

MANAGING WORKPLACE DEMOGRAPHICS

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1 INTRODUCTION

Managing the changes occurring in the world of work, the workplace, and the workforce is a daunting challenge for firms. Technological advancements such as nanotechnology, automation, artificial intelligence, and robotics are leading to advances in manufacturing methods, digital delivery of services, new forms of energy production, and a more educated workforce. Workers are becoming more entrepreneurial, more globally connected, and working more often in virtual workplaces. All of these changes require firms, employers, workers, and safety and health professionals to rethink how to manage the future world of work.

The mix of industries in the United States has also changed. Employment in the manufacturing and energy sectors is declining, while employment in the services and healthcare and social assistance sectors is increasing. Since the mid-twentieth century, there has been a marked slowdown in the growth of the workforce across the developed world, leading to worries about future labor shortages. Changes in the age, gender, and racial/ethnic composition of the workforce are also occurring that mean diversity management is a competency that safety and health professionals will need to acquire. Up to five generations are now working alongside each other in the workplace – traditionalists, baby boomers, Gen X, Gen Y (millennials), and Gen Z (1). Each generation has different attitudes about the role of work in their lives, different ways of communicating, and different perspectives on how workers should be managed (2).

Work arrangements are also changing. In the United States and other developed countries (3), the standard employer–employee relationship provides a “safety net” of

federal and state law protections for those workers deemed by law to be “employees.” However, the traditional employment relationship now exists alongside alternative work arrangements that lack the same labor law protections for workers. These alternative arrangements include coemployment, or “temporary” worker arrangements, contract, or business arrangements, and a “gig” arrangement, ostensibly intermediated by an online digital platform rather than an employer. The classification of gig workers in the transportation sector as independent contractors instead of employees is a contentious legal issue in the United States (4) and in Europe (5). Rules pertaining to the classification of workers as employees or contractors are unique to each country, and safety and health professionals and human resource professionals should review the specific requirements for each country when it comes to the classification of workers as employees or contractors (3).

For much of the twentieth century, a manager’s chief concern was planning, organizing, coordinating, and controlling the operations of the firm, but this is no longer so in the twenty-first century. Managers must now be aware of the demographic changes affecting the workforce in society, and their workforce in particular. Awareness must lead to the acquisition of competencies to manage both a more diverse workforce and a workforce that is a blend of standard employees with one employer, temporary employees with two employers, and gig workers with a business arrangement intermediated by a digital platform instead of an employment relationship. Managing these demographic and work arrangement changes presents a number of challenges to workers, firms, and society. This chapter presents a brief overview of the most salient workforce demographic changes

and work arrangement changes, and offers some change management perspectives on each for safety and health practitioners. Changes to the workplace resulting from technological advances are covered in other chapters.

2 WORKFORCE DEMOGRAPHIC CHANGES

2.1 Workforce Growth

Between 1950 and 2000, the civilian workforce grew from 62 million to 141 million people – an annual growth rate of 1.6% per year (6). The Bureau of Labor Statistics (BLS) projects that the US workforce is expected to grow from 159.2 million in 2016 to 169.7 million people in 2026 – an annual growth rate of just 0.6% per year (7). The projected slowdown in workforce growth is due to two major factors. One is a change in the composition of the working age population, and the other is a decline in the labor participation rate (8).

Despite an overall decline in workforce growth, the major growth in jobs will come in the services sector of the economy. The BLS projects that the services sector will add more than 10.5 million jobs to reach over 135.8 million jobs or 91% of all jobs added from 2016 to 2026 (7). Fastest growing jobs will be in the healthcare and social assistance sector of services because of longer life expectancies, an aging population, and the rise in chronic medical conditions (9).

2.2 Age Structure of the Workforce

The share of the US population aged 55 or older is rising rapidly. In 2000, the 55-year-and-older cohort made up 13% of the workforce. By 2020, this group is projected to increase to 20% of the workforce, and, by 2050, older workers will still constitute 19% of the workforce. However, millennials (those born between 1981 and 1997) have caught up with the baby boomers (those born between 1946 and 1964) (10). In April of 2016, population estimates from the US Census Bureau showed that millennials were estimated to number 75.4 million individuals, surpassing the 74.9 million baby boomers (11).

By 2024, a large proportion of the 55-year-and-older cohort will have left the workforce. As they leave, they will take their experience, skills, and institutional knowledge with them. The share of the prime workforce – those workers aged 25–54 years of age – is expected to decline until 2020, and then grow only slowly following that date (6). Even though they may leave the workforce on a full-time basis, firms may still want to retain them on a part-time, “retired-but-still-working,” basis, but these returning workers may want more flexible scheduling than permanent workers.

Slowing workforce growth and age-related changes in the workforce require firms to engage in “demographic risk management.” In general, two age-related risks can influence firms. The first is a productivity risk (12). Older workers bring value to the firm because of their experience, but older workers have more chronic medical conditions that may affect work performance than younger workers have. Chronic medical conditions, such as high blood pressure, arthritis, and respiratory and heart disease, may lead to more absences and a diminished physical tolerance in some workers. Physically demanding tasks may pose both a productivity risk and a safety risk for the firm with an aging workforce. Older workers may be less interested in promotional opportunities because they have less need of career advancement. Managing productivity risks by job function is especially important in industries and firms that are expected to see talent shortages in the future. Companies should capture what experienced workers know before they leave the workforce.

Safety professionals need to be wary of emphasizing the frailties and limitations associated with age without evaluation of each worker on an individual level. Mature workers can often function at a similar physical and cognitive level than younger workers. In addition, the organization may benefit from a mature worker’s experience with the particular process, condition, or task. An emphasis on positive outcomes for both aging workers and their organizations can support the safety and health actions that lead to productive aging for all workers (13).

Second, firms face a capacity risk (12). Retiring workers take institutional knowledge and skills with them when they leave the firm. This knowledge loss and skills shortage can disadvantage a firm’s operations. Firms need to assess job functions to determine which ones are at risk of being adversely impacted by retiring employees. Succession planning, including ensuring adequate time for a new employee to develop expertise in a critical job function, is an effective demographic risk-management technique.

2.3 Labor Force Participation and Labor Productivity

Labor participation, together with capital investment and technological innovation, is one of the major contributors to economic growth. The participation rate is measured by first dividing the population into “participants,” i.e., the employed and the unemployed, and the “nonparticipants,” i.e., children, the disabled, and those that are not working and not searching for work. The numerator of the rate is the sum of all people employed and unemployed, and the denominator is civilian, noninstitutional, population 16 years of age or older.

After steady increases for six decades, the labor participation rate – the proportion of the civilian, noninstitutional,

population in the workforce – peaked at 67.1% for each year from 1997 to 2000, and then declined to 62.8% in 2016 (7). There are two views about the causes of the declining participation rate. One view suggests that the decline in the participation rate is a reflection of demographic change – the participation rate of baby boomers, born from 1946 to 1963, is declining at the same time the participation rate for those birth cohorts following – 54 years of age and younger – is also declining (14). An alternate view suggests that the decline in the participation rate is the result of poor performance by the economy, resulting in fewer jobs or jobs taken by robots (14).

Regardless of the reasons for the decline, a workforce's contribution to the gross national product is determined by how productive the workforce is. This measure is called labor productivity – workforce output per hour worked (7). Labor productivity can be increased by technological advances, management practices, capital investments, economics of scale, and worker health. From 2006 to 2016, labor productivity increased 1.2% annually, down from 2.8% the previous decade. Projections are for labor productivity to grow 1.6% annually from 2016 to 2026 (7).

Traditionally, with fewer people working, the ability to generate greater economic output is difficult (7). However, better automation and information technology may enable work to be more efficient, resulting in more output per hour worked. We may be entering an era when economic growth is no longer pegged to workforce growth, leaving an era when manufacturing depended on manual labor instead of advanced manufacturing methods (15).

2.4 Generational Diversity

At the same time the workforce growth and labor market participation rates are slowing, the US workplace is experiencing a unique historical event – the presence of five different generations of workers in some workplaces at the same time. Generations are divided by their birth cohort into five groups: (i) traditionalists (born before 1946); (ii) baby boomers (1946–1964); (iii) Generation X (1965–1980); (iv) Generation Y or millennials (1981–1997); and (v) Generation Z (born after 1999) (16).

Multiple generations in the same workplace may have different attitudes about work, loyalty toward the employer, respect and authority, learning styles and training needs, supervision, how work–life balance should be considered, and how attached a worker should be to a particular workplace or to one's work associates (2). Cross-cultural differences can also magnify generational differences (2). Generational diversity can also pose a challenge to achieving organizational coherence as well as creating a consistent safety and health culture (16). Perceptions of about how to achieve safety culture may vary across individuals and

generations. Creating a constructive organizational culture in a diverse workforce depends on safety leadership (17). Leaders need to be transformational leaders; they need to understand generational values and work styles, find commonalities among generations, encourage employees to share their perceptions of other generations, and promote exchange of safety ideas across generations (18).

Leaders must stimulate an inclusive working environment in which people from diverse backgrounds feel respected and recognized (19). Research shows that the style and quality of leadership is associated with, and predictive of, occupational safety and health outcomes more than any specific program (19). Although there is no leadership approach that ensures a high-performance organization for safety, transformational leaders practice taking personal accountability, are willing to take new actions based on input from employees, are curious rather than judgmental about what others think and their different cultural approaches, and look for every opportunity to achieve improvements in the safety profile of a workplace even if it was not their idea (20).

2.5 Gender Diversity

A major factor that led to the workforce growth rate in the United States in the latter part of the twentieth century was the increase in the participation rate by women. In 1950, the labor participation rate for women was 34%. Women's participation rate increased to 60% by 2000 – an annual growth rate of 2.6%. In just one decade, 1970–1980, women's participation rates increased by 20.5% in the 25–34 age group, and by 14.4% in the 35–44 age group (6). The gap between men and women in the workforce has narrowed over the past several decades. In 1950, men accounted for more than two-thirds of the US workforce. By 2000, the gender gap had narrowed to just 7.0%, and by 2024 is projected to be only 5.6% (21). From the peak in 2000, the women's participation rate has declined each year since then (6). The US BLS expects the participation rate for all women to be 55.8% in 2024 (22).

The increased share of women in the workforce has led to a greater emphasis on gender-specific issues such as equal pay, prevention of gender-specific discrimination, and maternal and child leave policies. Gender diversity has become a business asset. The Gallup Organization found that in the retail and hospitality industries, gender-diverse business units have 14% higher revenue than less-diverse business units (23). Gender-diverse teams perform better than single-gender teams largely because different viewpoints and approaches assist a firm in tailoring goods and services to an increasingly gender-diverse customer base (23). Despite their large representation in the population and in the workforce, women occupy only about 25% of senior management positions in the private sector globally (24).

2.6 Racial and Ethnic Diversity

The American workforce has become more racially and ethnically diverse over the past century as the diversity of the Nation's population has increased. The workforce is projected to become even more diverse in the twenty-first century. Immigration, higher fertility rates, and higher labor force participation rates among minority populations such as Hispanics, Asians, and African-Americans have led to an expanded minority share of the American workforce (11). By 2050, there will be no single racial or ethnic majority in the United States (25).

2.7 Diversity Management

Workplace diversity can be thought of as the process of understanding, acknowledging, accepting, and valuing the age, gender, racial/ethnic, varying abilities, and cultural differences among workers (26). The increasing diversity of the workforce can lead directly to a diversity management opportunity (27).

Diversity management entails avoiding stereotyping people based on age, gender, and racial or ethnic status, emphasizing cross-cultural communication strategies, encouraging diverse teamwork, and treating all workers equally based on objective performance criteria (28). Organizations that fail to invest in managing the diversity inherent in the changing workforce demographics risk higher employee turnover rates, higher absenteeism rates, and invite lawsuits based on sex, race/ethnic, and age discrimination (28). A strong business case can be made for firms that engage in effective diversity management, successful talent recruitment and retention, improved market understanding, and enhanced worker creativity and innovation (28).

At the same time safety professionals promote the demographic diversity in their workforce; they must be careful to make safety-related decisions based on a worker's ability to get the job done. Making safety-related decisions based on age, gender, or race may constitute employment discrimination (29). Diversity management benefits the organization and its workers by creating a fair and safe environment where everyone has access to the opportunity to succeed (30). Safety managers must also use a balanced approach to changing organizational culture. In addition to providing information and training on rules and regulations, safety managers should aim for more permanent changes by emphasizing the importance of organizational values.

3 ALTERNATIVE WORK ARRANGEMENTS

Even though demographic changes in the workforce present a number of management challenges to firms, changes in

work arrangements may be the most pressing challenge. The relationship between entities offering jobs, and individuals accepting those jobs, comes in several different forms (31). Firms in the mid-to-late twentieth century increasingly shifted from the exclusive use of the traditional one employer—one employee relationship and moved toward using alternative arrangements that transferred some of the risk of doing business from the firm to the worker (32, 33). While firms benefit economically from these new "flexible" work arrangements (34), others see the new work arrangements as "precarious" for workers (35–37).

3.1 Types of Work Arrangements

3.1.1 Standard Employment Relationship

The standard employment relationship is an arrangement in which an employer exerts directive control over how a worker provides services to that employer (38). The twentieth century industrial model of the standard relationship predominately involved an individual who provided services exclusively to one employer on a predictable workweek schedule (usually 40 h week⁻¹) at the employer's place of business with the mutual expectation of long-term career development (39).

Individuals in a standard employment relationship are defined legally as "employees" and are given worker protections under numerous federal and state labor laws. Examples of these labor protections are as follows: (i) old-age assistance and disability benefits under the Social Security Act of 1935¹; (ii) collective bargaining rights under the National Labor Relations Act of 1935²; (iii) minimum wage, overtime, and child labor protections under the Fair Labor Standards Act of 1938³; (iv) employment discrimination protections under Title VII of the Civil Rights Act of 1964,⁴ the Age Discrimination in Employment Act of 1967,⁵ and the Americans with Disabilities Act of 1990⁶; and, importantly, (v) safety and health protections under the Occupational Safety and Health Act of 1970.⁷ Under the Occupational Safety and Health Act, independent contractors are not covered by law. Their safety and health is their own responsibility.

3.1.2 Coemployment Arrangements

Following World War II, women war factory workers started being hired by a labor supplier, i.e. an agency such as Kelly Services, for time-limited work assignments at the premises of another employer, i.e. a client in an office setting. This type of temporary help services model is also known as a coemployment or joint employment arrangement (40) and was an early form of alternative work arrangement. The agency pays wages, unemployment and workers' compensation premiums, and assigns their employee to the client employer who directs the employee's work. Historically,

temporary agency workers were assigned office administrative support tasks (41), but the use of temporary workers by firms is now expanding out of the low-wage sector into the legal services, business and financial operations, information technology, manufacturing, health care delivery, and education occupations (42).

3.1.3 Contract Work Arrangements

A worker is an independent contractor “if the payer has the right to control or direct only the result of the work and not what will be done and how it will be done” (43). An independent contractor provides services as part of a business relationship, and not as part of an employment relationship, retaining entrepreneurial control over exactly how services are to be provided (38). Employers or digital platform intermediaries can intentionally (as an integral part of their business model), or inadvertently, misclassify workers as independent contractors when they should have been classified as employees (44).

3.1.4 Gig Work Arrangements

Workers who are connected to their customers by a digital platform on the Internet for short-term assignments are known as “gig” workers, on-demand workers, new economy, or “app-based” workers (45). The platform considers itself merely a facilitating intermediary, not an employer. However, there is controversy and litigation about the legal status of many “gig” workers – are they independent contractors as some digital platform companies assert or are they traditional employees?

Determining whether a gig worker is an independent contractor or an employee can be a complex classification task and can result in increased benefit costs or legal liability for the employer. Recently, misclassification of gig workers as independent contractors instead of employees has become a contentious legal issue. For example, a number of legal cases have been filed by workers challenging their classification by on-demand economy firms as independent contractors instead of as employees (41). In a California case, a Federal district court said, “the court cannot conclude as a matter of law that Plaintiffs are Uber’s independent contractors rather than their employees”.⁸ *Uber Technologies, Inc.* appealed and the case settled. The legal issue of how to classify gig workers as contractors or employees has taken on international dimensions. In November 2017, the British Employment Appeal Tribunal rejected Uber’s arguments that its drivers were self-employed (5), but *Uber Technologies, Inc.* has appealed the case. In 2018, the California Supreme Court said that to justify independent contractor status for purposes of wage and hour issues only, a company must show that the worker is free, in everyday tasks, from the company’s control and direction; that the work is outside

the usual course of the hiring entity’s business; and that the worker is regularly engaged in an independent occupation or business of the same type the worker is performing for the company (46).⁹

The continuing controversy over the legal status of gig workers has led to proposals to create a new category of worker, the “independent worker” (47). Another proposal involves making aspects of the government safety net portable with the worker regardless of legal status as an employee or a contractor (48).

3.1.5 Prevalence of Nonstandard Work Arrangements.

Uncertainty exists about the number of workers involved in various alternative work arrangements, including those on-demand or gig workers (49–51). In 2005, the BLS reported that workers in all alternative work arrangements – called “contingent workers” – represented from 12.5% to 14.8% of total employment (52). In 2018, the BLS is expected to release a new survey of contingent work in the United States, which is expected to show an increase in contingent-type employment as defined by the BLS, i.e. independent contractors (including gig workers), temporary workers, on-call workers, and workers provided by contract firms (53). In 2018, another BLS survey of gig workers as a separate employment category is also expected.

In 2015, a National Bureau of Economic Research study reported that the percentage of workers engaged in alternative work arrangements increased from 10.1 to 15.8 of the US workforce (54). Also in 2015, the General Accountability Office reported that “the size of the contingent workforce can range from less than five percent to more than a third of total employed labor force, depending on widely-varying definitions of contingent work” (55).

Various nongovernment surveys of gig work arrangements have been conducted to determine the characteristics of this new arrangement. One survey estimated in 2016 that only 0.5% of the US workforce worked for on-demand platforms, which is about 800,000 workers (56). Other surveys found that 40% of on-demand workers work for two or more companies in a given week, and one in seven work for three or more companies (57). Other surveys have found that workers in the gig economy differ from other contingent workers in that they are generally younger and more educated (57). Despite the problem of determining the exact size of the gig economy, it is a global trend that is booming and will only grow larger in the future (56).

3.2 Management Use of Alternative Work Arrangements

Strong economic incentives exist for firms to “rent” temporary or contract workers by using nonstandard arrangements, instead of “buying” permanent employees in standard

arrangements (37). There are several reasons for a firm's use of alternative work arrangements.

3.2.1 Organizational Flexibility

Firms want to maximize their organizational *flexibility* to meet changes in customer demand (58). Greater operational flexibility allows firms to more easily adjust to up-and-down fluctuations in the business cycle. Firms that want to shed labor during a downturn can more easily do so if they are using nonstandard workers. When demand returns, resupplying the firm with nonstandard workers can help position firms more quickly than can the hiring process for standard workers (59). Acquiring workers through nonstandard arrangements is also more efficient when a firm needs workers with highly specialized skills for short-term projects such as information technology initiatives or manufacturing turnarounds.

3.2.2 Labor Cost Reduction

Nonstandard workers free the firm from the high *costs* of hiring and firing permanent workers (34). The labor cost differential between a full-time employee with benefits and an independent contractor or gig worker can be upward of 30% or more (60). Given the narrow operating margins many firms operate under, reducing health insurance, pension, unemployment insurance, and other regulatory costs associated with permanent employees can be a strong financial incentive, leading to the greater use of nonstandard workers (61), although cost may not be a factor for every firm (33).

3.2.3 Institutional Factors

Firms are under financial pressure to externalize or contract out all but their "core" activities. Unlike activities that improve customer value and generate profits, "noncore" activities are routine tasks that add little value or profit to the firm's income statement (62). To secure financing from capital markets, enhance investor confidence, and compete better globally with firms with lower labor costs, firms are looking for ways to shed noncore workers by greater use of nonstandard work arrangements. Sustaining the standard work arrangement in many firms has been relegated considerably below the importance of managing the customer relationship (36).

3.2.4 Concern about Collective Action

A firm's concern about, or experience with, labor-management conflicts is an incentive for the use of arrangements lacking collective bargaining rights (63, 64). Characterizing themselves as mere intermediaries, and workers as microentrepreneurs, digital platforms can stymie collective action efforts (36).

3.2.5 Technology and Mobile Communications Enablers

Advanced digital technology enables the creation of a digital labor platform on which individuals (contractors and gig workers) can offer their services directly to a customer without an employer intermediary. A mobile app replaces the connectivity between a worker and the work task that an employer provides in standard arrangements (51).

3.2.6 Worker Preferences

Some workers seek flexible scheduling jobs that provide them with more work-life balance than a standard employment job would. The Patient Protection and Affordable Care Act of 2010 may have lessened the dependency of workers on standard arrangements that provide health insurance, and accelerated the use of part-time employment (65). In 2005, BLS found that 32% of temporary help services employees and 82% of *independent* contractors *preferred* nonstandard work arrangements in lieu of standard work arrangements (52). A 2014 survey of temporary agency workers showed that 49% were doing agency or contract work as a way to get a permanent job, and 40% said that they were unable to find a permanent job. Only 22% of agency workers answered that they performed agency or contract work because they wanted flexible scheduling (66).

3.2.7 Capability of Labor Suppliers

Firms interested in avoiding the costs of recruitment, hiring, mentoring, monitoring, career development, and retention must rely on a labor market supplier to provide them with workers. The capacity of the employment services industry to meet the demand for workers from such firms is an important factor in supporting the increased use of coemployment work arrangements (67). Platform intermediaries that are interested in attracting workers can avoid being dependent on a labor supplier by engaging in crowdsourcing, or the "act of taking a job traditionally performed by employees and outsourcing it to an undefined, generally large group of people in the form of an open call" (68).

3.3 Safety Management Issues in Alternative Work Arrangements

The increased use of alternative arrangements alongside the standard arrangement leads to a "blended" workforce. In a blended workforce, workers in standard and alternative arrangements work together on the same project, often doing the same type of work. A blended workforce can present various organizational management challenges for a firm. Working alongside temporary workers can negatively affect standard workers' attitudes toward the firm and their temporary coworkers (69). In addition, the use of temporary

workers can adversely affect a standard employee's perception of their own job security (70).

Blended workforces also present challenges to safety management. The agency-client relationship that governs the assignment of temporary workers may result in differences in the safety training that temporary and permanent employees receive for hazardous jobs, differences in personal protective equipment provided, and differences in workers' perception of safety practices (71). Managers may have difficulty in creating an organizational culture in which all workers, regardless of their employment status, can participate. Safety managers need to develop ways to overcome the heterogeneity of employment relationships that hinder building a strong organizational culture of safety at the workplace (72).

Determining responsibility for safety in a blended workforce can also be challenging. Agency and client employers both can become confused about which of them bears particular safety responsibilities for temporary agency workers in the host employer's workplaces. Reacting to tragic fatalities and serious injuries involving temporary workers (73), OSHA and NIOSH jointly developed in 2015 a set of recommendations aimed at how agency and client/host employers can better understand their mutual responsibilities to safeguard temporary agency workers at hazardous workplaces (74).

OSHA/NIOSH recommend that prior to accepting a new host employer as a client, or a new project from a current client/host employer, the temporary staffing agency and the client employer review all task assignments and job hazard analyses to ensure that the temporary workers receive appropriate site- and job-specific training and any needed personal protective equipment. Agency staff should be trained to recognize safety and health hazards at the employer's workplace. Host employers should be knowledgeable about the safety training and training certifications of the temporary workers who will be assigned to their workplace. The agreement between the temporary staffing agency and the client employer should specify safety responsibilities to eliminate any confusion about which employer is responsible for the safety and health of assigned workers. Staffing agencies and their client employers should inform each other of worker injuries and illnesses when they learn of them. Finally, maintaining contact with workers assigned by the temporary staffing agency to a client can help ensure that the host employer is fulfilling all required safety responsibilities (74).

3.4 Worker Health and Alternative Work Arrangements

The way work is organized can be a potential workplace hazard. Work organization studies have taken their place

alongside studies of physical, chemical, and biological hazards in the workplace. For nearly 20 years, how work is organized has been recognized as a dedicated area in the field of occupational health and safety research (75). Work organization studies focus on the ways work is arranged, scheduled, and managed as a potential risk factor for adverse health outcomes (76). Early studies demonstrated that adverse mental health outcomes can result from (i) major organizational changes (77); (ii) downsizing (78, 79); or (iii) sudden unemployment (80, 81). By the beginning of the twenty-first century, attention turned to the study of work arrangements as hazardous "agents" affecting worker health (82, 83). By 2005, a review of 27 studies published indicated an association between adverse psychological health effects and temporary employment (84).

3.4.1 Injury

Beginning in the 1990s, studies began to demonstrate higher physical injury rates among temporary agency workers than standard employment workers. For example, temporary nurses had higher rates of sharps injuries than standard employment nurses did (85). Temporary workers in the petrochemical industry had higher rates of injury, especially when they were engaged in maintenance and turnaround procedures (86). Temporary workers had twice the injury rate than their standard employment coworkers in plastics manufacturing industry (87).

In 2005, a systematic review of international studies indicated that 7 of 13 reports showed an increased risk of work-related injuries among temporary workers (84). In 2006, a study of temporary and contract workers reported that such workers had twice the rate of fatal and nonfatal work-related injuries than standard employment workers (88). In 2010, a Washington State study of the workers' compensation claims rate for agency workers found temporary worker injury rate to be double those of standard employment workers (89). In follow-up interviews published in 2017, temporary workers reported lower hazard exposures, but less ability to cope with the hazards to which they were exposed because of a lack of experience of screening, safety training, and schedule control (90).

3.4.2 Illness

Illness outcomes were also found to occur at a higher frequency in alternative arrangement workers (84, 91). Increased illness morbidity may be related to the lack of paid sick leave benefits for nonstandard workers. Working while sick can increase the risk of injury. Workers with paid sick leave benefits were less likely than workers without access to paid sick leave to sustain a work-related injury (92). Firms should review their sick leave policies as a tool for injury prevention.

3.4.3 *Mortality*

In general, differences in US life expectancy across various demographic groups can be explained by different job conditions (93). Specifically, shortened lifespans can be related to the type of work arrangement. A study using longitudinal data collected from 10 Finnish towns showed that the overall mortality rate for temporary workers was 1.2–1.6 times greater than the rate for permanent employees, chiefly from alcohol- and smoking-related cancer (94). An interesting finding in this study was that workers who moved from temporary to permanent employment experienced a lower mortality risk than those who remained temporary workers.

3.4.4 *Differential Health Risks*

The differences in injury, illness, and fatality rates between workers in standard employment arrangements and alternative arrangements have been noted in studies over the past 20 years, but the reasons for these differential risks that occur are not entirely clear. The literature has emphasized that temporary workers in various industries are often assigned the most hazardous work. Employers may find that their liability if a worker sustains an injury in the course of doing hazardous work is reduced if the worker is a temporary worker as opposed to a worker in a standard employment relationship with the employer. Second, nonstandard workers may be less likely to raise objections to doing a hazardous job because of a fear of losing their job if they complain (95–97). This is understandable as temporary workers' employment is precarious; they can be easily replaced by another worker from the temporary staffing agency. They have no explicit or implicit promise of continued employment. Gig workers can be easily deleted from the platform. Third, workers who are subjected to frequent short-term temporary assignments may lack sufficient site-specific safety training (98, 99), or lack access to appropriate personal protective equipment to do the job assigned to them without risk of injury or death (100). The lack of coordination between the temporary staffing agency and the client/host employer about who bears the safety responsibilities for a particular worker can result in neither employer taking responsibility. Fourth, serial-temporary workers lack a social connection to the permanent workers at each workplace since their work is often of a short-term nature. This work pattern may deprive them of personal relationships that could protect them from worksite-specific hazards. Longevity in a job creates social relationships between workers that can protect a worker from an unsafe act. Fifth, workers may also be reluctant to ask for additional training or file a complaint with OSHA because of their precarious job status (101, 102). Furthermore, independent contractors and gig workers (to the extent they are correctly classified as independent contractors)

are outside OSHA's jurisdiction and cannot file an OSHA complaint (91).

3.5 **Research Needs**

Economic incentives that lead to the use of nonstandard work arrangements will undoubtedly lead to an increase in temporary employment and gig jobs mediated by a digital platform. Our understanding of how alternative arrangements – temporary, traditional contract, and emerging gig arrangements – can adversely affect the health and safety of workers is currently incomplete (103). A number of challenges exist. First, a set of standardized definitions for the types of nonstandard work arrangements would aid in any surveillance of potential occupational safety and health risks to workers engaged in the new work arrangements (103, 104). Currently, nonstandard work arrangements are defined differently by both government statistical agencies and private sector investigators. Second, consistent surveillance definitions could be used in future prospective studies of the adverse safety and health effects arising from alternative arrangements themselves. Third, prospective study results can then lead to effective interventions to mitigate the risks of nonstandard arrangements (97). Finally, tools to measure exposure variables associated with alternative work arrangements, e.g. temporariness, reluctance to exercise labor rights, or absence of labor rights altogether, are also needed to aid the future studies of the safety and health effects of work arrangements (105–107).

4 **CONCLUSION**

The demographic changes occurring in the American workforce, and the changes in work arrangements, challenge safety and health professionals to ensure that the workforce can continue to be a strong contributor to economic growth. Sustaining successful inclusiveness in the workforce means providing work that is safe and healthy. Safe and healthy work fosters better, longer working lives for American workers. If the United States is to meet the challenge of a rapidly aging population, safety professionals must become adept at diversity management (108).

Safety management will need to incorporate greater understanding of the safety and health needs of women, racial and ethnic minorities, and new immigrant entrants to the workforce. Alternative work arrangements, virtual workplaces, and workers assigned work by an online platform will require a wider engagement of occupational safety and health professionals with population health professionals to develop new models of worker exposure and risk (109). Ultimately, ensuring the safety and health of an increasing diverse workforce will lead to a more creative, innovative, and productive workforce.

ENDNOTES

- 1 Social Security Act, 42 United States Code, Section 301 et seq.
- 2 National Labor Relations Act of 1935, 29 United States Code, Sections 151–169.
- 3 Fair Labor Standards Act of 1938, 29 United States Code, Sections 201–219.
- 4 Civil Rights Act of 1964, 42 United States Code Sections 2000e et seq. (1964).
- 5 Age Discrimination in Employment Act of 1967, 29 United States Code, Sections 621–634.
- 6 Americans with Disabilities Act of 1990, 42 United States Code, Sections 12101 et seq.
- 7 Occupational Safety and Health Act of 1970, 29 United States Code, Sections 651 et seq.
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