Health and Safety Issues of Telecommuters:
A Macroergonomic Perspective

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Abstract. With the rising number of telecommuters who are working in non-traditional work locations, health and safety issues are even more critical. While telecommuting programs offer attractive alternatives to traditional work locations, it is not without challenges for employers and workers. A macro ergonomics approach or work system design for telecommuting programs is proposed to address these new challenges. This approach explains the impact of organizational, psychosocial and workplace risk factors on telecommuter's health and safety. A process for managing the health and safety of telecommuters is presented along with preventive strategies to provide an injury-free working environment.

Keywords. Telecommuting, Macroergonomics, Health, Safety.

1. Introduction

Telecommuting, defined as working for an employer at an alternative work location such as the home with an electronic link, is common for millions of Americans. According to the International Telework Association and Council (ITAC), more than 23.6 million people reported working as telecommuters in 2000. While telecommuting programs offer an attractive alternative to traditional work locations, it is not without challenges for employers and employees (Hequet, 1994; Kurland, 1999). These challenges include how to best manage employees who work at home rather than at the corporate site, implementing and supporting the required information technology, the lack of social and group interaction, changes in job autonomy, the absence of mentoring and career development balancing work and personal conflicts, extended work hours and workload, and sound risk management that addresses safety and health issues (Harrington and Ruppel, 1999; Ilozor, Ilozor and Carr, 2001; Trent, Smith and Wood, 1994; Claes, 2000; Durbin, 1991; Galitz, 1984). Designing effective communication strategies that allow managers and employees to define job responsibilities, set goals and job expectations and regularly review work and performance are just some of the challenges that organizations must address to implement successful telecommuting programs (e.g., Piskurich, 1996). Others include establishing policies and procedures regarding appropriate technology and equipment, and training employees to manage these technologies (e.g., Belanger, Collins and Cheney, 2001).

All these challenges can have an impact on employee morale, stress and musculoskeletal discomfort such as low back pain and upper extremity disorders. This paper addresses these challenges, by providing a macroergonomic or work system design approach for telecommuting programs. This approach explains the impact of organizational and psychosocial risk factors on telecommuter safety as well as on traditional workstation design. Additionally, the paper will outline a process for managing the health and safety of telecommuters, and presents guidelines to prevent and reduce disability associated with alternative-site work injuries.

2. Macroergonomic Framework

To conceptualize these macroergonomic issues as related to telecommuting, we conceived a model that structures the issues into three levels: organizational, group and individual (See Figure 1). Within each of these levels, the sociotechnical elements (technological and personnel subsystem) and the physical work environment factors are identified as well as potential outcomes that could measure the success of the telecommuting program. At the bottom of the model, a continuum is shown of macroergonomics issues to consider in the organizational design to micro-ergonomics physical and psychosocial individual design factors. These factors were derived from the literature and exemplary industry case studies.

3. Macroergonomics Process: Managing the Health and Safety of Telecommuters

3.1. The safety and health management process
Optimizing the working environment of telecommuters, reducing the risk of claims and injury costs and higher profits are critical to incorporate a safety process using a macroergonomic approach. Key stakeholders inside and outside the organizations are critical to the success of this program. This process identifies important elements, which address prevention (pre-injury) and return-to-work (post-injury). Those involved in the process include human resources, leadership personnel, safety and health professionals, engineering and maintenance, the health care provider, the rehab provider, the Worker's Compensation

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(WC) insurer and others. The worker is in the middle, and communication between the worker and all other parties is essential for instilling safe behavior on the job and enabling return to work after an injury occurs (Robertson, Maynard and McDevitt, 2003).

3.2. Managing telecommuter safety
Of the many elements in the safety management process, surveillance, or worksite analysis, is essential. It is difficult to manage safety without detailed injury and hazard information obtained through surveillance efforts. Obtaining accurate and complete injury data and hazard information to effectively manage telecommuter safety is a challenge. Part of designing a telecommuting program is training the employees and managers how to provide and maintain a safe working environment. Managers need to be trained in effective risk management concerning their employees and what policies and procedures to follow and implement. Employees need to understand office ergonomics guidelines and other related safety issues and hazards (Lenckus, 1997). Three safety and health surveillance approaches that are recommended to assist managers, safety and health professionals in managing risks associated with telecommuters are:

Employee reports: Prompt reporting of hazards, injuries or symptoms to the employer is important for treatment and prevention. However, some telecommuters are reluctant to do so, fearing that reporting work-related hazards or injuries may result in the cancellation of the telecommuting agreement. Rather than report a work-related injury, some may visit their personal physician and rely on health insurance to pay the bill;

Review of existing records: Records such as Workers Compensation claims reports and OSHA logs provide valuable information. Because of some telecommuters' fears (see above), there is a WC data quality issue. In addition, WC insurer claims databases may not accurately code for worker injuries occurring off-site, so claims detail reports may not be available. This results in the lack of quality data for managers regarding trends and loss issues involving off-site workers. Claims cost data can point to health care quality issues and return-to-work issues, which impact the length and cost of disability of off-site workers;

Job surveys: These include checklists and surveys dealing with hazards. Employers may not know what hazards exist in the home environment unless the worker voluntarily offers the information. Some companies use checklists, but whether an employer should visit the home to do an inspection is debated and involves privacy issues. OSHA will not conduct these, and some companies have policies that prohibit employees from visiting other employees at home for this purpose. Most companies rely on self-assessments of at-home workplaces (Healy, 2000).

4. Conclusion
Telecommuters are faced with unique challenges and opportunities regarding their work style and workplace. To have a successful telecommuter program, organizations need to design and implement them with a systems oriented, macroergonomic approach. Previous research identifies several key components necessary to implement an effective telecommuting program (McCloskey and Igbaria, 1998). Future research should empirically explore the effects of virtual ergonomics intervention programs, such as health employee circles and participatory ergonomics, on the health and safety of the telecommuter. Understanding the elements of the telecommuting program that contribute to creating a vital virtual telecommuting culture, and how it is successfully linked to the organization's culture, also needs further exploration.

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Organization Level

Organizational Design: Structure & Processes

       Supportive infrastructure
       Senior Mgmt Commitment
       Policies
1. HR; technology
2. Financial resources
3. Communication programs

Personnel Subsystem

- Information systems training
  - computer support; online help

Technological Subsystem

- Information systems (IS)
  - computers; communications
  - technology support; online help

Effectiveness Outcomes

- Productivity
- Customer satisfaction
- Employee satisfaction
  - turnover; absenteeism
- Balance score card
- Economic value added

Group Level

Personnel Subsystem: Psychosocial Factors & Professionalism

- Team work synergy
  - social norms
  - team training
- Job design
  - high workload
  - time pressures
  - electronic performance monitoring
- Distributed team
  - satellite centers
- Managerial Support
  - mentoring
  - technology facilitator
  - communicator

Technological Subsystem

- Groupware
  - computer supported cooperative work
    - Lotus Notes
  - Teleconferencing
- Videoconferencing

Effectiveness Outcomes

- Group effectiveness
- Group collaboration
- Teamwork
- Performance

Individual Level

Physical Environment Subsystem

- Computer/Workstation design
  - training; ergonomic knowledge
  - lighting; acoustics
- HVAC

Technological Subsystem

- Communication lines/cables
  - Electrical service

Psychosocial Factors

- Balanced work/personal
- Flexible time
- Social Isolation
- Personal stress
- Longer work days
- 24-hour accessibility
- Recognition & feedback
- Attitudes; supportive relationships
- Responsibility
- Self-help support; appropriate personal work style
- Decision-making
- Social isolation

Effectiveness Outcomes

- Health & well-being
- Job satisfaction
- Workplace satisfaction
- Workplace comfort
- Reduced stress
- Performance

External Environment
- Culture
- Politics
- Market
- Competition
- Migration of capital

Macro Ergonomics   *Micro Ergonomics*
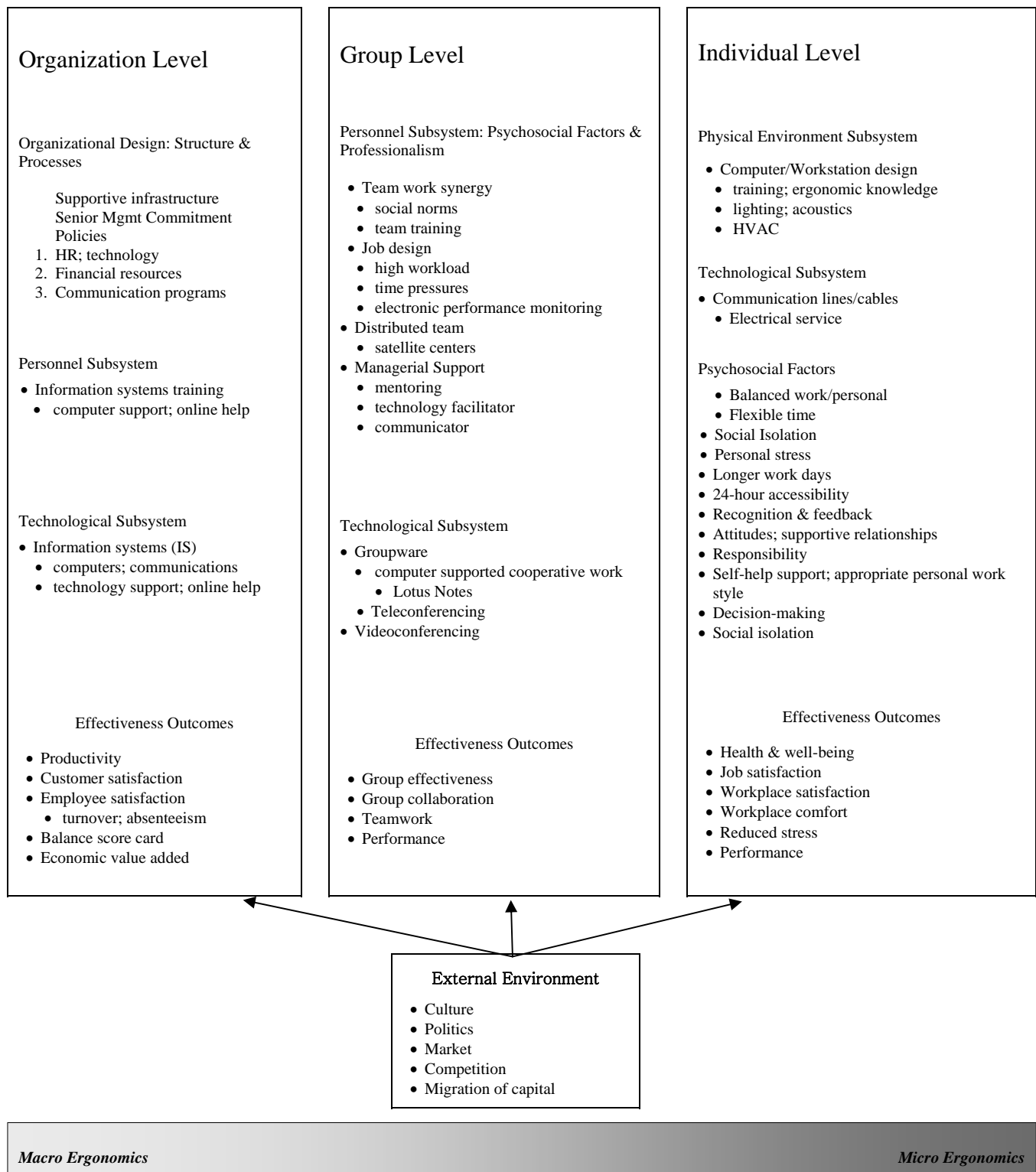
Figure 1. A macroergonomics model of telecommuting factors at the individual, group and organizational level.