Work Organization, Job Insecurity, and Occupational Health Disparities

An Issue Paper for Discussion at the Eliminating Health and Safety Disparities at Work Conference, Chicago, Illinois, September 14 and 15, 2011 (rev 11-14-11pm)

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Discussion Questions

The authors propose the following questions for discussion at the conference:

1. What role can businesses, public employers and labor unions play in minimizing exposure to work organization hazards that pose health and safety risks, such as temporary or contingent employment, low job control, or work-family conflicts? What role can they play in reducing differences in exposure ("differential exposure"), that is, the higher levels of exposure to such hazards faced by lower income workers, racial and ethnic minority workers, younger workers, and, for some hazards, women workers?
2. What challenges (empirical, political, logistical) stand in the way of developing and enacting local, state or Federal laws or regulations designed to minimize exposure to work organization hazards that can negatively affect health and safety?
3. What research is needed to strengthen the evidence-base answering the general question "do differences in work organization hazards between groups of workers contribute to occupational health disparities"?
4. The limited available data reviewed in this paper suggests that the impact of job insecurity and work organization hazards on health and safety is greater for workers in lower socioeconomic positions ("differential vulnerability"). If future research confirms such an interaction, what factors may explain it? What could be done to prevent such a greater health and safety impact among workers in lower socioeconomic positions?
5. What issues or constraints need to be addressed to be able to conduct intervention research or research studies on work organization hazards with a strong "translational" impact, that is studies that have a practical use in the workplace or when developing public policy?

Work Organization, Job Insecurity, and Occupational Health Disparities

Executive Summary

- **Statement of the Issues**

Economic globalization based on free market principles, designed to create a flexible workforce, increase productivity and profitability, and enabled by technological innovation, has profoundly changed employment conditions and the organization of work over the past 30 years. These changes have increased job insecurity, which includes the threat of job loss, temporary work, downsizing, outsourcing and privatization of public services. Job insecurity and work organization hazards can increase the risk of occupational injuries and illnesses. They can also contribute to disparities (inequalities) in injury or illness between groups of workers defined by socioeconomic position or status, gender, race, ethnicity, immigration status or age.

Other features of work organization include schedule factors such as long work hours (more than 50 hours per week) and shift work (evening or night work); psychosocial job stressors such as job strain (low levels of job control combined with high levels of psychological workload demands), lack of social support, effort-reward imbalance (high efforts combined with low rewards; rewards include support, respect, job security, income and opportunities for promotion), organizational injustice (unfair treatment by supervisors, unfair decision making procedures, unfair distributions of rewards and benefits) and workplace incivility; and production and management systems such as lean production (efforts to increase productivity by "just-in-time" production, quality control, and standardization and intensification of work; a variant in the public sector is known as "new public management"), piece rate compensation systems (payment by the piece or unit, rather than by the hour or salary) or electronic surveillance or performance monitoring (using GPS on mobile devices, identification badges, cameras, remote listening to phone calls, or other technology to check on employees' work or locations).

The state of the evidence for the impact of job insecurity and work organization hazards on health and safety, and about the effectiveness of interventions and prevention programs designed to reduce work organization hazards, is reviewed. Research on the following factors is considered as each affects exposure to and vulnerability to job insecurity and work organization hazards: socioeconomic position or status (SES); gender; age; race and ethnicity; and immigration status. Socioeconomic position and work organization are intimately linked:

employment, in part, defines the socioeconomic position of groups of workers and the amount of power they can exercise, but the type of employment groups of workers can enter into is shaped by their parents' socioeconomic position. Groups of workers at increased risk of occupational health disparities (that is, women, racial and ethnic minorities, immigrants, and younger workers) have less power primarily because of their lower socioeconomic position.

- **Major Findings**

Job Insecurity, Work Organization and Occupational Health Disparities

"Differential exposure" to job insecurity exists: fairly consistent evidence indicates that job insecurity is more common among workers in lower socioeconomic positions and among women. Although less consistent, evidence also suggests that younger workers, racial and ethnic minority workers, and immigrants are exposed to greater job insecurity. Additionally, there is general consistency that individuals with lower SES are more likely to be exposed to other work organization hazards; however, differences in exposure to such hazards by gender depend upon the type of hazard. The small size of the differential exposure research by race/ethnicity/immigration status and by age does not allow firm conclusions.

"Differential vulnerability" to job insecurity is ambiguous: some evidence suggests that work organization hazards have a greater impact on the health of workers in lower (vs. higher) socioeconomic position. However, no clear pattern of results can support the hypothesis that women, younger workers, racial and ethnic minority workers, and immigrants are more vulnerable to the health and safety effects of job insecurity or other work organization hazards.

Intervention Strategies to Reduce Differential Exposure and Vulnerability

Interventions to reduce occupational health disparities can be directed towards reducing differential exposure, reducing differential vulnerability, or both. A wide range of maco- and micro-level strategies can be applied to this end. There are few systematic studies of national/international- and industry/organizational level programs, but available evidence suggests that interventions could reduce health inequalities. For example, the UK Health and Safety Executive (their "OSHA") 2004 Management Standards has helped to minimize exposures to workplace stressors that arise from work organization factors. Legislation in New South Wales (Australia) and California have brought independent contractors and home-based

workers under the scope of labor and safety and health regulations, presumably leading to safer work arrangements. Additional research is needed to determine if legislation and regulation translates into improvements in work organization and worker health and safety.

National/international level interventions need to consider how the social and political context shapes both intervention form and outcomes. For example, workers in countries with stronger social protections, such as in Scandinavia, show a weaker association between job stressors and symptoms of depression, than workers in countries with weaker social protections.

Worksite interventions that focus on individuals may be successful in helping some workers cope with work organization hazards, but they do little to eliminate exposures to the hazards and have little effect at the organizational level (for example, reducing rates of sickness absence). On the other hand, worksite programs that combine reductions in work organization hazards with individual stress management showed benefits at both the organizational and individual levels. Participatory approaches were a consistent feature of effective comprehensive prevention programs. However, participation in such programs of workers with limited power or influence (and at increased risk of occupational health disparities) presents several challenges; for example, they may be hesitant to voice concerns about work hazards.

Three case studies highlight industry or occupation-specific hazards and interventions. In the first, low-wage contingent workers classified as "independent contractors" face increased risk of injuries and illness combined with limited legal responsibility on the part of their employers. Interventions addressing health disparities among independent contractors have included efforts to expand employment law coverage; labor, community and environmental groups' efforts to reclassify homecare workers and truck drivers as employees; and federal and state citations against employers of independent contractors for violations of health and safety regulations. The second case study addresses social service workers facing the threat of workplace violence, short staffing and high caseloads. Interventions with this population have included efforts of coalitions that have fought against budget cuts to public assistance and social services. The third case study describes the results of surveys conducted world-wide by an international trade union federation on the increasingly insecure and stressful working conditions of civil aviation workers (such as cabin crews, air traffic service workers, check-in workers and baggage handlers) between 2000 and 2007. The federation is calling for international minimum standards and producing policy

recommendations by the end of 2011.

- **Recommendations for Research and Intervention**

Expansion of surveillance tools for ongoing monitoring of key indicators of job insecurity, and work organization are needed and public dissemination of surveillance results is essential. It is important that new methodological research identifies more inclusive sampling approaches to ensure "invisible" workers in hazardous occupations are appropriately included in research. Better measurement tools are needed to assess work organization factors at the organizational level, (e.g., lean production, staffing levels, labor relations policies, electronic monitoring, and initiatives to help employees satisfy family responsibilities).

A number of hypotheses for further research are suggested by this review. The hypotheses address issues such as possible increasing socioeconomic disparities in work organization hazards and job insecurity and their health and safety effects, the combined health and safety impact of work organization hazards and domestic responsibilities, and differences between men and women in access to standard full-time employment.

Intervention effectiveness studies need to measure and report not only absolute changes in exposure or health outcomes, but also changes in exposure or occupational health disparities among worker groups with lower levels of power or influence (for example, racial and ethnic minorities, immigrants, lower income workers and women). Intervention research is also needed on the impacts of macro-level legislative and regulatory interventions on work organization and job insecurity, including funding for enforcement, the regulation of sub-contractors and global supply chains, and upgrading of international standards.

Intervention implementation studies are needed to better characterize: successful and potentially harmful intervention processes and strategies; the barriers to and risks of participation in workplace interventions and methods of overcoming barriers and risks for workers with lower levels of power or influence; and on the role of labor unions and other worker advocates in encouraging worker participation and implementing effective interventions. "Translational" research is needed to develop and disseminate evidence-based methods for risk assessment of job insecurity and work organization hazards and tailored intervention development to support "best practice" interventions.

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I. INTRODUCTION

A. The changing nature of employment and working conditions

Economic globalization based on free market principles designed to create a flexible workforce[1], increase productivity and profitability[2], and enabled by technological innovation, has profoundly changed the structure of the labor market and the nature of work over the past 30 years. Key manifestations of this trend have been downsizing, outsourcing, privatization of public services, increases in "precarious" employment[1,3], new production systems (e.g., lean production), new occupations (e.g., information processing and call center work)[4], and declines in the proportion of U.S. workers belonging to unions[5], and the reappearance of sweatshop work[6]. Other manifestations of global trends include flexible staffing levels, non-standard work schedules, the blending of work and home time, and work intensification[7]. These employment (labor market) conditions and the way work is organized can increase the risk of occupational injuries and illnesses[7]. Job insecurity and the organization of work can also contribute to disparities (inequalities) in rates of injury or illness between groups defined by socioeconomic position or status (SES), gender, race, ethnicity, immigration status or age[1,8,9].

B. Report Objectives

This report synthesizes what is known about the role work organization plays in creating and exacerbating occupational health disparities, and the effectiveness of interventions that address work organization and potentially reduce disparities. Job insecurity, in various operational forms, is a primary focus because it is a sentinel indicator of the health and safety impact of current and future trends in employment conditions. To accomplish this goal, we:

1) Conceptualize job insecurity and related concepts as core features of work organization relevant to occupational health disparities, and summarize what is known about their contribution to occupational health disparities,

2) Summarize what is known about intervention strategies to reduce OH disparities arising from work organization, and

3) Delineate high priority areas of research needed to address job insecurity and work organization as a means of reducing or eliminating occupational health disparities.

A comprehensive review of the literature on work organization, job insecurity, occupational

health, and occupational health disparities is beyond the scope of a single paper. The foundations for this report include books[2,9], major reports[10] and review articles, e.g.[1,4,8,11-16], included in an on-line Appendix (http://www.aoecdata.org/conferences/healthdisparities/index.html). This report complements existing reviews by focusing on studies that explicitly examine the role of job insecurity and work organization in occupational health disparities by socioeconomic position, gender, race, ethnicity, immigration status and age.

C. Conceptual overview

Figure 1 provides a framework on the nature of work organization and how it contributes to occupational health disparities. As in the model developed by NIOSH[7], our framework views the organization of work as nested wherein job-specific factors are presumed to serve an *intervening* role between organization-level factors and occupational health outcomes. Likewise, organizational factors (and subsequent job-specific factors) are presumed to serve an intervening role between external factors (employment conditions) and occupational health outcomes.

Labor stratification, the division of the workforce into groups with varying degrees of power, contributes to the development and perpetuation of occupational health disparities through two main processes. First, labor stratification contributes to *differential exposure* to work organization hazards at each level. Differential exposure is represented in the model by the direct lines from Labor Stratification to each box reflecting discrete levels of work organization. Worker groups with limited power (or "social disadvantage") have little opportunity to influence macro-level employment policies and they have limited ability to shape organizational practices and job design. Second, labor stratification contributes to *differential vulnerability*; that is, the health and safety effects of job insecurity and work organization may vary across groups of workers. Differential vulnerability is represented in the model by dashed lines and arrows from Labor Stratification to the linkages among the discrete levels of work organization, as well as the linkage between Job/Task Specific Factors and Processes: these dashed lines suggest that each linkage depends on where workers lie in the labor and socioeconomic hierarchy.

Socioeconomic position and work organization are intimately linked: employment, in part, defines the socioeconomic position of groups of workers and the amount of power they can exercise. However, employment opportunities for entire groups of society are shaped by their

parents' socioeconomic position. Likewise the lack of social power, due primarily to their lower socioeconomic position, places other groups of workers at increased risk of occupational health disparities (i.e., women, racial and ethnic minorities, immigrants and younger workers). Extreme examples of lack of social power are the employment conditions of forced labor and child labor. While not widespread in the U.S., forced labor[17] and child labor in agriculture[18] are more common in U.S. immigrant communities and thus contribute to occupational health disparities.

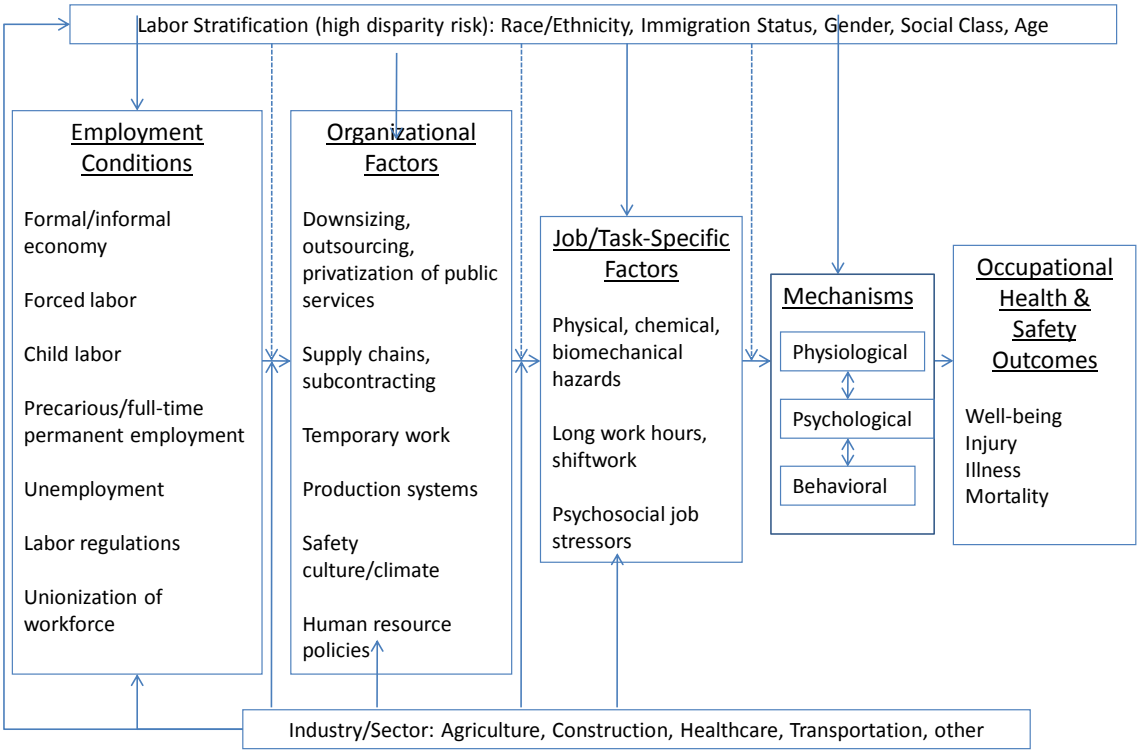

Figure 1. Conceptual overview of the role of work organization in the creation of occupational health disparities

Our conceptual framework considers occupational health to be a multidimensional outcome incorporating both positive (e.g., engagement, vitality) and negative (e.g., illness, injury) manifestations. We hypothesize that there are three primary mechanisms by which work organization can affect occupational health outcomes. The first mechanism is physiological, such as sympathetic and parasympathetic responses to stressor exposure and the somatic experiences that follow, such as fatigue. The second mechanism is psychological, whereby feelings of fear, helplessness or exhaustion contribute to psychological health outcomes, such as depression or burnout. The third mechanism is behavioral wherein work organization affects behavior on the

job (e.g., supervisory safety practices or compliance with safety protocols), as well as behavior off the job (e.g., physical activity, diet, smoking). Finally, our model highlights modifying factors based on industry or sector that shape the form and strength of each linkage in the model. An illustration of these modifying factors is when protections provided by the National Fair Labor Standards Act have explicit exemptions for workers in the Agricultural, Forestry and Fisheries sector relative to workers in other sectors[19] that bear on occupational health.

D. Definitions and inter-relationships

Job insecurity

Work that is "precarious" or "contingent" provides the clearest illustration of job insecurity in the current economy. "Precarious" employment is generally defined as the lack of a permanent or enduring employment relationship. Workers in precarious jobs face employment uncertainty; they generally lack control over future work and income opportunities, and they have fewer rights[3]. Consistent with this view, the Employment Precariousness Scale contains 6 subscales designed to measure various aspects of precarious work: temporariness, disempowerment, vulnerability, wages, rights (to benefits, such as paid holidays, family leave, pension), and exercising rights[20].

The U.S. Department of Labor defines "contingent" workers as those who do not expect their jobs to last, and defines a separate category of workers in "alternative work arrangements", such as independent contractors, on-call workers, temporary agency and contract firm workers[21]. The U.S. Government Accountability Office defines all these types of workers, plus self-employed and part-time workers, as "contingent". This broader definition classifies about 30% of the U.S. labor force as "contingent"[22].

Research on health and safety effects has focused on three types of working arrangements, which can be considered "overlapping facets of the new flexible labor market"[1, p. 105]:
1) *temporary employment*; 2) *job instability* (objective conditions, i.e. workforce reductions or workplace closure is expected or occurring) and *job insecurity* (a worker's perceptions of fear of job loss or job instability); and 3) *downsizing*, restructuring and outsourcing[1,8]. One form of outsourcing, i.e., *privatization* of public services, has also been investigated.

Downsizing research has focused on the jobs of the workers who remain with their employer

rather than those who have lost their jobs[1]. Downsizing can result in increased workload, job insecurity and physical hazards[23,24] and reduced job control[24,25] for those who remain on the job.

"Temporary work" encompasses a wide range of jobs of varying skill levels and stability, and may benefit workers when it allows them to control their work time, sample job experiences, use it as a "stepping stone" into permanent employment[1] or supplement retirement income after benefitting from earlier career standard employment[26]. However, temporary work also frequently involves exposure to low wages and benefits, unhealthy job characteristics (e.g., low levels of skill, lack of prospects for promotion), underemployment (e.g., involuntary part-time or seasonal work), and lack of social protection (i.e., low level of unionization)[1].

Temporary workers are more likely to work at high speed, make repetitive movements, have no control over the pace of work, and have less training[27]. Any task control they may have is reduced when economic pressures force them to work harder and longer[28]. Restructuring, use of contract and temporary employees, work intensification, computer technology and electronic monitoring all tend to reduce time available and opportunities for the informal social networking and support at work that enhance collective efforts to improve working conditions[29]. To the extent that temporary workers are desperate to achieve targets that would secure future work or permanent employment, their growing prevalence can undermine the resistance of permanent workers to work intensification[28]. Many contingent workers are not protected by laws designed to ensure proper pay and safe, healthful and nondiscriminatory workplaces, and many are not covered by workers compensation [22]. In addition, the development of extended national and international contracting networks (supply chains), which diffuse employer responsibility, pose a serious threat to occupational health and safety that disproportionately affects low-wage, ethnic minority, and immigrant workers [30].

Work organization and job characteristics

Work organization research has focused primarily on work schedule factors such as *long work hours*[31] and evening or night *shift work*[32], and psychosocial job stressors, such as *job strain* (high demand-low control work)[33,34], *lack of social support*[29,35] and *effort-reward imbalance* (high efforts combined with low rewards at work)[36]. "Rewards" include income, respect, support, fair treatment, promotion opportunities and job security. Newer research has examined

organizational injustice, defined as: 1) unfair distributions of work rewards and benefits (distributive injustice); 2) unfair decision making procedures (procedural injustice); 3) unfair treatment by supervisors (relational injustice). Research has focused mainly on the health effects of "relational injustice"[37,38]. *Workplace incivility* or behavior that violates social norms of mutual respect and is characterized by rudeness or a general lack of respect[39], generally by customers, is gaining increased attention[40,41]. Other research has focused on *threat-avoidant vigilant work*, which involves continuously maintaining a high level of vigilance in order to avoid disaster, such as loss of human life. It is a feature of various occupations at high risk for cardiovascular disease, e.g., urban mass transit operators, truck drivers, sea pilots and air traffic controllers[42].

Limited health research has been conducted on production and management systems, such as *lean production* (efforts to increase productivity by "just-in-time" production, quality control, and standardization and intensification of work[43]; a variant in the public sector is known as *new public management*[44]), *piece rate pay systems* (payment by the piece or unit, rather than by the hour or salary)[45], or *electronic performance monitoring* (using GPS on mobile devices, identification badges, cameras, remote listening to phone calls, or other technology to check on employees work or locations)[46].

II. STATE OF THE EVIDENCE

A. What is known about work organization, job insecurity, and health and safety?

Job insecurity and health and safety

Temporary employment has been associated with psychological distress[47] although null studies also exist[1]. Studies of physical health outcomes have produced mixed results, with associations seen with occupational injuries[1,47-53], including needlestick injuries[54], absenteeism, fatigue[1,55], mortality[56] and musculoskeletal disorders[55,57]. However, temporary work is sometimes related to better health[58], perhaps reflecting differing national regulations, the variety of circumstances which lead people to take on temporary work[8] or the "healthy worker effect"[1].

Job instability and job insecurity have shown associations with psychological ill health[1,59], but weaker evidence of association in cross-sectional studies of physical health[1,59]. However, chronic job insecurity appears to have a dose-response relationship with self-reported health and physical symptoms, and increases the risk of minor psychiatric morbidity[60-64]. Some studies have

shown associations with occupational injuries and accidents[65,66]. In 9 of 16 European countries, job insecurity was significantly associated with poor self-rated health[67].

Downsizing and restructuring. Adverse health effects have been reported among workers who lost their jobs, and, in a majority of studies, among employees who retained their jobs in the context of organizational downsizing[8]. Downsizing "survivors" have increased rates of sickness absence, musculoskeletal disorders, medical symptoms, psychological distress and sleeping problems[1,8]. Downsizing has been associated with increased risk of injuries[68] and workplace violence[69]. One study of Finnish public employees showed elevated rates of prescription psychotropic drugs[70] and cardiovascular mortality[71] among downsizing survivors. However, another study of a long-term follow-up of downsizing survivors in Finland did not show increased mortality[72], suggesting that long-term job stability may compensate for the temporary stress of the downsizing experience[8].

Privatization. British civil servants, whose agency was privatized, had a 90% elevated risk of work disability over an 8-year follow-up period compared to those who remained in the civil service[73]. A previous 5-year follow-up of privatization of a British government department found increases in body mass index, ischemia, cholesterol, and, for women, blood pressure, but little change in health behaviors, compared to employees in departments not privatized[74].

Work organization and health and safety

A substantial body of research exists linking long work hours, shiftwork, job strain, effort-reward imbalance and threat-avoidant vigilance at work with illnesses and injuries. More limited data is available suggesting health and safety impacts of low workplace social support, social isolation, organizational injustice, lean production, piece rate pay systems and electronic performance monitoring[2,4,75-77]. Typical outcomes examined in these studies include cardiovascular disease, psychological disorders, musculoskeletal disorders, sickness absence, unhealthy behaviors and acute injuries. Further details are provided in the Appendix.

B. What is known about work organization, job insecurity and occupational health disparities?

NIOSH conducted a literature search in February 2011 and 240 articles were identified (see

Appendix for search methodology). After reviewing these articles, 103 were found to meet inclusion criteria for the current review, that is, studies of associations between job insecurity, work organization and health and safety which provide information on differential exposures or differential vulnerability among groups at high risk of disparities. In addition, we included information from recent review papers which addressed work organization, job insecurity and occupational health disparities, e.g.[11,12,78].

Socioeconomic position

Socioeconomic status (SES) is defined as the location of persons along a continuum of attributes (e.g., income, educational level, occupational status). An alternative approach is to define a person's social class, their relationship to the production of goods and services (e.g., are they an owner, self-employed, worker; manager, supervisor, non-managerial employee?). These alternatives may show different associations with health outcomes[79]. Since research contrasting such alternatives is beyond the scope of this paper, we primarily use the term "socioeconomic position" as a general term that includes both SES and social class definitions[79-81]

Differential Exposure. Lower socioeconomic position is consistently associated with job insecurity. Studies in Spain,[82] France,[83] and Australia[84] report that temporary work contracts are more common among workers in lower than in higher occupational positions. Blue-collar workers have less work predictability than white-collar workers[85]. Employment in a temporary (vs. a permanent) position or currently lacking an employment contract, is also more prevalent in lower socioeconomic groups[86,87]. Perceived job insecurity is more common among individuals with a high school education or less compared to those with greater than a high school education[88], and more prevalent in lower SES groups[89-92]. Moncada[89] and colleagues suggest that socioeconomic position accounts for nearly 10% of the variance in perceived job insecurity.

Workers in lower socioeconomic positions are also disproportionately exposed to other work organization hazards. Low job control has been inversely associated with educational level[93-95], and is less common among workers in managerial and professional occupations relative to those in service or blue collar occupations[85,94,96-98]. Lower social class groups have less job control[82,90,91,99]. Exposure to high psychological job demands also varies by indicators of SES; however, exposure tends to be greatest among workers with higher SES[82,83,99,100], although null

associations between job demands and SES have been reported[93]. Job strain is more common among workers in lower socioeconomic positions in some studies[76,93,101,102], although this association is weak or not significant in others[103,104]. In addition, lower SES workers report lower social support[82,83,89], and greater exposure to effort-reward imbalance[98,101,105], organizational injustice[106], threat-avoidant vigilant work[42] and shiftwork[107,108].

The ability of differential exposure to work organization hazards to explain SES disparities in health outcomes is mixed. A pair of Scandinavian studies suggests that 20-40% of health disparities can be accounted for by work organization factors[97,109]. Others report that work organization hazards are associated with poor health but they contribute little, if any, explanatory power for understanding SES disparities in health[94,96].

Differential Vulnerability. Fewer studies have considered the possibility that the effects of job insecurity or work organization hazards on health are greater among lower status workers. Several studies suggest that employees in manual (blue-collar) jobs experience greater strain due to perceived threats of unemployment compared to employees in non-manual (white-collar) jobs[110,111]. A study of Swedish men found that the combination of high psychological demand and low control was associated with elevated risk for myocardial infarction, and that this risk was greater in manual workers relative to non-manual workers[112]. These two work organization factors were reported to account for 25-50% of the excess myocardial infarction burden experienced by manual workers. A similar stronger association among lower status than higher status workers was seen for effort–reward imbalance and risk of heart disease[105], job strain and heart disease[113,114], effort-reward imbalance and depression [115], and job strain and blood pressure during working hours[116]. However, some studies have failed to find such interactions[115] and, other studies suggest that higher status individuals are more affected by job strain[117]. The expected association of job strain with distress was seen in Finnish public employees in higher but not in lower socioeconomic positions[118]. More exhaustive discussions of the interactions between work stressors and socioeconomic position are available elsewhere[78,115,116].

Gender

In much of the world, women are typically employed and segregated in lower paid, less secure and 'informal' occupations[119]. In addition, women continue to perform most of the

essential unpaid work in the home[120,121]. Women work at the bottom of transnational production chains in the most precarious and highest risk jobs and are more likely than men to be engaged in "vulnerable employment"[122-124]. As a consequence of economic globalization, previously formal employment relations have become increasingly precarious, informal and home based, lacking in regulation and social protections[28,125-128]. For further details on globalization, work organization, gender and health, see the Appendix.

Differential exposure. Several studies reported similar levels of exposure among men and women to measures of job insecurity[88,129], temporary jobs[130] or downsizing[131]. However, others found greater exposure among women to job insecurity[132], temporary work[82], non-standard work[133], downsizing[70] or contingent work[86].

More research has been conducted on gender-based differential exposure to other work organization characteristics. Long paid work hours are more common in men[134-139], while longer domestic work hours are more common in women[82,134,140]. Women face a higher prevalence of job strain[76,129,132,135,136,141-144], low job control[85,100,135,137,145,146], low job variety[82,147], fewer learning opportunities[147], fewer promotions[148], access to flexible work schedules[149] and work-place incivility [150]. However, four studies found comparable levels of job strain[151], job control[152], job autonomy[82] or lack of control of pace or inflexible break times[147] for women and men.

Research focused on gender differences in other work organization factors is mixed. Studies of psychological demand find that, in some cases, men are exposed to greater demands than women[100,135], whereas as others find greater demands among women[145], and still others report no gender differences[82,137,146]. Likewise, studies of workplace social support sometimes find that women have lower support than men[145,146] whereas others find no gender differences in support[135] or working alone[82]. Effort-reward imbalance and its components are frequently found to be comparable among men and women.[131,135,136,152] However, some European surveys showed higher efforts and higher rewards among men[36]. Other studies showed no gender differences in levels of organizational justice[135] and shiftwork[136].

Differential vulnerability. Associations between indicators of job insecurity and health and safety outcomes tend to be similar for men and women[47,131,133,153,154]. However, research has found stronger associations for men than women between indicators of job insecurity and mortality[83], poor self-reported health[82], psychotropic prescription use[70], depression[132],

psychological distress[111] and musculoskeletal disorders[133]. Other studies found stronger associations of job insecurity with systolic blood pressure, smoking, BMI[155], and poor mental health[133] among women than men. Still other studies find no differential effects by gender in associations of job insecurity with longstanding illness[153] or atherosclerosis (after risk factor adjustment)[155], cardiovascular disease[133], and total mortality[72].

Research frequently finds differential effects of other work organization factors on health outcomes by gender, but the overall pattern is ambiguous. Stronger associations were seen in men than women for job strain and sickness absence[118,143] and psychological disorders[132]. Similarly, two studies found the association of low job control with heart disease[100] and low skill discretion and work injuries[156] to be stronger among men than women. However, two studies found stronger associations in women than men of low job control and systolic blood pressure, smoking, BMI[155] and psychosomatic complaints[145]. Stronger associations were seen in women between workload and injuries[156] and job demands and psychosomatic complaints[145]. Nevertheless, gender comparable health effects have been documented for long work hours[82,134,136], job strain[141,142], depression[144] and self-reported health[142] low job control[156-159] job demands[100,158,159] and several other work organization factors.

Gender and Socioeconomic Position

Some evidence suggests the presumed effects of work organization hazards on health outcomes are shaped by both gender and SES[160]. Some evidence suggests "greater health differentials associated with blue-collar (relative to white-collar) work for women than men"[11, p. 116]. For example, among U.S. aluminum manufacturing employees "Women in hourly jobs tended to be from lower SES backgrounds, have greater financial need (e.g., single mothers), and were more likely to hold lower-grade (e.g., lower-skilled) hourly jobs, than were hourly men"[11, p. 116], consistent with research on lower job control among women. Hourly work was associated with a greater risk of hypertension among women than men, adjusted for demographics. As Clougherty et al.[11] point out, higher injury rates, injury severity rates (controlling for job tasks)[161], time to return to work after illness and absenteeism[162] are seen in blue-collar women (vs. men). Blue-collar women are also more likely to experience harassment and discrimination than men[11].

However, Framingham, MA women in high demand-high control (high SES) jobs had a higher risk of heart disease than women in high strain (high demand-low control) jobs. With baseline data collected from 1984-87, this finding may reflect a period of changing social roles -- increasing labor force participation among women, including higher SES jobs -- yet with residual discrimination, *de facto* limited authority and wage disparities[163]. An Australian study found that, among men, depression attributed to job strain decreases as SES increases. For women, excess depression depends heavily on job strain and does not vary consistently by SES[76].

Work organization factors and job insecurity explained a larger proportion of socioeconomic inequalities in health among men than women in three studies[82,83,99], however, in women, class differences in health may be explained by working conditions, material well being at home and amount of household labor[82].

Race, ethnicity and immigration status

The evidence base considering health disparities by race, ethnicity or immigration status uses two primary strategies. The first strategy is comparative research using heterogeneous samples wherein investigators make direct comparisons to describe racial, ethnic or immigrant group variation in work organization factors. The second strategy is the use of "single sample" designs wherein the research focuses on a specific racial, ethnic, or immigrant group, but the motivation for the research and the interpretation of results frequently involves an indirect comparison with other groups. We use both types of evidence to summarize differential exposure and differential vulnerability to work organization factors by race, ethnicity, and immigration status.

Differential Exposure. Job insecurity, measured in alternative ways, varies by race, ethnicity and immigration status. In two nationally representative U.S. samples, more Blacks than non-Blacks experienced perceived job insecurity[88]. Contingent workers in the U.S. are more likely to be Black or Hispanic[86]. Other research indicates that concern about possible job loss is greater among Hispanics than Blacks and Whites[164] and that Blacks have greater perceived insecurity than non-Blacks[165]. Consistent with this evidence, based on perceived measures of job security, evidence from the National Longitudinal Study of Youth data indicated that minority workers are more likely than non-minority workers to experience an involuntary job loss[166]. Immigrant women in Sweden were more likely work in temporary jobs than native born women.[167]

Other research provides direct evidence that exposure to deleterious work organization factors systemically varies by race, ethnicity, and immigration status. Workplace discrimination occurs more frequently for racial and ethnic minority workers[168], although evidence from a non-probability sample of workers indicates that "incivility" in the workplace, defined as subtle mistreatment by customers, does not differ by race or ethnicity[169]. However, cultural variation in allowable customer behavior may mask real variation in incivility[170]. Immigrants tend to find themselves in jobs that have less opportunity to use high-level skills[171] than non-immigrants, although differences by immigration status in other work organization factors such as psychological demand, control, or social support are reported to be modest[172]. Immigrant day laborers are exposed to more occupational hazards than non-immigrant day laborers[173].

Other studies provide indirect evidence of variation in work organization factors by race, ethnicity or immigration status. Hispanics are disproportionately employed in dangerous sectors like agriculture[174] and construction[175,176]. Black and Hispanic workers and immigrants are increasingly concentrated in poultry processing jobs[177]; these are jobs with low social support and decision authority, high strain, and elevated isometric load[178,179]. Three-quarters of Latino poultry processing workers report that their employer has minimal concern for employee safety, and is primarily interested in getting the job done as cheaply as possible[180]. Consistent with these observations, Toh and Quinlan[181] argue that immigrant workers have substantially greater difficulty accessing occupational safety and health rights and entitlements[182].

Differential Vulnerability. A small number of studies have examined differential vulnerability to work organization factors by race, ethnicity or immigration status. There is some evidence that perceived job insecurity is associated with greater thickness of plaque in the carotid artery for both Blacks and Whites, but these associations may be attributed to racial variation in clinical cardiovascular disease risk factors[155]. Thus, job insecurity may affect cardiovascular disease through physiologic pathways like elevated blood pressure or cholesterol. Muntaner and colleagues[155] concluded that the putative explanatory value of work organization factors for cardiovascular disease may be stronger for Whites than for Blacks, due to racial discrimination. Other studies suggest that Blacks may be more vulnerable to exacerbation of injuries or illnesses because they are less likely to have workers' compensation benefits[183], and they have greater difficulty than whites resolving workers' compensation claims.

Age

Differential exposure. In the few studies that examined associations with age, younger age is associated with downsizing[70], insecure jobs, irregular shifts[184] and contingent work[84,86]. Likewise, younger age is associated with other work organization factors such as effort-reward imbalance[105], low job skills, low decision authority and low decision latitude[85] and job strain[185,186]. However, evidence suggests that older workers today will be exposed to greater psychological demands on the job than similar-aged workers a decade earlier[187]. Evidence suggests that older individuals looking for work may encounter barriers their younger counter-parts do not[188,189], and this potential may be exaggerated during periods of economic recession.

Differential vulnerability. Few studies examined interactions between work organization hazards and age. The effect of job strain on blood pressure in New York City men was greater among older (vs. younger) workers[190] as was the effect of job strain plus low social support on cardiovascular disease risk in Swedish white collar men[114]. However, low job control was associated with less leisure time exercise in all age groups among Finnish public employees[159]. Among Finnish public employees, risk of long-term sick leave following downsizing was highest for employees aged 44 or older[191]. Prospective studies of British civil servants[192] and Danish nurses[193] both found stronger effects of work stress on heart disease risk in younger workers. However, a large portion of the older workers in these studies (age 50-60 in Britain, 51-64 in Denmark, at baseline) had likely retired during the 12 and 15 years of follow-up, respectively, thus weakening the association between work stressors and heart disease in the older groups.

III. STATE OF THE EVIDENCE – INTERVENTIONS TO REDUCE OCCUPATIONAL HEALTH DISPARITIES

A. Intervention research

Interventions to reduce occupational health disparities can be directed towards reducing differential exposure, reducing differential vulnerability, or both (Table 1). A wide range of macro- and micro-level strategies can be applied to this end, drawing upon political economy, health inequalities, and other macro-structural perspectives[8,10,194,195] and including primary, secondary, and tertiary prevention at the micro-structural-level—drawing in particular from occupational and public health perspectives[196-198].

Most available evidence for addressing occupational health disparities arising from work organization and job insecurity pertains to improving psychosocial working conditions and reducing associated illness and other burdens in an absolute sense; thus, where explicit evidence is lacking on how interventions affect disparities, the available evidence requires extrapolation to how these strategies can reduce disparities. Population-level interventions that improve population health on average can at the same time potentially exacerbate health inequalities in a phenomenon termed the "inequality paradox"[199]. This can arise when disadvantaged groups have less capacity to transform public health interventions into health improvements. This has been observed, for example, in the context of smoking cessation and tobacco control initiatives in the UK and Australia, where population smoking prevalence steadily declined over time but disparities in smoking prevalence by SES widened[199,200]. This is not to deny the value of population approaches, but rather to highlight the need to monitor disparities in intervention impacts as well as absolute changes, to prioritize disadvantaged work groups and contexts in population approaches, and to implement tailored intervention strategies for disadvantaged work groups and contexts to complement population approaches (Table 1).

Macro-structural Interventions

The evidence base on the impacts of macro-level interventions on work organization is underdeveloped, because it is a relatively new policy area and due to methodological challenges. Nevertheless, it is becoming an active area of investigation[201-203]. Researchers in Europe and the UK are leaders in this area thus far.

Macro-level policy and other interventions can be conducted at various levels ranging from international to national to industry/sector. They can further be divided into regulatory vs. voluntary approaches. A prominent example of a regulatory approach is the UK Health & Safety Executive (HSE) 2004 Management Standards to help reduce work-related stress. The Management Standards cover six key areas of work organization linked with poor health and well-being, lower productivity and increased sickness absence. Key areas targeted by the Management Standards are demand, control, managerial support, peer support, role relationships, and change. Each Management Standard key area is assessed by an Indicator Tool. Formal evaluations suggest the Management Standards approach has substantially increased the focus on

Table 1. Strategies for Reducing Occupational Health Disparities Arising Through Work Organization and Job Insecurity		
Goal	**Objective/Targets**	**Sample Strategies**

Reduce differential exposure to poor psychosocial working conditions	• Reduce exposure to poor work organization/improve psychosocial job quality (primary prevention)…
	• …differentially prioritizing at risk work groups and contexts, including:
	  ○ workers in lower socioeconomic positions
	  ○ working women
	  ○ immigrant workers
	  ○ racial and ethnic minority workers
	  ○ precariously employed workers
		• Awareness-raising educational interventions at population, industry, organizational, or work group levels
		• Union advocacy & education programs
		• Environment-directed interventions (e.g., work time, organizational context)
		• Task-directed interventions (e.g., workload, job autonomy)
		• Social relationship-directed (e.g., communication, social support)
		• OH&S regulations
		• Strengthening labor standards, including raising minimum employment conditions, unfair dismissal provisions, job security, and job quality standards
		• National/local/organization-level job skills training programs
		• Management training programs
		• Strengthening human rights and equal opportunity law (e.g., to reduce discrimination based on race, gender, etc.)

Reduce differential vulnerability to health impacts of poor psychosocial working conditions	• Strengthen worker ability to withstand stressors (secondary prevention) and..
	• Effective treatment, rehabilitation and return to work of workers adversely affected by poor work organization (tertiary prevention)…
	• …differentially prioritizing at risk work groups and contexts, including:
	  ○ workers in lower socioeconomic positions
	  ○ working women
	  ○ immigrants workers
	  ○ racial and ethnic minority workers
	  ○ precariously employed workers
		• Strengthening workers' compensation systems, including anti-poverty support for injured or ill workers and their dependents
		• Universal healthcare coverage
		• Integrated workplace health promotion programs (addressing both health behaviors and working conditions)
		• Time management, coping skills development training
		• Raising minimum wages (to reduce proportion of working poor)
		• Special retraining programs to assist return to work from injury or illness, or to assist employment reentry from disability
		• Improved access to public transport
		• Increase in affordable housing
		• Food security programs

the prevention of stress among employers and other stakeholders in the UK and, as a consequence, increased organizational policies and procedures to deal with these issues[204].

While there a relatively few examples of regulatory standards on psychosocial hazards to date, there is a growing number of regulatory responses to temporary or precarious employment. In the Australian state of New South Wales, under a 2001 law, home-based clothing workers, a highly exploited primarily immigrant workforce, were deemed employees, and thus brought under labor regulations [30]. Similarly, a 2011 California law prohibits the "willfull misclassification" of employees as independent contractors [205]. In the U.S., all firms that provide contracted labor and services at mining operations are required to register with the Mine Safety and Health Administration, and are required to report the number of hours worked by their employees and any injuries sustained by them [206]. Similar regulations have been proposed for other industries [206]. A proposed Massachusetts law would end the exclusion of temporary employment agencies from state regulation [207]. In California, worker-investigators working with the Maintenance Cooperation Trust Fund, a watchdog organization created by the Service Employees International Union and its signatory contractors, identified labor abuses in large retail chains that contracted with janitorial services that failed to comply with labor laws and then developed legal cases against the janitorial services, winning over $26 million in back pay for these workers over a 3-year period [2,30].

An example of a voluntary macro-level intervention is a recent standard on workplace psychosocial risk management issued by the British Standards Institution, the "PAS1010"[208]. The guidance and recommendations in PAS1010 grew out of the European Framework for Psychosocial Risk Management (PRIMA-EF) initiative[209], and are intended to be incorporated into OHS management systems to provide guidance on best practice. Labor-management voluntary agreements are an example of macro-level policy intervention at the industry or sector level. A 2004 joint labor/industry European framework agreement on work stress aimed to increase the awareness and understanding by employers, workers and their representatives of work stress, including "best practice" interventions[210]. Awareness-raising and policy advocacy can also be advanced by individual stakeholder groups. For example, in September 2011, the Australian Council of Trades Unions launched a national campaign titled "Secure Jobs—Better Future" (http://securejobs.org.au), highlighting the elevated percentage of workers in insecure

jobs (e.g., ~27% of workforce in casual/temporary jobs, second only to Spain in the OECD), the impacts and inequities of insecure work, and the need for policy and practice reforms.

Some macro-level interventions may require further research to determine appropriate intervention targets and strategies. For example, social class and gender disparities in job control exist across OECD countries (differential exposure). However, there are wider social class inequalities in low job control (and other work organization hazards) in Spain compared to Denmark, which has a more developed welfare state[89]. This suggests that preventive strategies to reduce social inequalities in working conditions need to consider economic and labor market structures, education and training policy, labor relations regulations, unionization, and other macro-level policies. In a cohort of the Australian working population, working women reported significantly lower job control than men[211]. This disparity, persisting over 8 annual waves of observation (2001-2008), was largely attenuated by adjustment for occupational skill level and employment arrangement (permanent, precarious, etc.). Gender differences in low job control and other work organization hazards (and in physical and mental health) are smaller in Finland, where more gender equality policies exist, than in the UK or Japan[212]. These data suggest that differential exposure to low job control by gender could be more systematically and effectively addressed by macro-level interventions to redress the segregation of women into lower quality jobs (e.g., job skills training and equal opportunity employment initiatives) over micro-level (e.g., organizational level) interventions to improve job control for women .

It is also necessary to address non-work-related "social determinants" of health in order to reduce differential vulnerability to the effects of work organization hazards and job insecurity (Table 1). This is particularly necessary since many workers in lower socioeconomic positions are likely to be at higher risk of other forms of disadvantage, which include low income, poor housing, food insecurity, and lack of access to public transport. While these are beyond the scope of this report and are addressed in detail elsewhere[194], it is important to acknowledge them as potential limiting factors of the effectiveness of both macro- and micro-level interventions to address work organization and job insecurity.

Following on from the WHO's global recommendations to reduce health inequalities,[194] the 2010 UK Marmot Review proposed a country-specific coordinated set of policies to reduce health inequalities overall, including a major policy objective to "Create fair employment and

good work for all" alongside policy objectives for addressing other social determinants[10]. One of three major arms of this policy proposal is to "Improve the quality of jobs across the social gradient" through: 1) enhanced adherence to equality guidance and legislation, 2) implementing guidance on stress management (drawing largely on micro/organizational-level intervention research), 3) developing greater employment security and flexibility through greater retirement age flexibility and 4) encouraging and incentivizing employers to create or adapt jobs that are suitable for disadvantaged workers and people with disabilities or other work limitations.

Innovative approaches are being developed to investigate differential vulnerability and ways of addressing it at the macro- level. In a large-scale multi-country analysis, adjusted odds ratios of the association of high work stress and pronounced depressive symptoms varied according to type of welfare regime, with the highest effect size in a "neo-liberal" country, the UK (OR=2.64) and the lowest effect size in Scandinavian countries (OR=1.69), suggesting that weak social protections may magnify the health implications of poor work organization and job insecurity[213].

Nordic welfare regimes may also provide stronger buffers against the adverse health effects of economic crises and substantial job instability[214]. There is preliminary evidence that social inequalities in health have tended to remain stable in Nordic states during economic crises whereas they are widening in European states with more neo-liberal or conservative regimes[215]. Indirect support for this view is given in a report on the adverse health effects produced by economic insecurity, in the context of trade and financial liberalization. The absence of social protection policies is associated with a magnification of morbidity and mortality risks[216]. In summary, evidence to date suggests that general social protection policies, as well as occupational health and safety protection policies, can mitigate both differential exposure and differential vulnerability by gender, socioeconomic position, and possibly other factors (e.g., employment arrangement). Further such research, including in the U.S., would be valuable.

Micro-structural Interventions

Interventions to improve work organization have been extensively reviewed in recent years, but with a stronger emphasis on the micro- than the macro-level, and on working conditions (e.g., job demands, job control) more than employment conditions (e.g., job insecurity). The micro-level emphasis is likely explained by the greater feasibility of organizational-level

intervention and research, resulting in a larger evidence base at the organizational (micro) than the labor market or other macro level.

International research on interventions to improve work organization and to reduce job stress and stress-related illness has been the subject of a number of recent systematic reviews. The most comprehensive review (summarizing 90 intervention studies) focused on interventions wherein work organization factors were proactively addressed[217]. This review concluded that individual-focused, low-systems approaches (e.g., coping, developing time management skills) favorably affected individual level outcomes such as health and health behaviors. However, individual level interventions tended not to have favorable impacts at the organizational level (e.g., reducing stressor exposures or sickness absence). However, organizationally-focused high- and moderate-systems approaches (addressing working conditions), were beneficial at both individual and organizational levels. Participatory approaches were a consistent feature of effective comprehensive or systems approaches[197,217]. Participation is a concrete enactment of job control, demonstrates organizational fairness and justice, and if properly implemented builds mutual support among workers and between workers and supervisors[218].

Despite the benefits that can be gained through participatory approaches, active employee involvement tends to be the exception rather the norm. The predominant approach to developing and implementing organizational-level interventions is to assume that employees are passive recipients of change, and to adopt a top-down approach.[219] This is of particular concern in relation to workers with lower levels of power or influence. Concerns have been voiced regarding the extent to which attempts to gain employees' insights are genuine and whether participatory processes address employees' real issues. NIOSH states, for example, that "…..worker participation or involvement strategies may often be more ceremonial than substantive, having little meaningful influence on worker empowerment..."[7, p. 15-16].

Another factor influencing the effectiveness of participatory processes is the extent to which they capture the views and ideas of all relevant stakeholders. Studies examining the effectiveness of participatory-based interventions indicate that the groups who are particularly vulnerable to experiencing high levels of work-related ill-health are also less likely to have the opportunity to take part in participatory processes. This includes workers in lower socioeconomic positions; workers employed on a casual or short-term basis, particularly women; and night-shift

workers.[78,220-223] Low paid temporary or casual employees, for example, are far less likely to be represented in consultative forums (e.g., OHS committees) and are more likely to feel constrained by their status with respect to complaining about work hazards[222,223]. They are also likely to have less knowledge about their working environments and experience more difficulty altering working conditions[222,223]. Further research, as well as regulatory or other intervention, is needed to strengthen and support participatory opportunities for disadvantaged workers.

A 2007 systematic Cochrane review of organizational level interventions to increase job control found some evidence of health benefits (e.g. reductions in anxiety and depression) when employee control increased or (less consistently) when demands decreased or support increased[224]. They also found evidence of worsening employee health from downsizing and restructuring[224]. A second 2007 Cochrane review of task restructuring interventions[225] found that interventions that increased control resulted in improved health.

An 'umbrella' summary of systematic reviews of the effects on health and health inequalities of organizational-level changes to the psychosocial work environment was published in 2009 by the UK Cochrane Public Health review group[226]. Shift work, work scheduling, privatization and restructuring were also considered. Findings suggest that organizational level changes to improve psychosocial working conditions can have important and beneficial effects on health. The authors assessed the potential for such interventions to impact on health inequalities. Though there was limited evidence, findings tentatively suggest that organizational level interventions on the psychosocial work environment also have the potential to reduce health inequalities.

Taken together, these recent systematic reviews demonstrate that effective and feasible strategies for the prevention and control of workplace psychosocial risks are available, though on-going research is needed, particularly in relation to their application among disadvantaged worker groups and their impacts on occupational health disparities.

Intervention: Promise & Practice

Available research suggests that current intervention practice lags far behind evidence-informed "best practice". Despite evidence supporting a systems or comprehensive approaches as most effective, prevalent practice in most OECD countries remains disproportionately focused on individual-level interventions with inadequate attention to organizational-and higher-level

interventions[227-230]. Echoing this finding, a recent survey covering over 28,000 enterprises in 31 European countries revealed that even though work-related stress was reported by managers as being among the key safety and health concerns for European enterprises, only about half the establishments surveyed reported that they inform their employees about psychosocial risks and their effects on health and safety[8,231]. This suggests a need to better characterize worker and employer awareness, knowledge, and attitudes towards work organization and job insecurity in the US, and the need to consider population-level awareness-raising and educational interventions to set the stage for more substantive interventions to address psychosocial working conditions and their health and social consequences at the regulatory, organizational, and other levels.

Other applied research may be needed to support awareness-raising and educational efforts in order to maximize the impact of such interventions in moving workplace stakeholders towards best practice. 'Making the case' for best practice interventions prioritizing disadvantaged groups could include legal, equity, ethical, and business cases for intervention[218,232]. Translational research is needed to develop and disseminate evidence-informed methods and tools for psychosocial risk assessment and intervention tailoring, to promote the translation of knowledge and policy into effective practice at the macro- and organizational-levels[221]. The European Psychosocial Risk Management Framework (PRIMA-EF) is a model example that could be adapted in the U.S. The PRIMA-EF project has developed and is promoting and disseminating a unified approach to psychosocial risk management across Europe by applying a systematic, evidence-based problem-solving strategy[209,230,233,234].

B. Industry/occupation specific research – case studies

Case studies are helpful for understanding how work organization hazards may contribute to occupational health disparities. Case studies cannot provide strong evidence of effectiveness. However, the concrete examples of what employers, unions or groups of workers can do to enhance work organization are invaluable for designing and evaluating intervention studies attempting to create a healthier work organization. In this section, we provide three case studies that attempted to change the organization of work.

Case Study #1. Low-wage workers classified as independent contractors

Work organization hazards: Job insecurity, in the form of competition for jobs and contracts, pressure to retain a job, or pressure to earn a livable income[28]; long work hours and potentially hazardous forms of rushing[28]; pressure to accept high-risk activities off-loaded by larger organizations or refused by permanent workers[28].

Occupational health disparities: Contingent work, such as that conducted by independent contractors in low-wage sectors, is associated with increased injury rates, increased disease risk, increased hazard exposures, and decreased worker and manager knowledge of occupational health and safety and regulatory responsibility[28]. Misclassification as independent contractors frequently impacts low-wage, minority or immigrant workers, thereby contributing to broader occupational health disparities[235-237].

Employment conditions, economic/political context: About 30% of firms misclassify employees as independent contractors to avoid liability under the Federal Labor Standards Act and other workplace laws[238,239]. Because the employment relationship is temporary and at-will, the employer's legal responsibility for worker safety is minimal or nonexistent[183]. Independent contractors are also denied benefits often extended to employees, such as employer-sponsored health insurance and access to workers compensation in the case of injury[235]. The growth in independent contractor status for low-wage workers is associated with corporate downsizing, globalization, and trends toward privatization and various forms of subcontracting work[237,240].

Interventions: Addressing health disparities among independent contractors

At the policy level, advocates have argued for the expansion of employment law coverage to more contingent forms of work, while others have promoted interventions in employer behaviors to limit the process of disintegration of the employment relationship[241].

Within specific industries, unions and labor advocates have fought to convert independent contracting arrangements into more stable employment relationships. An organizing campaign in the 1980s and 1990s by the Service Employees International Union (SEIU) on behalf of homecare providers in California—an ethnically diverse and predominantly female workforce—led to the reclassification of these workers as employees. Local or state governments were designated as employers for bargaining purposes, thereby extending labor law protections to this workforce and opening a pathway for more than 100,000 homecare workers in California to

become SEIU members[242,243]. A similar campaign by community, labor and environmental groups to reclassify port truck drivers in Los Angeles and Oakland, California, would extend similar protections to an estimated 17,500 drivers who are classified as independent operators, though these changes to drivers' employment status are currently stalled in federal courts[244,245].

Finally, regulatory agencies have played a role in addressing labor law violations and hazardous working conditions for workers misclassified as independent contractors. Federal and state OSHA officials have successfully issued citations against employers of independent contractors for violations of health and safety regulations by arguing that the employment relationship was more akin to a traditional employer-employee arrangement[246].

Case Study #2. Work Organization and Health Disparities in the Social Service Sector

Work organization hazards: Threat of workplace violence[247]; working alone; short-staffing, mandatory overtime[248], lack of training[249,250]; low status, low income[251]; high caseloads[252].
Occupational health disparities: Increased risk of burnout[252,253] and assaults[252,254,255].

SES: Professional (licensed) employees may have better training to deal with work stressors than unlicensed non-professionals[254]. In one survey, direct care workers in social services had an increased risk of physical assault compared to clinical staff [250].

Gender, race: Significant numbers of women and racial and ethnic minorities employed at professional and non-professional levels[256]. Women in social services have lower salaries and fewer management positions[257].

Employment conditions, economic/political context: Underfunding, competition for scarce grant funding, shifting policy mandates[258]. Cutting services creates "double jeopardy"; the health and well-being of clients and the workforce that serves them are both at risk[258,259]. Client/patient care concerns supersede safety and health of workforce[260]. Union density low, approximately 24%[261]. Mainly public sector, non-licensed workers unionized. Non-profit social service agencies sometimes offer more job satisfaction and intrinsic rewards but worse pay, benefits, and working conditions than the public sector[262].

The concept of workplace incivility may function differently in health care and social services, where a client/patient is being cared for, rather than a customer being served[258] (see Case Study #2 below). In these settings, the social and organizational norms may excuse uncivil behavior as

"part of the job", and lead to minimization of its impact[262]. (See also the issue paper on "Discrimination, Harassment, Abuse and Bullying in The Workplace").

The impact of welfare reform on human service workers in New York City's non-profit agencies

"We take the role of the system that is no longer there. We have become the safety net." As a result of changes in Federal law, human service workers in New York City found that public assistance for basic needs was reduced or eliminated. This led to increased family struggles, demand for services, and work intensity/speed-up (increased paperwork to comply with welfare reform), as well as "mission drift" (agencies not able to focus on their primary mission) and ethical dilemmas ("gaming the system" to protect remaining benefits). These changes led to burnout, stress, and increased employee turnover[263].

Response and Intervention: A coalition of human service workers, labor unions, politicians, communities, and researchers have fought against cuts to public assistance and social services to marginalized groups[258,259,264].

Workplace violence fatality in Massachusetts sparks community response

A licensed clinical social worker, working alone, was stabbed to death during a routine home visit, by a client with mental health issues, but no history of violence.

Community Response: A statewide Task Force was formed to encourage development of: professional skills for risk assessment and safety promotion; safety policies in agencies and in social work schools and to advocate for legislation and state guidelines[265].

Management's response: One non-profit implemented policies to improve workplace violence hazard evaluation and developed tools for client assessment[265]. The MA Department of Mental Health created a task force to evaluate workplace safety and violence among its employees and contractors. The MA Department of Children and Families began an annual safety and wellness conference for the child protective services workforce.

Research Response: In Massachusetts, the Task Force sponsored research on workplace violence and threats in relation to training in the social service field[249,250].

Legislative Response: Many states have laws addressing workplace violence. In 2007, NASW introduced federal legislation (pending) to provide matching funds to states to develop workplace violence prevention programs for social service workers.

Labor Union Response: Service Employees International Union Local 509 in Massachusetts has

a statewide health and safety committee. The New York State Public Employees Federation has led a campaign against workplace violence (http://www.pef.org/stop-workplace-violence/), that mobilized workers to lead workplace/agency based violence prevention programs, played a lead role in passing legislation, and been part of a participatory action research project on environmental assessment to prevent violence in social services[248].

Case Study #3. International civil aviation industry

Work organization hazards: Long hours, shift work, lack of rest, mental work, unmanageable workloads, constant pressure, intimidation by management, short-term contracts[266-268].

Occupational health disparities: increased risk of musculoskeletal disorders, especially among airport check-in workers and baggage handlers; increased risk of burnout[266-268].

Employment conditions, economic/political context: new technology; deregulation of airline industry; privatization; outsourcing; international competition, mergers, alliances, cost-efficiency strategies, and low-cost carriers; local airports and service providers forced to lower charges and provide flexible and inexpensive labor; security concerns; economic crises[266-268].

Intervention: International survey of ITF affiliates (2007)

The International Transport Workers' Federation (ITF) and its affiliates represent 800,000 civil aviation workers worldwide. Responding to concerns by delegates about increases in job stress and fatigue, the ITF undertook a global study through all ITF affiliated trade unions, in 116 countries, on working conditions among airplane cabin crews, air traffic service workers, and ground staff workers (check-in workers, baggage handlers, security workers, caterers, cleaners, ticket sales/call center workers and ramp workers)[268]. Using participatory action research methodology, questionnaires were developed for each of the three groups of workers, with input from ITF's affiliates, its advisors, ITF's Civil Aviation Section's Health and Safety Working Group, and an independent research team. Each questionnaire was translated from English into 8 different languages. 105 questionnaires were received from affiliates in 54 countries worldwide (a high response rate of 67%). The research process also included literature reviews, secondary analysis of previous studies of the industry, and researcher participation at ITF Civil Aviation Occupational Health and Safety Working Group meetings.

Affiliates reported that, between 2000 and 2007, civil aviation workers in all regions and in

all three occupational groups faced increasingly difficult conditions of work, largely triggered by the events of September 11, 2001, yet they maintained a sense of solidarity, and respect for and personal interest in their co-workers. Survey results include:

1) Long/odd hours, physical work, lack of rest, and mental work were factors cited most often as contributing to fatigue. 80% of cabin crew reported increased flight hours between 2000-2007.

2) Working under constant pressure due to heavy and unmanageable workloads increased between 2000 and 2007 and associations were observed between constant pressure and burnout.

3) A majority of air traffic service workers had to work very fast under constant pressure and felt emotionally drained and burned out at the end of the workday, raising safety concerns.

4) All 3 groups reported increases in intimidation by management, increases in all types of abusive behavior, and increases in disciplinary charges brought against workers by managers.

5) Precarious work conditions and a decrease in stable employment increased through more job outsourcing, and more use of contracts of less than one year.

6) Regular shift work patterns decreased among cabin crew and ground staff workers.

7) Significant increases were reported in work-related stress cases, work-related injuries and illnesses, pain, sleep disorders, and absenteeism.

9) Legislative changes facilitated the overall decline of aviation workers' conditions of work[268].

Interventions: National and global campaigns

Unions are using the study findings as part of activities at national levels. The ITF is developing a global campaign to support national activities, encourage action in countries not currently involved in such initiatives, and to focus international attention. The ITF will be pressing for international minimum standards and producing policy recommendations by the end of 2011.

IV. CONCLUSIONS AND RECOMMENDATIONS

Summary of findings

Table 2 provides a summary of the state of the evidence regarding differential exposure and differential vulnerability to job insecurity and other work organization hazards by SES, gender, race, ethnicity, immigration status and age. Our review finds consistent evidence that job insecurity is more common among younger workers, racial and ethnic minorities, immigrants and workers in lower socioeconomic positions. Further, five of the nine reviewed studies found women to be more exposed to job insecurity. Thus, there is good evidence of differential exposure to job insecurity.

Table 2. Summary of research on job insecurity and work organization hazards contributing to variation in health and safety outcomes by various bases of labor stratification

	Lower socioeconomic position	Female gender	Racial and ethnic minorities/immigrants	Younger age
Differential Exposure				
Job Insecurity	+	+	+	+
Work Organization	+	-	+	+
Differential Vulnerability				
Job Insecurity	+	-	-	-
Work Organization	+	-	-	-

The symbols + or - refers to consistency of findings. Shaded areas represent areas of limited research inquiry (4 or fewer studies).

A sizeable body of research has explored differential exposure to other work organization hazards by SES and gender: although there is general consistency that individuals with lower SES are more likely to be exposed to work organization hazards, there is no discernible pattern of effects for gender. The small amount of research on differential exposure by race/ethnicity, age and immigration status does not allow firm conclusions. Limited research suggests that work organization hazards have a greater impact on the health of lower (vs higher) SES workers. However, there is no clear pattern of results to conclude that other groups of workers are systematically more vulnerable to the health effects of job insecurity or other work organization hazards.

Intervention strategies to reduce differential exposure and vulnerability. Intervention

strategies for improving work organization and job security and reducing their impacts on health can be implemented at various levels, including national/international or macro-structural (e.g., OH&S and employment rights legislation and regulation), industry/organizational or micro-structural (e.g., union- or employer-based job stress prevention programs) and individual (e.g., coping skills development training). While there has been limited research explicitly examining the impacts of these interventions on *health inequalities*, available evidence suggests that macro- and micro-level intervention strategies have the potential to reduce health inequalities.

Research agenda – occupational health disparities

This review highlights the substantial potential role that job insecurity and work organization play in creating and exacerbating occupational health disparities. Nevertheless, more research is needed, both methodological and substantive.

Surveillance. There is no current U.S. national surveillance program that monitors work organization. The absence of an active surveillance system makes it difficult to track trends in work organization and job insecurity and the role they may play in occupational or public health problems, including health disparities. Some mechanisms exist for tracking changes in work organization, such as periodic supplements to the Current Population Survey (Bureau of Labor Statistics), the National Study of the Changing Workforce (Families and Work Institute), or the General Social Survey Work Life Supplement (National Opinion Research Center with NIOSH in 2002, 2006 and 2010). However, none of these initiatives are specifically tasked with documenting trends in key aspects of work organization such as precarious or contingent employment, job insecurity or job strain. A high priority area for research development is the creation of surveillance tools for monitoring key indicators of work organization[269]. Ideally, effective surveillance would occur at the employer level (i.e., how are available jobs organized?) and the worker level (i.e., how do workers experience their work?). At a minimum, we recommend that NIOSH convene a panel of experts to identify key aspects of work organization necessary for national surveillance, create an assessment battery for measuring these work organization factors, and annual or biennial assessment of these factors through the standard Bureau of Labor Statistics channels (e.g., Current Population Survey). In addition, it is essential that NIOSH publicly provide already collected data on trends in work organization measures

from national surveys conducted in 2002, 2006 and 2010, including trends in these risk factors by SES, gender, race, ethnicity, immigration status and age.

Existing channels for work organization surveillance do not adequately capture work performed by individuals in invisible segments of the labor force. Work organization likely contributes to health disparities through the systematic involvement of some groups of workers in "bad jobs". Immigrants, for example, are overly represented in crop agriculture[174]. Much of this work is temporary, frequently involving piece-rate compensation systems, and jobs that are exempt from legislative mandates designed to protect workers such as the Fair Labor Standards Act (FLSA)[19]. Likewise, immigrants and refugees increasingly find themselves in dangerous sectors of manufacturing like meat processing[177] and construction. Yet, these segments of the labor force tend to be under-represented in research projects based on standard household sample designs, in part because the different living arrangements of these workers and in part because these workers want to remain "invisible". Methodological research is needed to identify alternative sampling strategies that capture workers in the full range of occupations, or the creation of sampling strategies that otherwise "enrich" probability samples with disadvantaged groups including immigrants, refugees, and members of racial and ethnic minorities.

Measurement. Cross-cultural equivalence of measurement instruments takes on significance when studying racial, ethnic and immigrant group variation in work organization factors. Fortunately, there is some evidence that instruments frequently used in this literature, such as the Job Content Questionnaire[34], have been validated in several cultural contexts[270]. Other research suggests that concepts like job demand and control have similar meaning in diverse cultural contexts and that items used to measure these concepts are appropriate[96,271]. Nevertheless, there is evidence that psychometric properties of these measures may differ between racial and ethnic groups[96], or that response options may need modification[272]. Thus, it is important to remain vigilant to the issue of cross-cultural equivalence when assessing research or designing new research studies. Appraisals of "job security," for example, are undoubtedly shaped by external realities (e.g., recent expansions or contractions of similar jobs), but interpretations of those realities are also colored by many other factors such as previous job losses, interpersonal experiences at work and the social or cultural meaning of "being fired" or "laid off". Research is therefore needed to ensure that individuals from different segments of society interpret job

security questions similarly and use comparable cognitive evaluations when articulating a response to those questions.

Better measurement tools are also needed to assess work organization hazards at the organizational level (e.g., lean production, labor relations policies, or electronic monitoring) and work-family conflict[273-275], such as have been developed for job specific factors[270], safety climate[276], and employment precariousness[20].

Relationships between levels of work organization (from Figure 1). More research is needed on the impact of employment conditions on organizational factors, as well as the influence of organizational factors (e.g., downsizing, subcontracting, production systems, staffing levels) on job specific factors, health and safety, and health and safety disparities. In addition, research is needed on the ways in which these relationships vary by industry.

Hypothesis testing. The research reviewed in this report leads to several important research questions:

1) The release of data on trends in work organization and job insecurity will allow us to test the hypothesis that increasing socioeconomic health disparities in cardiovascular disease[277,278], hypertension, diabetes and smoking[279] may be resulting, in part, from increasing socioeconomic disparities in job insecurity and work organization hazards[78]. Lower income U.S. workers face wage stagnation relative to higher income workers[280] and decreasing union representation[5]. Case studies suggest increasing workload, speed-up and tighter monitoring and control in assembly line work [281]. The prevalence of "hectic plus monotonous" work (similar to job strain) in Sweden increased at a faster rate for blue-collar workers than for white-collar workers between 1992 and 2000[282]. “Neo-liberal policies”, such as deregulation, privatization and reduced social welfare payments (e.g., social security, health insurance), along with downsizing and lean production may be causing a greater increase in work organization hazards and job insecurity among workers in lower (vs. higher) socioeconomic positions[4].

2) Are higher exposures to job insecurity and some work organization hazards among women, racial and ethnic minorities, immigrants and younger workers primarily due to their lower socioeconomic position, or do other factors play a significant role?

3) Based on limited data, the impact of job insecurity and work organization hazards on health and safety appears to be greater for workers in lower socioeconomic positions. If future

research confirms such an interaction ("differential vulnerability"), what factors may explain it? To what extent may such an interaction be due to exposure to other work and non-work hazards?

4) What factors explain greater health risks among blue-collar women vs. blue-collar men?

5) To what extent do work organization hazards and domestic responsibilities interact to increase illness risks among women, e.g.[283,284].

6) Do work organization hazards and job insecurity explain a larger proportion of socioeconomic inequalities in health among men than women[82,83,99]? To what extent are class differences in health explained by amount of household labor, e.g.[82]? Some research exists on demands, control, and support in household labor[285]. If both paid labor and household labor are both considered as legitimate areas of study in the fields of "working conditions" and "work organization", do gender differences actually exist in the proportion of socioeconomic health disparities explained by work organization hazards and job insecurity?

7) In 2008, the employment rate in EU-27 countries was about 60% among women and 73% for men. 30% of women but only 8% of men work part-time[286,287]. Part-time work among women is often not freely chosen, but results from gender differences in access to the labor market with a predominance of men holding fulltime "breadwinner" jobs. What are the policy implications for improving working conditions among women and reconciling "women's work" with family life?[288]

8) Further research is needed to better characterize the illness and injury burden attributable to poor work organization, as well as the economic costs associated with this burden. Exposure to job insecurity and other deleterious aspects of work organization are not evenly distributed in the population. Despite this fact, the literature remains underdeveloped in its ability to rule out competing explanations of associations between work organization factors and health outcomes. Research using alternative designs (e.g., case-control, case-crossover designs) or alternative methods (e.g., propensity score matching) are needed to more firmly establish the specific role work organization plays in occupational health outcomes.

9) An ongoing challenge to work organization research and prevention activities is the widespread feeling that "any job is better than no job", particularly in periods of higher unemployment. Some also argue that it is cost prohibitive for employers to organize work in a health-promoting way, particularly in "low skill" occupations, and that employers may move

jobs overseas if mandated to enhance the way jobs are designed. Research addressing these issues is therefore needed. Historical research is needed to determine whether the health benefits of work organization factors are enhanced or undermined during economic contractions. Similarly, economic evaluation is needed to estimate the return on investment of initiatives to enhance work organization, especially in industries and sectors of the economy for whom reductions of labor costs are viewed as the primary route to increased profitability.

Research agenda – interventions to reduce occupational health disparities

To improve the evidence base on intervention strategies to reduce OH disparities arising from differential exposure and differential vulnerability to poor work organization and job insecurity, a range of applied and more traditional intervention research is needed:

1) Applied intervention development research is needed to characterise perceptions, knowledge, and attitudes among workers and employers on work organisation, job insecurity, and occupational health disparities. Understanding where various groups "are at" in this regard is needed to guide population-level awareness-raising and educational interventions to set the stage for interventions to reduce differential exposure and differential vulnerability;

2) Translational research is needed to develop and disseminate evidence–based methods for risk assessment of job insecurity and work organization hazards and tailored intervention development (e.g., at organizational level) to support the adoption of best practice interventions;

3) Intervention effectiveness studies need to measure and report not only absolute changes in exposure or health outcomes, but also changes in exposure or health outcome disparities as key findings;

4) Intervention implementation and effectiveness studies are needed focusing on the particular circumstances of worker groups with lower levels of power or influence (e.g., racial and ethnic minorities, immigrant workers);

5) Participatory action and other intervention implementation studies are needed to better characterise successful and potentially harmful intervention development and implementation processes and strategies, and on the role of labor unions and other worker advocates in encouraging worker participation and implementing effective interventions;

6) Intervention implementation research is needed on the barriers to and risks of participation

in workplace interventions for workers with lower levels of power or influence in order to develop participatory strategies that are both effective and safe for participating workers.

7) Intervention research is needed on the impacts of macro-level legislative and regulatory interventions on work organization and job insecurity, including increases in funding for enforcement, the regulation of sub-contractors and global supply chains, and harmonizing of international standards

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