Worker Health*® program to include other contributors to occupational health (NIOSH, 2016). Figure 22.2 presents this expanded model, along with brief examples for each level. Strategies are listed from top to bottom in order of their perceived effectiveness. This model emphasizes the impor-

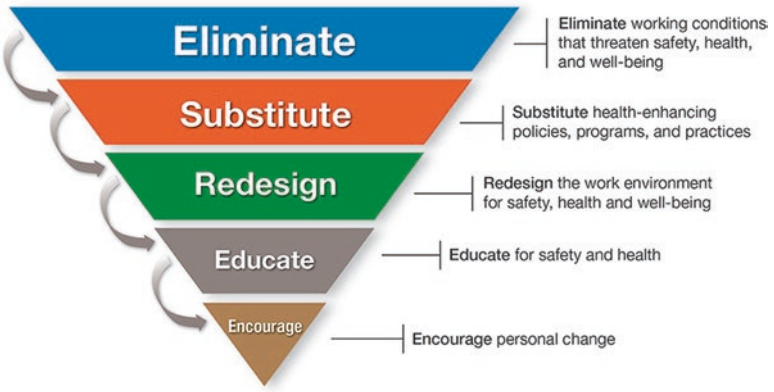

Fig. 22.2 Three hypothetical trajectories of aging in the workplace: optimal, normative, and unhealthy

tance of organizational-level interventions in advancing worker safety, health, and well-being. Although primary prevention is preferred, it should also be acknowledged that secondary (e.g., screening for injury/illness) or tertiary (e.g., preventing complications or worsening of existing health conditions) approaches may be necessary in some situations (Fig. 22.2).

Workplace Safety as a Foundation Given the range of strategies depicted in Fig. 22.2, a question often emerges as to where an organization should begin in designing an age-friendly workplace. In addition to an emphasis on primary prevention, ensuring a safe work environment provides an important foundation on which other programs or practices can build. In Maslow's hierarchy of needs, safety represents a basic human need, referred to as a "deficiency need," that must be met before other, higher-level "growth needs" such as belongingness and a sense of personal accomplishment can be realized (Maslow, 1962). In the workplace, safety covers many domains, including protection from chemical and biological agents, noise and lighting issues, vibration, radiation, temperature extremes, unsafe equipment and work area, and ergonomic hazards. In addition, psychosocial factors, which are relevant to virtually all occupations, play an important role and include workplace bullying, violence, harassment, discrimination, and a lack of organizational justice. When workers have concerns about their basic safety and security at work and these go unaddressed, other programs that address higher-level needs may not be effective.

Research on safety climate—defined as shared perceptions, attitudes, and beliefs about the importance of safety in the workplace—also illustrates the value of targeting safety-related issues. Studies across a wide range of industries have consistently found that a positive safety climate can be considered a "leading indicator" that predicts lower rates of workplace injury (Huang, Chen, & Grosch, 2010). Perhaps equally noteworthy, safety climate is also associated with a host of "quality of work life" measures, including trust in management, supervisor support, participation in decision-making, and job satisfaction (e.g., Grosch & Murphy, 2008). In other words, management commitment to safety communicates a certain level of concern and engagement that promotes a positive workplace culture overall and is likely to be reciprocated by workers.

Shared Responsibility and Benefits The general duty clause of the 1970 Occupational Safety and Health (OSH) Act requires that employers provide a workplace "free from recognized hazards that are causing or are likely to cause death or serious physical harm" (OSH Act of 1970, Section 5). This establishes a legal obligation for employers to proactively address recognized workplace hazards. At the same time, safety and health outcomes occur at the individual level, and a worker's behavior can sometimes contribute to those outcomes. For example, if appropriate safety equipment is available but not used by workers, its impact is likely to be minimal. Consequently, creating a healthy and productive work environment requires involvement by both employers and workers.

If responsibility is shared, so too should be the benefits. Although the interests of employers and workers often overlap, there can also be differences. With an aging workforce, employers may be most concerned with maintaining productivity, controlling health care costs, and reducing workers' compensation claims—all of which can be considered "organization-centered" outcomes. Workers may be more focused on the nature of their work activities and how they are treated by management or co-workers. As a result, "worker-centered" outcomes such as equitable treatment, opportunities to develop knowledge/skills, and a sense of making a meaningful contribution to the organization are likely to take priority. Increasingly, research on healthy work organizations has found that both types of outcomes are important and that a bi-directional relationship often exists between them (Harter, Schmidt, & Keyes, 2002; Wilson, Dejoy, Vandenbeg, Richardson, & McGrath, 2004). Therefore, measuring and improving both organization-centered and worker-centered outcomes are often considered necessary ingredients in establishing a culture of health within an organization.

A Holistic, Multi-level Approach Traditionally, occupational safety and health programs have focused on identifying and controlling hazards that adversely affect worker health. Although many advances in protecting worker health have been realized, this has sometimes led to a "siloed" strategy in which hazards are addressed in isolation. As our understanding of worker health has developed to include dimensions such as job stress (e.g., Sauter & Murphy, 1995) and well-being (e.g., Schulte et al., 2015), it has become clear that the determinants of health are many and often exist at different levels, both inside and outside the workplace. In addition, risk factors in the workplace may contribute to health issues previously considered unrelated to work, such as obesity, cardiovascular disease, and depression. One example of a comprehensive, multi-level approach is the NIOSH *Total Worker Health*® (TWH) strategy, which advocates "policies, programs, and practices that integrate protection from work-related safety and health hazards with promotion of injury and illness prevention efforts to advance worker well-being" (NIOSH, 2016, p. 1). TWH prioritizes a hazard-free work environment while also addressing other workplace systems, including those relevant to the control of psychosocial hazards and exposures, the organization of work, compensation and benefits, the built environment, and work–life management efforts.

Similarly, the impact of aging in real-world settings is complex and often described as a biopsychosocial process (Inui, 2003). Changes on one level (e.g., biological) can be affected by changes on another level (e.g., psychological or social). As a result, aging is best understood in the context in which it occurs, taking into account individual and workplace factors as well as those within broader society. An influential model of aging at work is the Work Ability model, which refers to an individual's capacity to continue working given work demands and available resources (Ilmarinen, 1999). This model, which has stimulated extensive international research, emphasizes the need to focus intervention efforts across four principal dimensions: physical working environment (e.g., ergonomics, reduction in prolonged physical exertion; see Chap. 10, this volume), individual health resources

(e.g., chronic disease management, health promotion), leadership and organization of work (e.g., workplace flexibility, job design), and professional development (e.g., training, lifelong learning; see Chap. 13, this volume).

Collectively, the above four principles provide a general strategy for designing age-friendly workplaces. This strategy is rooted in a traditional focus on preventing or managing exposure to potential health hazards, but is also informed by a broader view of worker health that includes a concern for well-being and related psychosocial factors at work including autonomy, work demands, and social support. The health of an aging workforce is determined by more than just the absence of hazards. It includes organizational features of the work itself and their potential to advance health (both physical and mental) in a positive direction.

22.5 Age-Friendly Environments

The goal of designing an age-friendly environment is not limited to the workplace. There are many contexts to which the term "age-friendly" has been applied (e.g., health care, businesses, parks, transportation systems, apartment buildings). Two areas receiving widespread attention, which may have implications for the workplace, are aging in place and age-friendly communities and cities.

22.5.1 Aging in Place

Although definitions differ slightly, aging in place refers to being able to continue living in one's own home or neighborhood safely and independently regardless of age while adapting to changing needs and conditions (Morley, 2012). The growing popularity of programs that support aging in place is partly due to the large majority of older adults—in one survey, nearly 90% of adults over 65 years of age (AARP, 2011)—who prefer to stay in their current home and community as they age. When properly implemented, aging in place can result in cost savings for families, health care systems, and government, as well as health and emotional benefits, when compared to institutionalized care. The term "place" refers to more than just a physical location and is conceptualized to also include psychological (e.g., sense of belonging and attachment), social (e.g., connectedness with others), and cultural (e.g., values and beliefs) dimensions (Iecovich, 2014).

Although aging in place is concerned with where an individual resides, its emphasis on the pivotal role played by the environment is relevant to the workplace. The Competence-Environmental Press theory, which provides a framework for many aging-in-place interventions, focuses on how a person fits into his or her environment (or P-E fit; Lawton, 1986; Lawton & Nahemow, 1973). Equilibrium occurs when an individual's competencies (or functional capacity) match the demands (physical, interpersonal, social) in the environment (or "environmental press"). If

the level of environmental press exceeds the level of an individual's competencies, P–E misfit occurs and leads to negative affect, maladaptive behavior, and ultimately poor health outcomes. As an individual ages and overall competencies gradually decline, the influence of the environment increases (Byrnes, Lichtenberg, & Lysack, 2006). If environmental press remains constant, then adverse outcomes can result. In contrast, an increase in individual competencies improves a person's ability to use environmental resources and achieve more positive outcomes.

This theoretical perspective has a number of implications for the workplace. The concept of person–environment fit is relevant to work and predicts that changes to both the environment and the individual can help maintain equilibrium and promote health and well-being. Since the environment plays an increasingly important role in functioning as workers age, this is clearly a target area for interventions. In the case of improving individual competencies, this should begin well before a worker is considered older, since maintaining (or improving) functional capacity and skill level benefits from a long-term approach. It has also been proposed that a person's environment can have a buoyancy effect, which is the inverse of environmental press (Glass & Balfour, 2003). In the case of aging, environmental buoying is often associated with environmental flexibility, resource availability, and social support. These characteristics affect person–environment fit and ultimately health and functional outcomes.

In terms of aging-in-place programs, there is an emphasis on providing a wide range of home- and community-based services that make it possible for older adults to maintain their quality of life and remain at home. In many cases, physical modifications to the home environment are needed, such as removing trip or fall hazards, providing adequate lighting, reducing level of clutter, smoothing floor surfaces, widening stairways, and installing walk-in tubs (AARP, 2000; Gitlin, 2003). Many of these changes use the principle of universal design, which involves creating products or environments so they can be accessed and used by all individuals to the greatest extent possible, without regard to age or disability. Some of the features of universal design include simple and intuitive use, minimizing physical effort, reducing any adverse consequences in the case of error, and accommodating a wide range of abilities and preferences (National Disability Authority, 2012). The use of in-home technology to help with daily tasks, provide memory support, monitor health, and help maintain social and family relationships can also play an important role in aging-in-place efforts (e.g., Mynatt, Melenhorst, Fisk, & Rogers, 2004).

Although these strategies may require further customization before being used in the workplace, they suggest an approach that can generate possible solutions for helping aging workers remain healthy and productive. In most aging-in-place efforts, there is a thorough attempt to understand the needs of older adults relative to the demands they face in their surrounding environments. Once these needs are identified (often through focus groups, interviews, and health assessments), proposed changes need not be complex or expensive. The strategy of many small changes across different domains (e.g., physical, psychological, social) can produce sustainable improvements in health and well-being. Also, the benefits of

aging-in-place programs are not necessarily limited to the older adults they are designed for, but can extend to many other groups as well.

22.5.2 Age-Friendly Communities/Cities

On a more macro-level, there is a rapidly growing interest in making communities and cities more age-friendly, due in part to population aging and increased urbanization. In contrast to traditional public policy that focuses on providing individually targeted support services for older adults such as Medicare, meals-on-wheels, and Social Security, age-friendly communities and cities emphasize modifying the broader physical and social environment as a means of advancing health and capacity to function (Greenfield, Oberlink, Scharlach, Neal, & Stafford, 2015). This focus is imperative because the infrastructure of many communities is simply not designed to deal with the changing needs of residents as they age. It is estimated that less than one half of the cities and towns in the United States have started to make the changes that an aging population will require (N4A, 2007).

In recent years, age-friendly initiatives have been introduced in a wide range of settings, both large and small, throughout the world (Fitzgerald & Caro, 2014; O'Hehir, 2014; Scharlach, 2012). Terminology varies slightly and includes descriptors such as "elder friendly," "aging friendly," "livable communities," "naturally occurring retirement community," "lifetime neighborhoods," and "active aging community." In many cases, the goals of these efforts overlap with that of aging in place in that there is a desire to design the environment so that older adults can remain and lead fulfilling lives in their current living arrangements. A review of the international literature noted that efforts to design age-friendly communities and cities can be categorized on two different continua (Lui, Everingham, Warburton, Cuthill, & Bartlett, 2009). The first continuum is the degree to which an age-friendly initiative focuses on physical infrastructure or services versus the quality of the social environment. The second is the degree to which an initiative is based on a centralized planning process (top-down) versus a more participatory approach (bottom-up), in which older adults are empowered to suggest and help plan changes in their environment.

One of the most large-scale initiatives is the World Health Organization's (WHO) Global Age-Friendly Cities project that began in 2005. Based on focus groups conducted with almost 1500 older adults at least 60 years of age in 33 different countries, as well as focus groups with caregivers and service providers, WHO developed a detailed guide for cities to use in developing an age-friendly environment (Plouffle & Kalache, 2010; WHO, 2007). The WHO model focuses on the following eight core indicators: outdoor spaces and buildings, transportation, housing, social participation, respect and social inclusion, civic participation and employment, communication and information, and community support and health services. The first three indicators focus on the physical environment, the second three on the social

environment, and the final two on features that combine indicators that are both physical and social.

The WHO definition of an age-friendly city is "an inclusive and accessible community environment that optimizes opportunities for health, participation, and security for all people, in order that quality of life and dignity are ensured as people age" (WHO, 2015, p. 3). This model has led to practical tools such as an 84-item checklist for self-assessing a city's core indicators, a database of age-friendly practices that have been implemented, and a global network of over 700 cities and communities in 39 countries that allows for an exchange of information, knowledge, and solutions regarding age-friendly environments.

In addition to the WHO Global Network, there are many other age-friendly community or city initiatives at local as well as national levels. For example, AARP has a livable communities program that includes dimensions that overlap with the WHO model but also adds walkability, shopping, and recreation and cultural activities (AARP, 2005). A Livability Index is available to assess a community setting (AARP, 2018) with the goal of identifying strategies for developing environments that advance successful aging. The AdvantAge Initiative is a community-building effort that focuses on four domains: maximizing independence, optimizing physical and mental health and well-being, social and civic engagement, and basic needs of safety and housing. This initiative provides information on a vast of array of aging-related programs in the USA and other countries (AdvantAge Initiative, 2013).

In summary, both aging in place and age-friendly communities and cities demonstrate how changes to the physical and social environment can have a powerful influence on the health and functioning of older adults. Age-friendly environments help individuals meet basic needs, but also provide support for learning, growth, and maintaining social connectedness. These environments recognize the wide range of capacities of older people and respond flexibly to aging-related needs and preferences.

22.5.3 Age-Friendly Workplaces

In terms of aging, there are at least two important ways in which the workplace differs from the home and community/city settings. First, chronological age and the severity of health conditions and functional limitations tend to be higher for older adults in the general population trying to remain in their homes or in their communities or cities. In the workplace, if health impairments are severe enough, a worker is likely to seek a job elsewhere or leave the workforce altogether. This "survivor effect" means that workers are likely to be healthier and at a stage where modifications can be particularly helpful in preventing future health problems. Second, as mentioned earlier, the workplace environment extends beyond the physical setting to include the nature of the job. This refers to the structural arrangements of work such as number of hours worked per week; type of work shift; availability of health care and other benefits; training opportunities; and whether employment is full- or

part-time, permanent, or non-standard (e.g., independent contractor, on call). Work can also be viewed in terms of job characteristics, such as physical and cognitive demands, participation in decision-making, time pressure, skill variety, task significance, job security, flexibility, and supervisor or co-worker support. All of these features of work provide potential targets for age-friendly modifications.

Strategies for developing age-friendly workplaces come from a number of different sources. One of the more extensive efforts, supported by the European Foundation for the Improvement of Living and Working Conditions (Naegele & Walker, 2006; Walker, 1997), consisted of a wide-ranging series of case studies conducted with organizations in several different European Union (EU) member countries that had implemented "good practice in age management." A good practice was defined as "employment conditions for older and ageing workers that provide an environment in which each individual can achieve their full potential without being disadvantaged by their age" (Taylor, 2006, p. 25). Table 22.2 presents a list of the eight dimensions of good practice that were identified in the project, along with information about the goal of each dimension, an example, and benefits reported by employers.

Of the eight categories, "flexible working time practices" is one that continues to receive growing attention, in part because of the range of practices (e.g., flexible schedules, flexplace, options for time off), and the appeal of flexibility to all workers regardless of age (Pitt-Catsouphes, Matz-Costa, & Besen, 2009). The dimension of "health protection, health promotion, and workplace design" comes closest to the NIOSH *Total Worker Health*® model in advocating strategies across different levels of the workplace (individual, physical environment, and work organization). "Comprehensive approaches" were observed, although they were more common in larger organizations and were generally not as widespread as individual approaches. The type of evaluation conducted of these eight practices varied considerably across EU member countries and organizations, and rarely included comparison groups, cost/benefit data, or long-term analysis of sustainability. In spite of these limitations, these case studies provide a rich source of examples on potential age-friendly practices.

Perhaps one of the best known case studies, conducted separately from the EU effort, took place at a BMW production line in Germany (Loch, Sting, Bauer, & Mauermann, 2010). Relying extensively on input from workers (whose average age was 47), more than 70 small changes were implemented including adjustable worktables, larger typeface on computer screens, orthopedic footwear, manual hoisting cranes, and wooden flooring. In addition, BMW established job rotation to better distribute physical demands, and they offered strength and stretching exercises to all workers. The total cost of these modifications was approximately $50,000. BMW reported a 7% improvement in productivity to levels comparable to lines staffed by younger workers. Time off for sick leave decreased to below the company average and the defect rate fell to zero.

Another source of information on age-friendly practices are award programs sponsored by government, non-profit organizations, and professional associations that collect qualitative data similar to that in case studies. Recently, the European

Table 22.2 Eight dimensions of good practice in age management[a]

Dimension	Goal	Example	Benefits reported by organizations
Recruitment	Provide older workers access to available jobs, reduce age discrimination	Training of interviewers, selection process not focused on age	Greater age diversity; raise general skill level of workforce
Training and lifelong learning	Ensure that all workers have training and learning opportunities	Customize efforts to motivate learners and provide support; linking training strategies to life course	Raise overall skill level; greater employability; willingness to take training later
Career development	Provide older workers with opportunities for progress; expand skills and knowledge	Provide advice and feedback regarding career progress and goals	Reduced physical strains and mental stress; worker skills are better utilized
Flexible working time practices	Give workers greater flexibility in their work hours and other aspects of employment	Adjustment of shift schedules; flexible working hours; job rotation	Improved health and motivation; better work–life balance; reduced absenteeism and sick days
Health protection, health promotion, and workplace design	Adjusting work processes and the organization of work to advance health and the capacity to work	Reducing safety risks (e.g., falls); improving ergonomic design; access to health promotion programs	Improved health status; greater job satisfaction; fewer injuries; decreased health-related costs; lower absenteeism
Redeploying older workers	Balance demands of workplace with capacity of workers	Replacing demanding work activities with less demanding ones	Maintenance or improvement of worker productivity; improved motivation; expertise retained
Employment exit and the transition to retirement	Provide options and greater control in leaving job or entering retirement	Flexible forms of retirement that allow for gradual reduction in hours	Facilitates succession planning; reinforces sense of fairness
Comprehensive approaches	Implement several age-friendly strategies at once	Combining age-specific ergonomic interventions with leadership training and mentoring programs	Greater lasting impact; more likely to result in a cultural change

[a]Based on reports by Naegele and Walker (2006); Taylor (2006); Walker (1997)

Agency for Safety and Health at Work announced "good practice awards" in conjunction with their 2016–2017 Campaign on *Healthy Workplaces for All Ages* (European Agency for Safety and Health at Work, 2017). Selection criteria included interventions that reduce workplace risks in the context of an aging workforce, consultation with workers, a holistic approach, examples that demonstrate a real

improvement, and sustainability. A wide range of good practices were recognized, including better ergonomics to reduce musculoskeletal disorders, use of assistive devices to reduce physical demands, flexible working arrangements to improve work–life balance, and multiple health-based programs to improve work ability. In the United States, the Age Smart Awards program recognizes age-friendly workplace strategies utilized by employers in New York City (Finkelstein, Roher, & Owusu, 2013). Strategies identified as being particularly effective include: clear paths to advancement from within, cross-training and mentoring, workers having input into design of work stations, work hours and location that are flexible, and job structuring to fit the ability of workers.

On a more empirical level, the Work Ability model developed by Ilmarinen and colleagues (described earlier in this chapter) has generated a great deal of research and provides a useful conceptual approach for designing an age-friendly workplace. Many of the studies testing the model use the Work Ability Index (WAI), which consists of seven items that assess work demands and an individual's health status and resources. Scores on the WAI predict sickness absence, future disability, early exit from the workforce, as well as health and life quality after retirement (Feldt, Hyvönen, Mäkikangas, Kinnunen, & Kokko, 2009). A recent review and meta-analysis of 17 randomized control trials involving workplace interventions to improve work ability found a small positive effect, indicating that these interventions might improve work ability (Oakman, Neupane, Priper, Kinsman, & Nygård, 2018). However, the quality of the evidence was rated as only moderate, largely because compliance with the work ability intervention was low in some of the studies. Interestingly, multi-level interventions (individual and workplace) were fewer in number and did not seem to result in significant improvements in work ability, although the authors note the need for additional high quality studies and for taking into account the role of individual capabilities in evaluating an intervention's impact.

There are also workplace strategies not specifically labelled as age-friendly that may have benefits for an aging workforce. For example, there is strong empirical evidence that return to work (RTW) programs can decrease work disability duration and be cost-effective, especially for larger employers (e.g., Franche et al., 2005; McLaren, Reville, & Seabury, 2010). Since an older worker, once injured, is more likely to experience a severe injury and take longer before returning to work, these programs can play an important role following an injury or illness. RTW programs vary considerably, but practices such as providing workplace accommodations, using a trained RTW coordinator, and encouraging contact between health care providers and the workplace seem to be important (Franche et al., 2005). A related strategy is the prevention and management of different chronic health conditions such as arthritis, hypertension, and diabetes, all of which show an increase in prevalence with age. Although we know that lifestyle and workplace factors both play an important role in the development of chronic conditions, we are just beginning to study the types of workplace accommodations and other strategies that may be effective in improving quality of work life and employment outcomes (Gignac et al., 2018; Sorensen et al., 2011). Workplace health promotion programs are another example of a strategy that can yield positive results in terms of worker

health outcomes (e.g., Goldgruber & Ahrens, 2010). These programs work best when there is a supportive workplace culture (Kent, Goetzel, Roemer, Prasad, & Freundlich, 2016). It is not entirely clear whether the benefits of these programs vary by age.

22.6 Some Practical Guidelines for Designing Age-Friendly Workplaces

Earlier in this chapter, we described four general principles from an occupational health perspective for designing age-friendly workplaces. Findings from case studies, award programs, and empirical research provide additional guidance for successful implementation. Ten key factors advocated by different aging workplace experts (e.g., Naegele & Walker, 2006; SHRM, 2016; Taylor, 2006; Truxillo, Cadiz, & Hammer, 2015) include the following:

- *Including workers from all age groups*. Almost all efforts to design age-friendly environments, whether in the workplace or for the general population, should start by seeking input from the individuals who will be affected by the change. In the workplace, it is important to include not just older workers, but workers of all ages in identifying needs and suggesting possible solutions.
- *Conducting a thorough needs assessment*. The foundation of any age-friendly strategy should be a thorough understanding of both the workforce and the work environment. This includes: the changing age structure of the workforce, skills that are essential to the organization's mission, current or potential workplace hazards and risk factors, health and well-being issues affecting workers, and current organizational programs, policies, and practices that are relevant to an aging workforce. Data, both qualitative and quantitative, should be collected from as many sources as possible including worker surveys, organizational records, focus groups, and observation.
- *Ensuring management commitment*. An age-friendly program or practice is more likely to succeed if it has the active support of management. This support involves providing appropriate resources, communicating continuously about the program and its implementation, and being able to build acceptance of the program throughout the organization.
- *Focusing on aging workers—not just older workers*. There is strong evidence that programs to improve health and well-being are more effective when they are implemented early for workers, as opposed to waiting until an individual is considered older. Aging should be viewed as a continuous, lifelong process that all workers experience. Successful interventions are likely to have a positive impact on everyone who participates, not just those over a certain age (Crawford, Graveling, Cowie, Dixon, & MacCalman, 2009).
- *Choosing workplace design goals that are large enough to make an impact, but manageable enough to be accomplished*. Implementing a holistic or multi-level

design strategy can be a formidable task. The organizational change literature emphasizes the need to select feasible goals that generate support from both management and workers. Workplace programs can be implemented in gradual steps, or first as pilot program that allows for adjustments before being extended to other parts of the organization.

- *Understanding that many small changes can add up to have a big impact*. The BMW case study illustrates how many small scalable changes can collectively result in an effective strategy that improves worker health and productivity. The deciding factors seem to be how well the changes fit together as a coordinated strategy, and the degree to which they address the balance between work demands and individual resources.
- *Addressing multi-generational issues*. The changing age structure of the population has resulted in organizations that have as many as five generations working together. As a result, it may be important to tailor communication strategies and/or approaches in designing the work environment to meet different needs and preferences. The goal should be to foster a culture that respects and utilizes the unique skills, knowledge, and abilities of all age groups (Rudolph & Zacher, 2015). Such a culture also can encourage workers to manage age-related conflicts effectively and engage in mentoring and reverse mentoring to pass along valuable knowledge.
- *Implementing programs in a careful and flexible manner*. Research suggests that *how* a workplace program is implemented can be as important as *what* is implemented. A workplace program should be transparent and developed in sufficient detail to address how the program or intervention will work, who will be involved, barriers that may occur and how they can be overcome, expected timetable, and clear benchmarks for accessing progress. Implementation should be done in a flexible manner taking into account worker response and unexpected events. A model or theoretical perspective on aging (e.g., work ability) can also be useful in guiding the implementation process.
- *Conducting a comprehensive evaluation*. A systematic evaluation of a program can provide valuable information about what works and why. An evaluation should examine how the program was implemented (e.g., percent of eligible workers who participated, whether program met worker needs) and whether or not desired outcomes were achieved (e.g., reduction in musculoskeletal complaints, increased employee engagement). Conducting a cost–benefit analysis can also provide valuable data to help guide future efforts.
- *Adopting a long-term perspective that includes a concern for sustainability*. Many of the age-friendly practices described in this chapter require time to implement and may need to be adjusted based on feedback after they are introduced. Improvements in targeted safety and health outcomes can occur slowly. A long-term perspective encourages the development of workplace strategies that are more than a novelty and can continue to be relevant and effective over time and changing conditions.

22.7 Summary

In summary, there is a growing knowledge base of age-friendly strategies for the workplace. Much of this knowledge comes from case studies, often conducted in the EU, although some recent efforts have taken place in US companies (e.g., SHRM, 2016) and elsewhere. More in-depth case studies are needed across a wider range of countries that address aging-related concerns in specific industries and work settings (e.g., small business). In addition, regular surveillance through national and local surveys of programs used by employers to address the needs of an aging workforce is needed (e.g., Chap. 14, this volume), as well as a greater sharing of information regarding the details of those programs that work and those that do not work.

As in studies of aging in place and age-friendly communities and cities, policies and practices that benefit older individuals quite often have benefits for all individuals, regardless of age. Empirical studies of age-friendly strategies also exist and provide support for the effectiveness of these approaches. Holistic strategies targeting multiple levels of the organization are often recommended, but high quality research evaluating these approaches is limited, as are studies on some single-issue strategies such as the prevention and management of chronic health conditions. Additional research is clearly needed to identify strategies that work, and individual- and organizational-level factors that moderate effectiveness. At the same time, from the studies that have been conducted, we have developed better insight into the key steps organizations should take in their efforts to design an age-friendly workplace.

22.8 Going Forward

A survey of human resource professionals in the USA found that although 87% reported some level of awareness regarding aging workforce issues, only 36% were beginning to examine management practices and policies, and a mere 13% had actually proposed or implemented formal policies or programs to address these issues (SHRM, 2015). This gap between knowing and doing represents a major challenge for the future. In recent years, our knowledge of the subtleties of aging and its role in occupational health has grown substantially. Still developing is our ability to apply that knowledge to make practical and cost-effective improvements in the workplace.

In the decades ahead, the aging population will not only be getting larger, it will also be getting more diverse. In addition, the workplace itself will be changing as the impact of globalization, advances in technology, robotics, new forms of employment (e.g., gig work, use of independent contractors, mobile work), and new approaches to retirement (see Chap. 18, this volume) become more pervasive. These changes will pose new challenges and require an even greater understanding of the different ways a workplace can be designed to meet the needs of an aging workforce.

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