National Institute for Occupational Safety and Health, Organizational Science and Human Factors Branch, Cincinnati

Monitoring the changing organization of work: international practices and new developments in the United States

Summary

Recent trends in the organization of work have raised concerns about their implications for safety and health in the workplace. Capacity for monitoring of these trends from an occupational safety and health perspective (also known as hazard surveillance[1]) varies considerably across countries and regions. This forum article discusses current practices for monitoring the organization of work, noting strengths, limitations, and needs for improvement. Particular attention is given to the status of monitoring practices in the U.S., and new initiatives by the National Institute for Occupational Safety and Health (NIOSH) to improve upon these practices.

Keywords: **Monitoring – Work organization – Occupational safety and health.**

Abbreviation index

BLS	Bureau of Labor Statistics
DOL	Department of Labor
CPS	Current Population Survey
NEWS	National Exposure at Work Survey
NIOSH	National Institute for Occupational Safety and Health
NORA	National Occupational Research Agenda
NOS	National Organizations Survey
QES	Quality of Employment Survey
QWL	Quality of Worklife Survey

Changing organization of work

Mature industrial countries have experienced sweeping changes in the organization of work that have been shaped by economic, legal-political, technological, and other forces. Manufacturing jobs continue to decline, giving way to service and knowledge work. Liberalized trade regulations and new information and computer technologies have enabled more companies to operate globally and around-the-clock, resulting in intensified price and product competition. In addition, product and service demands are shifting rapidly amid pressure for higher quality and customized products.

Organizational practices have changed dramatically in this new environment. To compete more effectively, many companies have restructured themselves by downsizing their workforces and outsourcing all but core functions. At the same time, nontraditional employment practices that depend on temporary workers and contract labor have grown steadily. Organizations are also adopting new and flatter management structures that result in downward transfer of management responsibility and decentralized control, and implementing more flexible and lean production technologies. In turn, these forces and practices cascade downward to affect job demands and quality of working life, as illustrated in Figure 1.

A significant body of literature has developed around these trends (International Social Security Association 2002; Isaksson et al. 2000; Landsbergis et al. 1999; Quinlan et al. 2001), raising fears about increased risk to worker health from factors such as destabilized employment, increased exposure to physical and psychological stressors at work (e.g.,

[1] To be consistent with the convention in much of Europe, we have adopted the expression "monitoring" in relation to the collection and evaluation of data on trends in the organization of work. In the public health field in the U.S., the term "surveillance" is used as an analog to monitoring, referring to the systematic and ongoing collection of information on occupational injuries and illnesses ("health surveillance") and hazards ("hazard surveillance"), and analysis, interpretation, and dissemination of this information for prevention purposes (NIOSH 2001).

Soz.- Präventivmed. 48 (2003) 341–348
0303-8408/03/060341–08
DOI 10.1007/s00038-003-3026-2

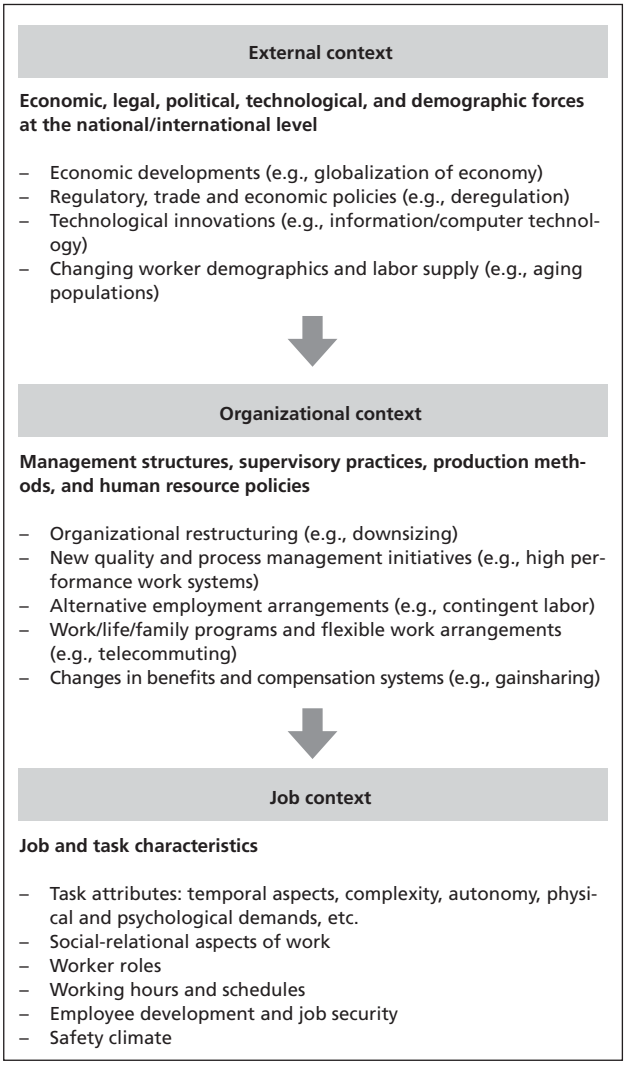

Figure 1 Organization of work

work intensification), and reduced access to health services and prevention programs. However, the scope, complexity, and speed of new trends in the organization of work have clearly outpaced understanding of their implications for work life quality and safety and health on the job.

Responding to growing concerns over rapidly changing organizational practices, the (U.S.) National Occupational Research Agenda (NORA) recognized organization of work as one of the 21 priority research topics for the next decade, and a strategy was developed to better understand and prevent potential risks posed by these new practices (Sauter et al. 2002). The European Agency for Safety and Health at Work has similarly mobilized around this topic (European Agency for Safety and Health at Work 2002; 2000).

A cornerstone of the NORA strategy is the need for improved monitoring of the changing organization of work in the U.S. In the present article we expand upon this NORA discussion. We begin by highlighting the importance of monitoring the organization of work. The status of monitoring practices in the U.S. is summarized and examples of monitoring practices in Europe and other regions are presented, noting both strengths and limitations of these practices. We conclude with a description of new NIOSH initiatives to improve upon monitoring practices in the U.S., and suggestions for future directions in monitoring the organization of work. The NORA strategy also points out the need for increased epidemiologic study of the changing organization of work and for expanded research on work organization interventions to protect worker safety and health. NORA perspectives on the status of research and knowledge on organizational interventions will be the focus of the second issue of this journal in 2004.

Monitoring the organization of work – rational and current practice

Monitoring the organization of work can be useful for:

– Understanding changing worker exposures to organization of work factors (e.g., highly repetitive work) that present known risks for stress, illness and injury.
– Detecting and charting emergent trends in the organization of work (e.g., the spread of lean production practices) that pose uncertain or suspected risk.
– Describing the distribution of these exposures and trends within industry, occupation, demographic, and other relevant sectors.

In turn this information can be used to target interventions to reverse hazardous trends in the organization of work and to identify organization of work factors for further epidemiologic study and risk assessment (Costa 1992; Sauter et al. 2002). For example, evidence of steady increases in working hours in the U.S. in the 1990s (Bluestone & Rose 1998; DOL 1999; Rones et al. 1997) prompted NIOSH to significantly expand funding of research to investigate potential safety and health effects of this trend, resulting in five new extramural grants on this topic in 2001.

In a review of occupational illness and injury monitoring in the U.S., Baker et al. (1988) suggested that, from the standpoint of targeting interventions, monitoring of workplace exposures can be more useful than monitoring health outcomes since the latter may have complex etiologies that make it difficult to isolate specific risk factors within or outside the workplace. This would certainly seem true for conditions such as stress related disorders, which are of special concern in relation to the changing organization of work.

The situation in the U.S.

Monitoring the organization of work has been a longstanding concern in the U.S. In 1969, the U.S. Department of Labor (DOL) sponsored the first wave of the Quality of Employment Survey (QES) (Survey Research Center, University of Michigan 1970). The QES was the first ever survey of workers in the U.S. (and perhaps the first such survey in any country) to collect nationally representative information pertinent to the organization of work. DOL was joined by NIOSH and the Occupational Safety and Health Administration in follow-up administrations of this survey in 1972 and 1977 (Quinn & Shepard 1974; Quinn & Staines 1979). In each of these surveys, information was collected via household interviews from a sample of over 1500 active workers. Core elements of the QES included questions on the nature of job tasks (e.g., demands, autonomy, variety), working hours, job security and psychological outcomes (e.g., job satisfaction). Key goals of these surveys were to establish baseline and normative data on working conditions and worker mental health, to examine trends in these factors, and to assess the impact of working conditions on worker well-being. Notably, data from the QES were integral to formulation and testing of what was to become one of the most prominent theoretical models of work, stress and health in recent decades – namely, the Karasek demand/control model (Karasek 1979; Karasek & Theorell 1990).

The National Organizations Survey (NOS) has also collected extensive information on the organization of work in the U.S. (Kalleberg et al. 1996). In contrast to the QES, which focused more on job context factors, the level of analysis in the NOS was broader organizational practices, especially new human resource practices (e.g., flexible employment arrangements) and organizational aspects of high performance work systems. (See Figure 1 to distinguish between these two levels of analysis.) Data were obtained from key informants from a representative sample of over 700 organizations in the first round of the NOS in 1991, and from a second cross-section of over 1000 organizations in 1996–97.

However, the most accessible and current information on the status of work organization in the U.S. comes from regular surveys by Federal agencies and some private organizations. Like the NOS, the primary focus of these surveys is at the organizational level. The Bureau of Labor Statistics (BLS) provides periodic updates on labor market conditions and other topics relevant to organization of work through mechanisms such as the Current Population Survey (CPS), a monthly telephone survey of 50000 households. Examples of information that is relevant to the organization of work and collected by BLS through the CPS and other surveys include data on occupational growth in different sectors of the economy, job displacement and layoffs, alternative employment arrangements (e.g., temporary help agency employment), multiple job holding, earnings and benefits, and hours of work and work schedules. Similar information has also been collected by other Federal agencies (e.g., Census Bureau) and private organizations (e.g., Families and Work Institute, American Management Association).

Reports from these sources have yielded insights on changing patterns of work in the U.S. that may have implications for worker safety and health. For example, a sampling of findings from these sources suggests the following:

- Hours of work have grown steadily within many occupations and industries in the U.S., increasing by nearly 700 hours annually in the last two decades for prime-age working couples (Bluestone & Rose 1998; DOL 1999; Rones et al. 1997).
- Strong increases in telecommuting in the U.S. were evident in the 1990s (Department of Transportation 1993; International Telework Association and Council 2000). Nearly 20% of the nonagricultural workforce presently performs some work at home as part of their primary job (BLS 2002a).
- The temporary workforce in the U.S. has multiplied 6-fold to nearly 3 million workers during the period 1982–1998, in contrast to total employment growth of 40% during this period (Congressional Research Service 1999; Government Accounting Office 2000). Workers with alternative (other than direct hire) employment arrangements constitute 10% of the U.S. workforce (DiNatale 2001).
- Until the recent economic downturn, risk of job displacement in the U.S declined steadily from the early 1990s when a third of major organizations engaged in broad workforce reductions annually (American Management Association 1997; 2000; BLS 2002b; Hipple 1999). However, the fraction of job loss due to restructuring continues to grow and accounts for 25% –30% of all job displacement (Hipple 1999).

However, from an occupational health perspective, current monitoring mechanisms in the U.S. leave much to be desired. Common limitations include the discontinuous and fragmentary nature of surveys, the proprietary nature of data in many private surveys and their restricted samples, and variation in definition and measurement of conditions of interest. Further, present day systems for monitoring the organization of work in the U.S. are motivated primarily by business interests and economic concerns. Complementary data on health and safety are seldom obtained, nor are the

Soz.- Präventivmed. 48 (2003) 341–348

organization of work survey data readily linkable to health data sources such as workplace injury or compensation logs, or population health surveys such as the National Health Interview Survey. Thus, much of the available data on the organization of work cannot be subjected to further analysis to explore health and safety implications.

Finally, no Federal or other systematic monitoring efforts exist in the U.S. to capture information about changes in specific job characteristics that are known risks for stress, illness, and injury. For example, in the absence of the QES, there has been no way of determining whether job tasks are becoming increasingly or less repetitive, whether workloads are increasing or decreasing, whether workers have reduced or increased control in their jobs, etc., and how these trends vary from one industry/occupation or working population to another.

Monitoring the organization of work in Europe and other regions

There exists considerable variation internationally in monitoring the work environment with respect to organization of work factors. An inclusive or detailed accounting of these monitoring practices or comparative analysis with the U.S. situation is beyond the intent of this report; rather, our goal is to provide a sampling of these practices and to highlight some of the key distinctions among them.

Work environment surveys that incorporate the organization of work have become well-established in Europe (Mossink & DeGier 1996). The European Foundation for Improvement of Living and Working Conditions has responsibility for what is perhaps the most comprehensive and far-reaching survey of this nature (European Foundation for Improvement of Living and Working Conditions 2002a). Following a two-year developmental phase that included an extensive review of European systems and instruments for monitoring the work environment (see European Foundation for Improvement of Living and Working Conditions 1992), the European Foundation survey was implemented in 1990 and repeated at five-year intervals as a household interview in all EU Member States. Information is captured on employment status and arrangements, work schedules, job and task characteristics (payment systems, team work, complexity, control, support, etc.), together with information on the nature of work performed and the physical environment, exposures to psychological violence and discrimination, work-family balance, and psychological and health outcomes. This survey has been extremely productive, yielding rich information on changing exposures to physical and organizational factors at work, on differences among member states in these exposures, and on possible health effects (Merllié & Paoli 2001). However, one limitation of the survey is that health outcomes are self-attributed to workplace exposures, precluding objective determination of these associations.

Many individual European countries conduct periodic work environment surveys that incorporate the organization of work with nearly the same breadth as does the European Foundation survey. The Spanish National Working Conditions Survey, for example, captures data at four-year intervals on employment arrangements, working hours and schedules, job and task characteristics (control, pressure, repetition, etc.), exposure to violence, occupational health services and programs, and on injury and illness, including mental health outcomes. As summarized by the European Agency for Safety and Health at Work (2003), data on many of these same conditions are collected by several other European countries, including Austria (Microcensus on Working Conditions), Belgium (Benchmark Questionnaire on Experience and Assessment at Work), Denmark (Danish Work Environment Cohort Study), Finland (Finnish Work and Health Survey), Netherlands (Working Conditions: Monitoring by Individuals Study), Sweden (Work Environment Study), and the United Kingdom (Self-reported Work-related Conditions Survey). Most of these surveys are of recent origin (after 1990) and are conducted on a cross-sectional basis at one- to five-year intervals.

Outside of Europe, information pertinent to the organization of work is available mainly from surveys of management practices and labour market conditions by national labour or statistical bureaus. In Japan, the Survey on Employment Management is conducted at three-year intervals and provides data on conditions such as job mobility, temporary employment, and organizational restructuring. Additionally, data on working hours and other conditions are obtained annually from the General Survey on Working Conditions. The biannual Australian Survey of Working Arrangements captures data on employment arrangements and security, and on working hours and schedules. The Australian Workplace Industrial Relations Survey, which is administered at five-year intervals, provides data on work intensity, security, influence over work, and job and workplace satisfaction.

The Canadian Workplace and Employee Survey is of particular interest because it provides exceptionally broad coverage of new organizational practices and includes both employer (workplace) and employee frames. Administered annually since 1999 at 8000 locations, these surveys collect data on technology use, major organizational changes (e.g., downsizing), alternative staffing arrangements, work at home, working hours and schedules, training, work-family programs, and numerous aspects of high performance or

participatory work systems (job rotation and enrichment, cross-training, problem-solving and labor-management teams, self-directed work groups, etc.). The employer frame tends to focus on broad workplace or organizational level practices (e.g., restructuring, adoption of quality management practices), whereas the employee frame places more emphasis on organizational aspects of the actual job (e.g., cross-training and team work).

However, similar to the situation in the U.S. and unlike European surveys, these national surveys are directed primarily toward a better understanding of work and employment from an economic perspective, and information on specific job demands and exposures, illness or injury, or other circumstances with direct relevance to worker safety and health is usually not collected.

The Canadian Employment Relationship survey is one exception to this situation (although it was not intended for repeated administration). This survey of 2500 employed Canadians was conducted in 2000 and examined psychological dimensions of work (e.g., trust and commitment) in relation to the type of employment contract and other organizational practices. Of special interest, extensive outcome data were obtained, including measures of job satisfaction and morale, turnover and absenteeism, work-family balance, and job-related stress, illness and injury.

Additionally, collection of data on work organization and health and safety outcomes will occur in a national survey under development by New Zealand investigators to better understand the implications of future trends in work in New Zealand (R. Lilly, personal communications January 30, 2003). Similar to the survey employed by the European Foundation, the New Zealand survey is designed to collect a wide range of information on physical and organizational aspects of work (both organizational practices and job characteristics), health and safety outcomes, and work-family balance. The survey is undergoing pilot testing in 2003, with initial deployment for collection of national baseline data anticipated for 2004.

New developments in the United States

In 2000, NIOSH implemented a plan of action to improve upon monitoring the organization of work in the U.S. This plan had three elements: 1) re-introduction of a "QES-like" survey, 2) support for a new wave of the NOS with expanded coverage of organizational practices that are thought to influence risk of illness and injury, and 3) development of an organization of work component for a new NIOSH workplace hazard survey.

At present, two of these three objectives have been achieved. Working with a multidisciplinary panel from industry, labor and academia, NIOSH has developed a 76-item National Quality of Work Life (QWL) survey comprising four broad categories of information: 1) job design and task characteristics, including working times and schedules, 2) employee development and job security, 3) organizational climate, and 4) outcomes corresponding to health, safety, work-family balance, and organizational performance. Data on alternative employment relationships are also obtained. One-half of the QWL items were taken directly from the 1977 QES. The survey was administered in 2002 as one of the "topic" modules in the General Social Survey, a personal interview survey of over 2000 households that has been conducted since 1972 by the National Opinion Research Center. Analyses of the QWL data, including evaluation of trends resulting from comparisons with earlier QES findings, are presently underway at NIOSH.

Additionally, NIOSH has cosponsored a third wave of the NOS. As noted, previous waves of the NOS gave primary attention to new human resource practices and high performance work systems, similar to the Canadian Workplace and Environment Survey. Broad indicators of organizational performance were also assessed. In the third wave of the NOS, NIOSH added separate modules on shift work and work scheduling (including mandatory overtime), violence prevalence and prevention, and occupational health and mental health services. Items were also added to expand data collection on organizational climate, safety and health programs, and the prevalence of occupational injuries and illnesses.

NOS data collection from key informants at 500–600 establishments was completed in early 2003. Because the National Opinion Research Center is also responsible for administering this wave of the NOS, the sampling frame for the NOS was based on the distribution of organizations represented in the General Social Survey (which is the vehicle for the QWL employee survey). This arrangement provides opportunity to link the NOS and QWL, and explore the relationship between broad organizational practices and resultant job demands and conditions in a reasonably objective fashion.

Finally, NIOSH is reaching closure on development of an organization of work core for the "National Exposure at Work Survey" (NEWS), a new survey under development at NIOSH for monitoring workplace hazard exposures. The NEWS replaces the National Occupational Exposure Survey that was conducted at 4500 establishments in 1981–1983 and the National Occupational Hazard Survey of 5000 establishments in the early 1970s, neither of which obtained information pertinent to the organization of work. Beginning in 2004, NEWS is expected to be successively deployed

across different occupational sectors. The organizational core of the NEWS will be similar to the content of the QWL, but of reduced breadth.

Summary and future directions

The literature provides almost no guidance on the design of monitoring systems for the organization of work. Kasl (1992) provides what is perhaps the only in-depth treatment of this subject, and concludes that approaches falling short of careful epidemiologic surveys are unlikely to suffice.

The essence of hazard monitoring is the collection and evaluation of information on exposures to known hazards – in turn used for targeting interventions (Baker et al. 1988; NIOSH 2001). This would suggest that, at minimum, surveys for monitoring the organization of work should incorporate data collection on conditions that are widely recognized in the job stress and psychosocial epidemiology literature to influence risk of stress, if not illness or injury, which would include many of the job context variables in Figure 1 (but acknowledging that, even here, uncertainty may exist). Because these conditions represent the proximal causes of illness and injury, information on their prevalence and intensity serves as important signals of risk.

But the larger question, which is critical from the standpoint of targeting policy and intervention, is how these conditions are influenced by higher-order (i.e., organizational context) organizational practices that are spreading rapidly through the economy and arousing concern about their implications for worker safety and health. Posing this question enlarges the monitoring agenda beyond description per se to include risk assessment, and thus organization of work monitoring systems need to be designed to support this kind of inquiry.

Evidence of risks associated with new organizational practices can be established by examining the relationship of these practices with exposures to job context variables whose risks may be better understood, with exposure to chemical, physical (e.g., ergonomic) or other known workplace hazards, or with illness and injury indicators themselves. The status of occupational health services and programs can also serve as a risk indicator since some organizational practices (e.g., restructuring, flexible employment practices) may influence availability of these services and programs. Thus, surveys for monitoring the organization of work also need to incorporate measures of these diverse conditions and outcomes.

Many countries and regions have made important strides in monitoring the organization of work. Work environment surveys in Europe capture information on the organization of work together with health and other indicators on a recurrent basis, providing the foundation for both tracking trends in the organization of work and validating risks posed by these trends. In the U.S., the former QES has been given new life in the form of the QWL survey and, in tandem with the NOS, promise to offer rich insight to changing organizational practices and working conditions in today's workplaces. We anticipate these surveys will repeat at 4–5 year intervals, with on-demand supplements (e.g., a QWL workplace violence supplement is scheduled for 2004). New Zealand seems to be on a similar path.

But notwithstanding these advances, monitoring the organization of work is still very much an emerging field of science in need of further development. For example, European surveys seem less comprehensive than the NOS or the Canadian Workplace and Employee Survey in capturing information on new organizational practices, although this is an area of development by the European Foundation (European Foundation for Improvement of Working and Living Conditions 2002b). On the other hand, the NOS and the Canadian Workplace and Employee Survey offer superior coverage of new organizational practices, but are limited in their ability to capture information pertinent to health and safety. While further development of monitoring surveys is desirable to overcome these limitations, this problem could be compensated in part by more universal application of standardized occupation and industry coding schemes in workplace hazard surveys and population health surveys, thereby enabling linkage of these two types of data sets to investigate the relationship of work organization exposures and health indicators.

Another recognized challenge is the need for increased harmonization of survey content to facilitate comparisons across samples and time, and to allow aggregation of data in support of epidemiologic study. Presently, virtually no communality exists among monitoring surveys within or between jurisdictions. One obvious step to improve upon this situation would be development of at least a minimal set of core items on work organization and on health for inclusion across national and international work environment surveys. Additionally, scientific meetings or other venues to share recent developments or planned activities in monitoring the organization of work would be helpful to promote harmony among monitoring practices. In this regard, many work environment surveys are posted to websites of national health, labour and statistical organizations (see NIOSH [2002] for access to the 2002 QWL items). More consolidated or linked postings of these surveys could lead to increased uniformity in monitoring practices by improving investigator access to information on current methods.

In sum, work environment monitoring is especially valuable in times of rapid changes in the economy (Fine 1999), and thus the importance of growing international interests and practices in monitoring the organization of work cannot be overstated. However, as commented by Kauppinen and Toikkanen (1999) in their recent review of health and hazard surveillance, "Surveillance of work organization and psychosocial factors is a challenging area that still requires research (p. 61)."[2] We hope this forum will help to stimulate further scientific attention to this topic in the interests of better protecting worker safety and health in today's environment of rapid organizational change.

Acknowledgements
The authors wish to recognize Ms. Kellie Pierson of NIOSH for her technical support in preparation of this manuscript.

References

American Management Association (1997). 1997 AMA survey. Corporate job creation, job elimination, and downsizing. New York: American Management Association.

American Management Association (2000). 2000 American Management Association survey staffing and structure. New York: American Management Association.

Baker E, Melius J, Millar J (1988). Surveillance of occupational illness and injury in the United States: current perspectives and future directions. J Pub Health Policy *9*: 198–221.

BLS (2002a). Work at home in 2001. Washington, DC: U.S. Department of Labor. (Department of Labor, Bureau of Labor Statistics, News USDL; No. 02-107).

BLS (2002b). Worker displacement, 1999–2001. Washington, DC: U.S. Department of Labor. (Department of Labor, Bureau of Labor Statistics, News USDL; No. 02-483).

Bluestone B, Rose S (1998). Public Policy Brief # 39, The unmeasured labor force: the growth in work hours. Blithewood, Annandale-on-Hudson, NY: The Jerome Levy Economics Institute of Bard College, Bard Publications Office.

Congressional Research Service (1999). CRS report for Congress: temporary workers as members of the contingent labor force. Washington, DC: The Library of Congress. (The Library of Congress; Congressional Research Service, Order Code; No. RL30072).

Costa J (1992). Report from workshop on monitoring stress at work. In: Monitoring the work environment: report of second European Conference. Luxembourg: Office of Official Publications of the EC: 159–162.

DiNatale M (2001). Characteristics of and preference for alternative work arrangements, 1999. Monthly Labor Review *124* (*3*): 28–49.

DOL (1999). Report on the American workforce. Washington, DC: U.S. Department of Labor.

Department of Transportation (1993). Transportation implications of telecommuting. Washington, DC: U.S. Department of Transportation, Bureau of Transportation Statistics.

European Agency for Safety and Health at Work (2003). OSH monitoring systems. http://europe.osha.eu.int/systems/osm/system.stm#work.

European Agency for Safety and Health at Work (2002). The changing world of work: trends and implications for occupation safety and health in the European Union. Forum 5. Bilbao, Spain: European Agency for Safety and Health at Work.

European Agency for Safety and Health at Work (2000). The changing world of work – Magazine 2. Luxembourg: Office of Official Publications of the EC.

European Foundation for the Improvement of Living and Working Conditions (2002a). Working conditions surveys. http://www.eurofound.ie/working/surveys.htm.

European Foundation for the Improvement of Living and Working Conditions (2002b). Work in progress. http://www.eurofound.ie/working/working_progress.htm.

European Foundation for Improvement of Living and Working Conditions (1992). Catalogue of systems for the Monitoring of Working Conditions relating to Health and Safety in the European Community. Luxembourg: Office of Official Publications of the EC.

Fine L (1999). Surveillance and occupational health. Int J Occup Environ Health *5*: 26–9.

General Accounting Office (2000). Contingent workers: incomes and benefits lag behind those of rest of workforce. Washington, DC: U.S. General Accounting Office. (U.S. General Accounting Office, Report; No. GAO/HEHS-00-76).

Hipple S (1999). Worker displacement in the mid-1990s. Monthly Labor Review *122* (*7*): 15–32.

International Social Security Association (2002). Social security changes in the world of work. International Social Security Association. Geneva: ISSA.

International Telework Association and Council (2000). Telework America 2000 summary of key research findings. http://www.workingfromanywhere.org/telework/twa2000.htm.

Isaksson K, Hogstedt C, Eriksson C, Theorell T, eds. (2000). Health effects of the new labour market. New York [etc.]: Kluwer Academic/Plenum Publishers.

Kalleberg A, Knoke D, Marsden P, Speath J (1996). Organizations in America: analyzing their structures and human resource practices. Thousand Oak [etc.]: Sage Publications.

[2] See Kasl 1992, Kauppinen & Toikkanen 1999, and Sauter et al. 2002 for further discussion of conceptual and methodological issues confronting organization of work monitoring (what to measure, psychometric quality of measures, economy of measurement, alternative data sources, etc.).

Karesek R (1979). Job demands, job decision latitude, and mental strain: implications for job redesign. Adm Sci Q *24*: 285–307.

Karasek R, Therorell T (1990). Healthy work: stress, productivity, and the reconstruction of working life. New York: Basic Books, Inc.

Kasl S (1992). Surveillance of psychological disorders in the workplace. In: Keita G, Sauter S, eds. Work and well being: an agenda for the 1990's. Washington, DC: American Psychological Association.

Kauppinen T, Toikkanen J (1999). Health and hazard surveillance – needs and perspectives. Scand J Work Environ Health *25* suppl *4*: 61–7.

Landsbergis PA, Cahill J, Schnall P (1999). The impact of lean production and worker health. J Occup Health Psychol *4:* 108–30.

Merllié D, Paoli P (2001). Ten years of working conditions in the European Union. Luxembourg: Office of Official Publications of the EC.

Mossink J, DeGier H (1996). Assessing working conditions: the European practice. Luxembourg: Office of Official Publication of the EC.

NIOSH (2001). Tracking occupational injuries, illnesses, and hazards: the NIOSH surveillance strategic plan. Cincinnati, OH: National Institute for Occupational Safety and Health. (DHHS (NIOSH) Publication; No. 2001–116).

NIOSH (2002). The 2002 Quality of Employment Survey. http://www.cdc.gov/niosh/qwlquest.html.

Quinn RP, Shepard LJ (1974). The 1972–73 quality of employment survey: descriptive statistics, with comparison data from the 1969–70 survey of working conditions. Ann Arbor, MI: The University of Michigan.

Quinn RP, Staines GL (1979). The 1977 Quality of employment survey: descriptive statistics, with comparison data from the 1969–70 and the 1972–1973 surveys. Ann Arbor, MI: The University of Michigan.

Quinlan M, Mayhew C, Bohle P (2001). The global expansion of precarious employment, work disorganization and consequences for occupational health: a review of recent research. Int J Health Services *31*: 335–414.

Rones PL, Ilg RE, Gardner JM (1997). Trends in hours of work since the mid–1970s. Monthly Labor Review *120 (4)*: 3–13.

Sauter S, Brightwell W, Colligan M et al. (2002). The changing organization of work and the safety and health of working people, DHHS (NIOSH) Publication No. 2002–116. Cincinnati, OH: National Institute for Occupational Safety and Health. http://www.cdc.gov/niosh/02-116pd.html.

Survey Research Center (1970). Surveys of working conditions: Final report on univariate tables. Ann Arbor, MI: Survey Research Center, The University of Michigan.

Address for correspondence

Steven L. Sauter, Ph.D.
Mail Stop C-24
Organizational Science and Human Factors Branch
National Institute for Occupational Safety and Health
4676 Columbia Parkway
Cincinnati, OH 45226, USA
Tel.: +1-513-533-8157
Fax: +1-513-533-8596
e-mail: ssauter@cdc.gov