Work organization interventions: state of knowledge and future directions

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Summary

Changes taking place in the modern workplace, such as more flexible and lean production technologies, flatter management structures, and nontraditional employment practices fundamentally alter work organization factors and raise concerns about potentially negative influences on worker health and safety. These changes raise concerns about adverse effects on worker safety and health and call attention to the need for interventions to counter these effects. This forum article provides an overview of work organization intervention research, highlights gaps in the research literature, and sets forth an agenda for future intervention research. Research to date has focused primarily on individual-level interventions, with far less attention to interventions at the legislative/policy level, employer/organization level, and job/task level. Future research is recommended to establish the effectiveness of work organization interventions using improved methodological designs and giving increased attention to the circumstances within organizations that promote the adoption of such interventions.

Keywords: Work organization – Interventions – Occupational safety and health.

In the prior issue of this journal we identified some of the concerns raised by rapid organizational change in today's workplace and the need for improved monitoring of work organization factors to better understand and prevent potential risks posed by these changes (Sauter & Murphy 2003).

One of the main uses for such monitoring information is to target interventions to reduce safety and health risks associated with these practices. In this article, we address the subject of work organization interventions to improve worker safety and health, focusing primarily on the situation in the US. The need for increased attention to work organization interventions has been highlighted in a recent report on future research needs in work organization and occupational safety and health (Sauter et al. 2002) that was prepared under the auspices of the US National Occupational Research Agenda (NORA, http://www2.cdc.gov/NORA/default.html). The present article builds upon this discussion of work organization interventions.

The plan of the present article is to summarize the work organization intervention literature, highlight interventions that US organizations are taking to improve worker health and safety, identify gaps in the intervention research literature, and set forth an agenda for future intervention research. We use the term "work organization intervention" broadly to include changes in job design and changes in organizational practices and social policy that influence job design (Sauter et al. 2002). Although distinct from organizational change per se, individual level interventions cannot be disregarded in discussion of work organization interventions because they involve the interface between workers and the work process. This approach stands in contrast to the customary practice of separating interventions into two categories: job/organization focused interventions and individual worker focused interventions, which reflect primary vs secondary prevention efforts (tertiary prevention is rarely considered in this context). Primary prevention attempts to alter job or organizational characteristics to protect/

	Primary	Secondary	Tertiary
Legislative / policy	Legislation to limit hours of work	Worker compensation	Social security disability program
Employer / organization	Work-family programs	Return to work programs	Company provided long-term disability
Job / task	Job/task redesign, job enrichment, Job rotation	Provision of light duty jobs	
Individual / job interface	Health promotion programs	Stress management programs	Employee assistance programs Disease management programs

Figure 1 Levels of work organization interventions and stage of prevention. There is a degree of arbitrariness in classifying intervention programs within this taxonomy. Several interventions, for example, would appear to bridge prevention stages (e.g., worker compensation). Further, most interventions classified at the individual level are actually coordinated as programmatic activities at the employer/organizational level as a form of secondary prevention

improve worker well-being. Secondary prevention aims to reverse or slow the progression of ill-health while tertiary prevention aims to treat manifest health disorders.

Overview of the work organization intervention literature

Prior reviews of the work organization intervention literature have dealt mainly with job stress interventions, the most common type of intervention study encountered in the published literature. However, other types of interventions that have become prevalent in US organizations (e.g., work-family programs) are at base "work organization" interventions and should be included in literature reviews. In order to better reflect the nature and scope of work organization interventions, we use a taxonomy that consists of four levels of intervention: legislative/policy, employer/organization, job/task, and individual/job interface. Within each level, interventions may be primary, secondary, or tertiary in nature, depending on the target for change and the intended outcome (Fig. 1). In the next section, we define each level, provide examples, and give an overview of the pertinent research literature.

Legislative/policy level
Interventions at this level target policies, priorities or laws that affect work establishments and work practices nationally or within state or other jurisdictions (e.g., public vs pri-

vate sectors). Historically, work organization interventions in US organizations have not been accomplished at the legislative/policy level, although there are significant exceptions. For instance, the Family and Medical Leave Act of 1993 provides workers with the flexibility to take up to six weeks of unpaid annual leave to attend to family members in need of medical care, and numerous states have recently enacted legislation limiting mandatory overtime for health care workers (Golden & Jorgensen 2002). The Fair Labor Standards Act (http://www.dol.gov/dol/compliance/comp-flsa-childlabor.htm) which governs overtime pay also falls into this category. (See http://www.thecre.com/fedlaw/legal 12.htm for other examples). However, empirical study of this type of social policy impacting the workplace is scare and more typically, work organization interventions are driven by a) employer/company-initiated efforts or b) investigator-initiated studies supported by research and demonstration grants to universities and other research institutions.

Employer/organization level
Interventions at this level target characteristics of the organization, such as policies, procedures, and/or benefits, as well as aspects of the organizational culture/climate. Employer/organization-initiated efforts are common types of intervention in US workplaces, but they are very rarely evaluated in a scientific sense and thus do not often appear in the peer-reviewed literature. Indeed, a simple review of the scientific literature would produce a truncated view

of the scope of work organization interventions US companies.

At least two groups of such programs can be identified. One group of programs have been labeled "work-family" programs and surfaced in US companies during the past 15 years to reduce work-life conflicts that fostered employee stress and dissatisfaction. It is noteworthy that the US federal government took the lead in developing and introducing many work-family initiatives to federal employees and these initiatives became models for the private sector (Saltzstein et al. 2001). Flexible work schedules are perhaps the best examples of these types of initiatives and were designed to reduce scheduling conflicts associated with routine family activities such as care of a sick child. Provision of childcare for employees, compressed work schedules, part-time work and job sharing, flexi-place, elder care, and concierge services are more recent examples of efforts by organizations to help employees achieve a better work-life balance. These programs have grown in prevalence in US workplaces in response to significant changes in the US labor force (Murphy & Sauter 2003) and the desire to provide competitive human resource benefits as a means of improving recruitment and retention (Drago & Hyatt 2003). A recent survey of 945 major US companies by Hewitt Associates (2002) found that 74 % of these companies offered flexible scheduling, 48 % offered part-time work, 40 % job sharing, 30 % work at home, and 21 % compressed work weeks. Fully 94 % offered help to employees with childcare, and 38 % assisted employees financially with elder care needs (http://was4.hewitt.com/hewitt/resource/newsroom/pressrel/2002/05-13-02.htm).

Although evidence has accumulated over the past five years indicating that work-family programs improve worker satisfaction and employee attitudes toward their employer (e.g., Berg et al. 2003; Ezra & Deckman 1996; Families & Work Institute 1998), evaluation studies have not produced consistently positive results. For instance, Saltzstein, Ting & Saltzstein (2001) conducted a detailed analysis of work-life survey data collected from over 32 000 federal employees in 1991. Their analyses indicated that the use of flexible work schedules showed a small but negative effect on satisfaction with work-family balance and job satisfaction; this finding remained the same when analyses were conducted with various demographic subgroups. Compressed work schedules had no effect on satisfaction with work-life balance or job satisfaction. On the other hand, part-time employment was strongly related to work-life balance but not with job satisfaction. Use of company-provided childcare had no link to work-life balance but was associated with improved job satisfaction (Saltzstein et al. 2001).

A second group of employer/organization level intervention involves changes to the organizational culture or climate to improve worker health and well-being. Although these types of interventions are rarely seen in the published literature, examples can be cited for changing safety climate (Gershon et al. 2000), comprehensive culture change in a healthcare setting (Parsons & Murdaugh 1994), values-based management (Collins & Porras 1994), magnet hospitals (Aiken & Sloan 1997), and healthy work organizations (Lindstrom et al. 2000). Each of these reports indicated large scale, beneficial effects of organization-wide interventions, offering significant potential for future research.

Job/task level

Interventions at this level focus on changing characteristics of the job/task or working conditions, and nearly all of these interventions would be classified as primary prevention. Examples include workload reduction, participation in decision-making, improved job control, job enrichment, and the like.

Job/task interventions are not very common in the research literature and reviews of the effectiveness of these studies are not encouraging. Thus, it is not unusual to find small or null effects on worker stress and well-being (e.g., Briner & Reynolds 1999; Parkes & Sparkes 1998; Murphy 1996; Semmer 2003; van der Klink et al. 2001). This is surprising in light of the fact that these are "preferred" interventions from a theoretical point of view and are routinely advocated by most researchers in the field because they target stressors at their source (i.e., health protection).

However, two recent reviews have provided a bit more positive picture. Murphy (1999) identified a handful of studies of job/task interventions in healthcare settings that produced positive effects. Although many of these studies were not scientifically rigorous, the results were sufficiently positive to warrant attention from researchers and practitioners. For instance, participatory job redesign in a 50-bed surgical unit (Abts et al. 1994) led to improvements in both employee and patient satisfaction. Another study showed that comprehensive restructuring of work routines and organizational culture at a large US medical center led to increased feedback, task significance, meaningfulness of work, internal motivation and job satisfaction (Parsons & Murdaugh 1994). Likewise, Kompier et al. (1998) reviewed 10 Dutch studies that involved attention to work redesign, sickness absence management, or training to improve coping capacity. Many of the studies demonstrated improvements in sickness absence and the benefits of the intervention outweighed its costs. Key ingredients of successful interventions included a risk analysis to identify the problem areas, a combination

of worker and work-directed measures, a participative approach, and top management support.

Why job/task interventions have not been more successful in many studies is not entirely clear. It is possible that because many of these interventions focused on reducing job stress, and a fundamental tenet of stress is that change is stressful, job/task interventions might increase worker stress in the short-term. Workers may need training and assistance to help them adapt and adjust to new work routines and interpersonal relationships, beyond the need to cope with change *per se*. In a very recent review of the job stress intervention literature, Semmer (2003) suggested that the experience of stress might undermine those personal resources like self-efficacy that are needed for effective coping. It is also possible that job/task interventions decrease stress for some workers (the ones who see the change as positive) but increase stress for other workers (those who see the change as negative). This suggests the need for evaluation protocols that include subgroup analyses to identify workers who were positively and negatively affected by the intervention. Nevertheless, absent further research supporting or clarifying the effects of job/task interventions, it may be difficult to make a strong case for these initiatives despite their theoretical appeal.

Individual worker level

This level refers to interventions directed at changing characteristics of the individual/job interface, such as perceptions, attitudes or behaviors at work, as a means of improving worker well-being. Examples would include stress management, time management and conflict resolution seminars that became popular in the 1980s in large and medium-sized US organizations (http://www.traininguniversity.com/tu pi 1995nd 4.php). Stress management training includes a wide assortment of techniques including meditation, biofeedback, muscle relaxation, and cognitive behavioral skills training, all designed to reduce the symptoms of stress. As such, they typically are viewed as secondary prevention. It is noteworthy that stress management training could be considered primary prevention if the training includes components that help workers alter negative lifestyle habits and/or manage inaccurate perceptions of work organization factors.

The popularity of stress management programs in the US has grown significantly over the past 20 years. National surveys conducted in 1985, 1992 and again in 1999 found that the prevalence of stress management programs (among worksites employing 50 or more workers) was 27%, 37% and 48%, respectively (National Worksite Health Promotion Surveys 1985; 1992; 1999).

Reviews of the effectiveness of stress management programs date back to the 1970s (Newman & Beehr 1979) and have appeared periodically since that time (Bunce 1997; DeFrank & Cooper 1987; Giga et al. 2001; Ivancevich et al. 1990; Kompier et al. 1998; Murphy 1984; 1996; Semmer 2003; van der Klink et al. 2001). While the earlier reviews were limited to a very small number of published studies, more recent reviews have identified up to 64 stress management studies (Murphy 1996), 48 of which used at least a quasi-experimental design (van der Klink et al. 2001) and 10 studies that compared the effectiveness of two or more training techniques (Bunce 1997).

A few general conclusions can be drawn from these reviews. First, most worksite stress intervention studies involved efforts to help employees manage stress through education about the nature and sources of stress and through training in relaxation and cognitive/behavioral skills. Second, stress management training is more often than not associated with benefits to workers in the form of lower physiological arousal level, reduced feelings of distress, and fewer somatic complaints, but significant changes in job satisfaction are rarely observed (Bunce 1997; Murphy 1996; van der Klink et al. 2001). This makes sense since the primary target of stress management interventions is the individual, not the organization itself, and one might expect direct effects on the former but only indirect effects, if any, on the latter. Third, post-training benefits have not always been maintained in follow-up evaluations and regression toward baseline levels has occurred in many studies that contained a follow-up (Murphy 1996).

A number of reasons have been offered to explain why stress management interventions are more prevalent than job/task interventions to reduce stress (e.g., Ganster & Murphy 2001). For instance, there has been a common belief in US organizations that stress is a personal, not work-related problem and this view has led many organizations to focus on helping workers cope with stress instead of efforts to reduce job stressors (Singer et al. 1989). Likewise, stress management interventions directly address the idiosyncratic components of stress ("one person's meat is another person's poison") more so than job-oriented stress interventions. How does one design an effective intervention involving work redesign for individual attributes of workers that contribute to stress? Of course, the fact that job/task interventions have not produced consistent, positive results may also contribute to their infrequent use in US organizations. Perhaps the bottom line is that stress management represents a less risky choice for organizations because it does not entail what may be costly and disruptive changes in production practices.

Intervention research needs

Needs for future research on work organization interventions seem especially apparent in three areas. First, more research is needed to better establish the effectiveness of work organization interventions, particularly at the legislative, employer/organizational and job/task levels. Second, methodological advances are needed in support of these types of studies and, third, from the standpoint of promoting interventions, a better understanding is needed of the circumstances within organizations (political/cultural factors, resources and knowledge, etc.) that influence the adoption of work organization interventions. Each of these is addressed in the following sections.

Effectiveness of interventions

Although studies of intervention effectiveness are needed at the legislative, employer/organizational and job/task level, the absence of studies of legislative or public policy initiatives and employer/organizational programs is especially notable. This type of research may be more properly called program evaluation. The California Family Rights Act (CFRA http://www.californiadiscriminationlaw.com/fmla.html) that is set for implementation in 2003 and provides for paid leave time for critical family medical reasons is a timely candidate for intervention research addressing legislative and policy initiatives. It can be anticipated that the CFRA would reduce stress associated with added workload burdens, job insecurity, or work-family conflict that may otherwise result from the need to provide family medical care. However, empirical study of this type of social policy impacting the workplace is scarce. A proposed amendment to the Fair Labor Standards Act that gives workers flexibility to use accumulated overtime for personal or family needs represents another opportunity for evaluative research of this nature.

Among employer/organizational level interventions, there is a particular absence of studies examining the effects on effort to reform the organizational climate or culture. These interventions are certainly more complex to design, implement and evaluate, but the potential benefits to the worker and to the organization may be substantial would seem to outweigh the implementation costs. For instance, the remarkable turnaround of Sears, Roebuck and Company was initiated by a refocus on its core values (honesty, integrity, respect for the individual, teamwork, trust, customer focus), involvement of all employees in the process, and efforts to insure that the core values permeated all levels of organizational functioning (Rucci 1998). As a result, not only did employee satisfaction improve, but customer satisfaction and profitability also showed significant gains. Some of the difficulties inherent in values-based management have been set forth (Anderson 1997), as have some clear, step-by-step guidelines for implementation (Taft et al. 1999).

Ideally, these types of intervention studies would include effectiveness measures for a wide range of cost factors such as illness, injury and disability rates, health care utilization, absenteeism and lost time, etc., in addition to measures of health and well-being that are more commonly collected in research on the organization of work (e.g., self-reports of health status, job satisfaction) to better understand the intervention impact on injury and disease burden sustained both by workers and the organization. This breadth has been noticeably absent in intervention research to date.

Along this line, a new concept of organizational effectiveness (sometimes dubbed "organizational health") links organizational practices that protect worker safety and health with high levels of organizational functioning – a variant on the theme safety pays (Murphy & Cooper 2000; Sauter et al. 1996). Safety and health studies of organizational interventions that examine a broad range of organizational outcomes may identify practices that are conducive to both improved worker safety and health and improved organizational effectiveness, thereby building a stronger case for worker protection through job redesign.

As a practical matter, advances in organization of work intervention research would benefit from improved resources and training. A need exists for developing and compiling information about the science of intervention research, and increased exposure of researchers to this information in their graduate training to improve their capacity for intervention research. In this regard, it is notable that the topic of intervention effectiveness has been recognized as a research priority under NORA, and a team of specialists from the National Institute for Occupational Safety (NIOSH) and outside interest groups have undertaken an evaluation and compilation of knowledge on this (Goldenhar et al. 2001; Loeppke et al. 2003; Robson et al. 2001).

Finally, reviews of the intervention literature consistently acknowledge the importance of management commitment to the success of any work organization intervention (Kompier et al. 1998; Murphy 1996; Parkes & Sparks 1998) and future studies should not only seek to obtain such commitment but also to measure it as a mediating/moderating variable.

Improvements in intervention research methods

Advances in knowledge of organizational interventions to protect worker safety and health will require improvements in intervention research practices. There are two major issues here. First, a need exists for improved guidance, and possibly a new paradigm, for designing and conducting

research on organizational interventions. Stated in the most general terms, approaches need to be articulated that build on the strengths and minimize the limitations of various contrasting methods (e.g., case studies and action research vs experimental designs, qualitative vs quantitative methods) and allow for reliable and expeditious conduct of interventions in an organizational context. Responding to this need, Zwerling et al. (1997) suggested that a sensible and economical approach to conducting intervention effectiveness studies begins with qualitative methods and quasi-experimental designs to explore the feasibility of interventions, holding randomized controlled trials in reserve for testing and validating the most promising approaches. Similar ideas for improving work organization intervention research have been offered by Baker et al. (2001).

Second, intervention research needs to be more theory driven to learn why and under what circumstances organization of work interventions succeed. In their recent report, the NORA intervention effectiveness team noted that too often investigators do not adequately describe the intervention or address the issue of why or how an intervention is expected to bring about improvement in the safety and health of workers (Goldenhar et al. 2001). Well designed, theory-driven intervention research increases the likelihood that an intervention will ultimately be effective because it leads to a better understanding of how the intervention works and allows for generalization and tailoring of the intervention to multiple situations.

Until recently, theory-driven models for occupational safety and health interventions were not common in the published literature. However, Cohen et al. (1997) developed a model for reducing work-related musculoskeletal disorders that prescribed a seven-step process beginning with problem identification and leading ultimately to the design of new work practices (intervention). Melhorn et al. (1999) used this model to establish an occupational intervention program for musculoskeletal disorders and reported substantial savings in worker compensation costs. Israel et al. (1996) presented a conceptual framework for interventions to reduce stress at work that was based on a comprehensive model of stress and health. Such models provide guidance for each step in the intervention process (design, implementation, and evaluation). As a side note, both of the above-mentioned models emphasize the need for management commitment and employee involvement in the intervention design process.

Implementing interventions

More information is needed about critical factors and conditions that motivate organization of work interventions to protect worker safety and health. Experience suggests that decisions for organizational change are often driven by industry opinion leaders, by authority figures in organizations who are convinced about the efficacy of new organizational practices, by best practices, or by industry norms (benchmarking). However, these decision processes are not well understood or appreciated in the scientific community.

Ethnographic study of organizations to better understand the processes that govern intervention decisions could lead to development of products to help motivate and support interventions. Examples of these products might include (1) casebooks on successful interventions to help organizations select, guide, and evaluate interventions; (2) design and promulgation of best practices based on accumulated findings from intervention research; and (3) forums on organization of work and health that are keyed to practitioners (in contrast to researchers) and highlight information about interventions and intervention effectiveness. Study of these decision processes could also lead to improved study designs and methods for intervention research (e.g., help to identify organizationally relevant measures of intervention effectiveness).

Conclusions

As organizations continue to transform and grow in the 21st century, attention to work organization factors as potential risk factors for worker health and safety will become increasingly more important. Evidence is accumulating that management practices such as downsizing, flexible labor arrangements, and lean production can impair worker health and safety (Murphy & Sauter 2003). To address these work organization risk factors, effective interventions need to be developed, implemented, and evaluated. A confluence of higher level work organization interventions, better methodological designs, and increased attention to factors surrounding successful implementation of interventions offers the best hope for identifying successful interventions to protect worker health and safety.

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