



Ergonomic Issues: Managing Safety & Health of Telecommuting Workers

Presented by

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Session Objectives

- Review telecommuter (teleworker) exposure
- Discuss some benefits of telecommuting
- Identify safety and health issues associated with telecommuters
- Provide guidelines and possible interventions for managing safety of telecommuters and other distributed workers.

Telework Facts

- More than 44 million US workers reported working as telecommuters in 2004. An increase of over 40% since 2001 (International Telework Association & Council (ITAC)).
- Working long hours at a computer combined with badly designed computer systems and high work demands clearly increase risk of health problems (Aborg et al., 2000 regarding telework)

Benefits of Alternative Worksites

- Reduce office space = real estate \$ savings
- Enhance employee retention
- Enhance employee recruitment
- Increase productivity
- Flexibility (flex time)
- Real Estate
- Work/Life balance
- Stress management
- Contribute to meeting “Clean Air standards”

Risk Assessment

- Telecommuting locations include vehicles, hotels, restaurants, airports, etc.
- Determine the degree of risk by qualifying and quantifying operations, tasks, behaviors or processes.
- Consider any complaints / claims
- Focus efforts on recognizing, understanding, and controlling risk in telecommuting operations.
- Risks include personal safety, public safety, fire, data safety, hardware loss, etc.,

Telecommuting Risk Factors

Physical

- Workstation ergonomics
- Long work hours
- Insufficient breaks or recovery time
- Lighting
- Environment
- Security

Psychosocial

- Isolation
- Limited social support
- Time pressures
- High workload
- “Technostress”
- Health complaints
- Family stress

Risk Assessment

- **Ergonomic Task Analysis**
 - Observation from external
 - Assumptions about device usage
 - Focus on physical risk factors
- **Basic JSA**
 - Personal safety
 - Public safety, e.g. driving
- **Macroergonomics assessment**
 - Isolation
 - Need for supervision
 - Lack of feedback
 - Focus on the work, process and people.
 - Some are systems issues (e.g. support and connection speed)
 - Family expectations

System Analysis

- Workplace Environment

 - Furniture

 - Location

 - Interruptions

- Worker Capability

 - No one to turn to

- Worker Motivation

 - Few immediate managerial or organizational antecedent and consequences

And their degree of interaction

Macroergonomics



Accident Causation – Multiple Factors

- Accidents are the result of multiple contributing factors.
- Do the stakeholders believe this?
 - Senior Management and Operating Managers
 - Supervisors
 - Workers
 - Medical providers

**Corporate
Culture**

**External
Conditions**

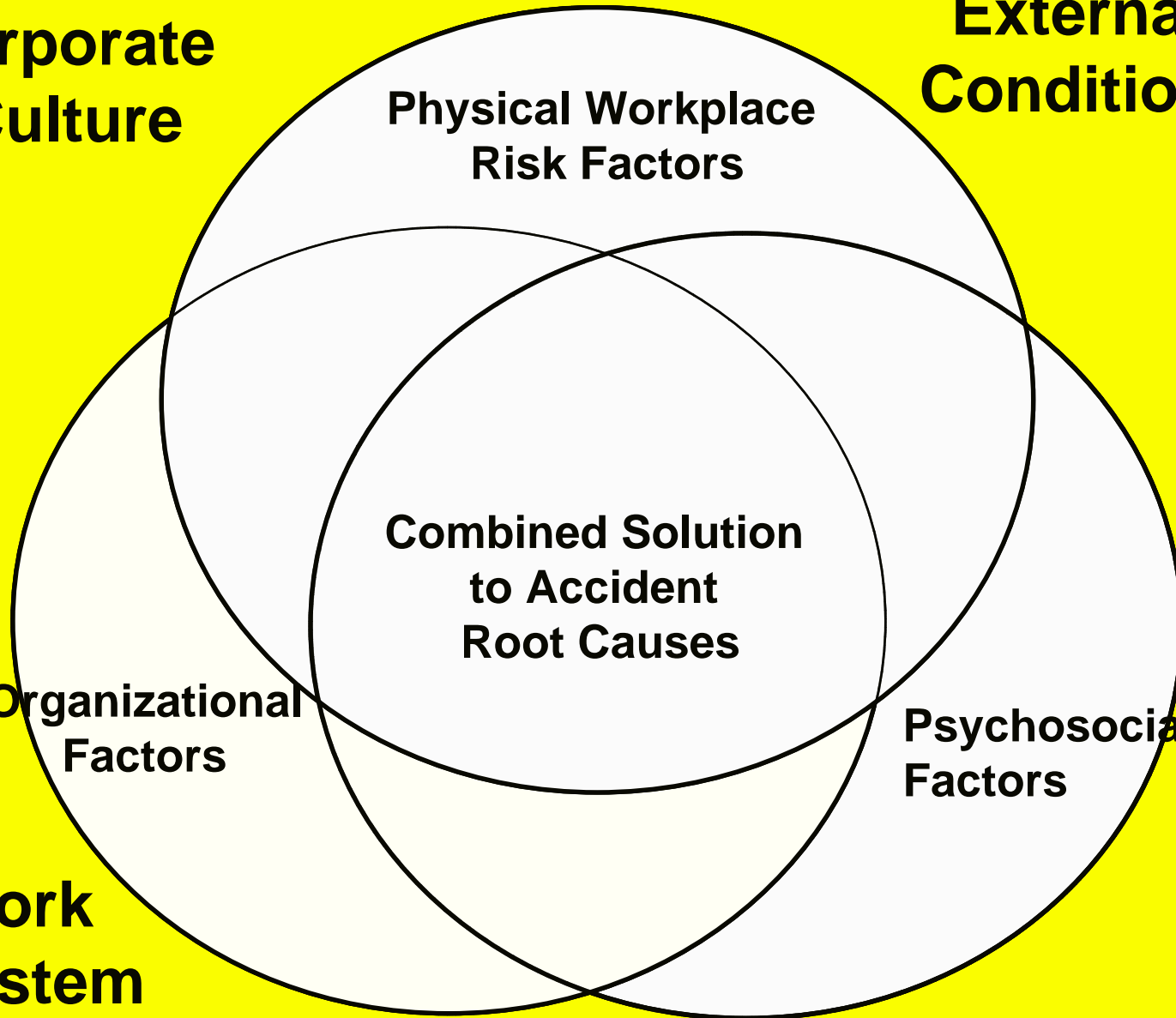
**Physical Workplace
Risk Factors**

**Combined Solution
to Accident
Root Causes**

**Organizational
Factors**

**Psychosocial
Factors**

**Work
System**



Macroergonomics Principle: Use a Systems Approach

- Evaluate and control the physical risk factors for the workstation.
- Evaluate and influence the psychosocial risk factors to improve the organization.
- Evaluate and influence the organizational risk factors to improve the whole system.

Organization and Job Design

- Microergonomics leads to standards and best practices for equipment and physical factors.
- Some people are poor candidates for telecommuting – psychosocial risk is too great.
- May also lead to resentment from both the telecommuter and those who cannot telecommute.

Systems Analysis

Telecommuting Readiness

- Is this the right position?
- Is the employee suited for work at home work?
- Is the space sufficient?
- What office furniture does employee need?
- Telephone and equipment (fax, voice, conferencing, broadband etc.) needs identified?

Telecommuting Readiness (continued)

- Computer equipment needs (i.e. laptop versus desktop computer) identified?
- Does employee workstation meet ergonomic standards?
- Keep lines of communication open.
- Personal security at telecommuting space
- Report accidents / musculoskeletal disorders

Integrate Solutions

Design and implement strategies for improving systems. System examinations provide opportunities to correct discrepancies that drive loss.

Engineering Solutions

Training & Education

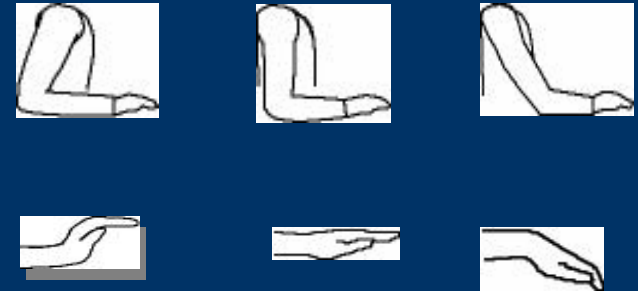
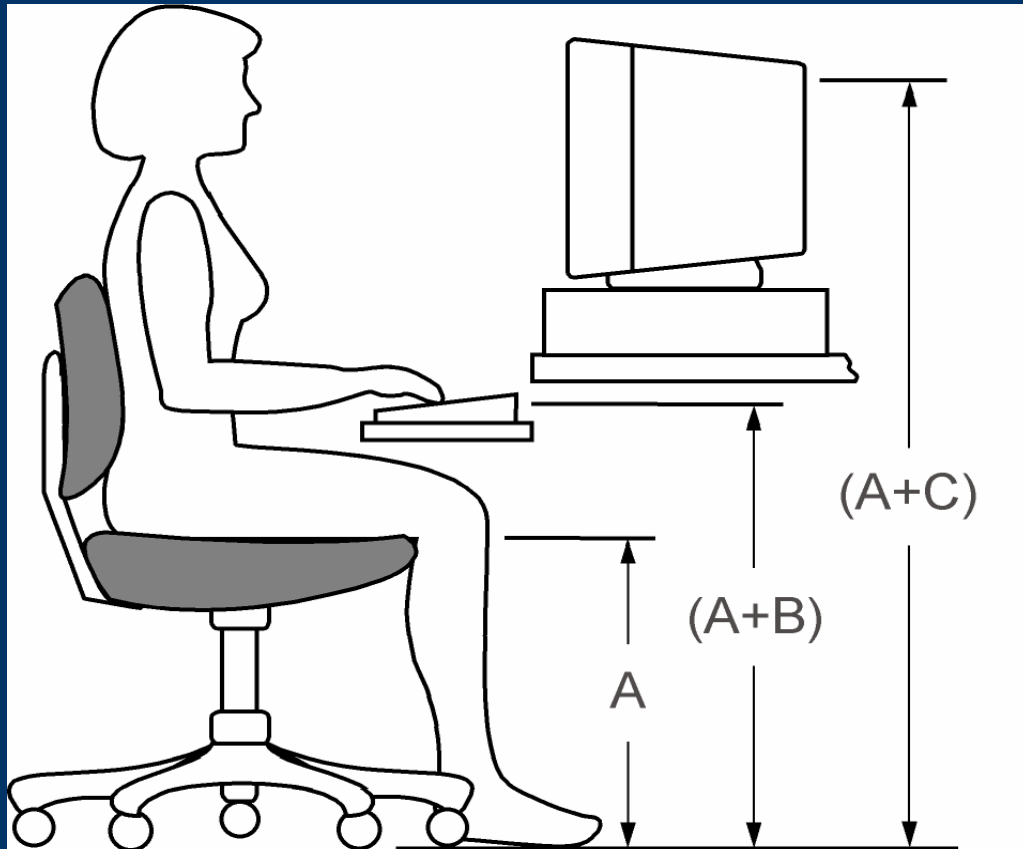
Behavioral

Organizational Culture

Office Computer Workstation



Strategies for Improving Computer Workstation Evaluations



Telecommuter Safety Survey

Telecommuter — Individual Safety and Health Survey

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Telecommuter Safety and Health Survey

Instructions to employee: the survey below is designed to assess the safety and health of your residential office workstation. Please take a few minutes to complete it (if any). No visit to your home will result from this survey. Only the information you provide on this question below should be discussed with your supervisor.

Name: _____

Organization: _____

Address: _____

City/State/Zip Code: _____

Business Telephone: _____

Briefly describe your designated work area

A. Workplace Environment

1. Are the following environmental conditions maintained to your normal level of job performance?

A. temperature,

B. illumination,

C. noise levels

1. Does the work area have adequate fresh air ventilation and is it free of unusual odors?

2. Are all stairs with four or more steps equipped with handrails?

3. Is office equipment free of recognized electrical hazards? (frayed wires, bare conductors, sufficient number of permanent outlets, loose wires, etc.)

4. Are surge protectors available to protect electrical office equipment from overload?

5. Are aisles and passageways free and clear of obstructions and tripping hazards? (i.e. boxes, file drawers, papers, books, supplies, wires, phone lines frayed or worn carpet etc.)

6. Does your work area have two exits to the outside (for residential "basements," a minimum of one passage door leading to the outside).

7. Are the phone lines, electrical cords, and other wires secured under a desk or alongside a baseboard?

8. Is the office space neat, clean, and free of an accumulation of combustibles?

9. Are file cabinets secured from tipping and arranged to avoid tripping or obstructions?

10. Are carpets secured to the floor and free of fraying or worn seams?

11. Is the work area free from sources of accumulated mold, mildew or musty smells?

12. Is a smoke detector installed, working and suitably located near the work area?

13. Is a fire extinguisher suitable for use on electrical equipment located near the work area (with a rating of ABC)?

14. If radon is an issue, has it been tested? (basement offices)

15. Is the room heating sufficient enough so that a space heater is not used?

16. Are carbon monoxide and gas detectors available?

B. Computer Workstation Ergonomics

17. Is your chair adjustable?

18. Do you know how to adjust your chair?

19. Is your back well supported by a backrest?

20. Are your feet flat on the floor or on a footrest?

21. Are you satisfied with the placement of the monitor and keyboard?

22. Is it easy to read the text on your monitor?

23. If you input data from printed documents, do you use a document holder?

24. Are file cabinets and book cases need to stand to access them? (if continuously throughout the day)

25. Do you have enough leg room and can you swivel your chair and/or reach other equipment without having to stand?

26. Is the screen free from noticeable glare?

27. Is the top of the screen at eye level or do you prefer it lower?

28. Is there space to rest the arms without touching the floor?

29. When keying, are your forearms resting on the floor?

30. When keying or using other input devices, do your elbows stay at your side?

31. Are your wrists straight when keying?

32. Have you received ergonomics training?

Please return a copy of this form to your supervisor or manager. Optional-attach photos of your workstation if applicable.

Employee's Signature and Date: _____

Supervisor or Manager Signature and Date: _____

Action taken (to be completed by manager or supervisor)

C. Overall

18. Are you comfortable while working in your residential office? If no, please explain below.	Yes []	No []	NA []
19. Do you believe your residential office is free from anything unsafe or that puts you at risk for an injury? If no, please explain below.	Yes []	No []	NA []

NA = Not Applicable

D. Comments

Macroergonomics Applications

Improving Workstation Evaluations

- Develop process for working with supervisors who perform evaluations.
- Email to workers asking for feedback after the surveys.
 - Opportunity for anonymous evaluation.
- Interviews with selected workers for detailed feedback.
- Communication with supervisors on the effectiveness of the interactions.
- Use of the results in the performance review of the supervisor.

Macroergonomics Applications Improve Training Programs

- Workers involved in design, development, delivery and evaluation of the training.
- Integrated into operational training.
- Includes managers, supervisors and employees.
- Reinforced by management and by the system.

Plan the Workplace

- Need 6' by 6' space for your primary work area.
- Book cases and filing cabinets should be placed such that one needs to stand up to access them.
- Avoid placing the computer next to a window. Windows create problems with glare.
- Be careful of extension cords and wiring that passes across travel area, which can produce trip and fall hazards. All cables and extension cords should be fastened up and out of the way

Selecting Furniture

- Establish furniture criteria, especially the desk and chair.
- A VDT monitor needs at least 30” of depth, less for flat panel.
- Sufficient room to place the keyboard and mouse in front of the display
- Adjust the workstation and chair to the correct height
- Know how to adjust the chair (height, seat pan, arm rests, back rest tilt etc).

Laptop Computers

- Provide a docking system and a full-size display.
- Provide a full-size keyboard and mouse or other pointing device.
- Provide a regular size and shape number pad for those who work with numbers on a laptop computer.
- The use of drapes, shades or blinds may help control glare.

Ergo guide: tips to maximize your comfort when computing

CHAIR

- Make sure your chair allows **clearance behind your knees** when seated against the backrest.
- **Use the backrest of the chair** to provide full support to your lower back.

LIGHTING

To **reduce glare and shadows** on your work surface:

- **adjust window shades or decrease overhead lighting.**
- **adjust the monitor screen** or add an anti-glare filter.
- **add a task light** to properly illuminate paper references.

DOCUMENT HOLDER

Use an **adjustable document holder** to:

- place reference materials as **close to the computer screen** as possible.
- keep materials at the **same height and distance** as your computer screen.

References: www.libertymutual.com
www.mmm.com www.pc.ibm.com/www
Healthycomputing; www.bermanmiller.com,
www.compaq.com/comfortguide/index.html

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POSTURE

- **Maintain proper body posture** by:
 - sitting with your hips and knees at a **90 degree or greater angle.**
 - keep your **feet flat** on the floor or on a footrest.
 - keep your **arms relaxed** at your sides; ideally with elbows at 70-135 degrees.



HEALTHY COMPUTING HABITS

- **Use a softer touch** when keying; relax your grip on the mouse.
- Avoid working too long **in one position.**
- **Change body your posture** frequently.
- Take frequent breaks. **Stretch periodically.**
- Give your **eyes a visual break.**

MONITOR

- **Place the monitor directly in front of you** about an arm's length away.
- Position the top of the monitor screen **at or below eye level.**

KEYBOARD/INPUT DEVICES

- Adjust the keyboard or chair height to **keep forearms, wrists and hands in a straight line.**
- Place mouse and other input devices **near to and at the same height** as your keyboard.
- Keep your **elbows close to your body.**

WORK AREA

- **Allow ample clearance to move your knees and legs** under the keyboard and desk.
- **Avoid contact stress** with the edge of the desk and keyboard.

ACCESSORIES

- **Use your ergonomic accessories** to support body posture (e.g. lumbar support, arm rests, monitor blocks, external keyboard).
- Get a **head-set if you regularly talk** for extended periods of time on the phone. Use a lowered voice.

Basic Principle: Participation

- Expand participation in the program and processes.



Expand Participation

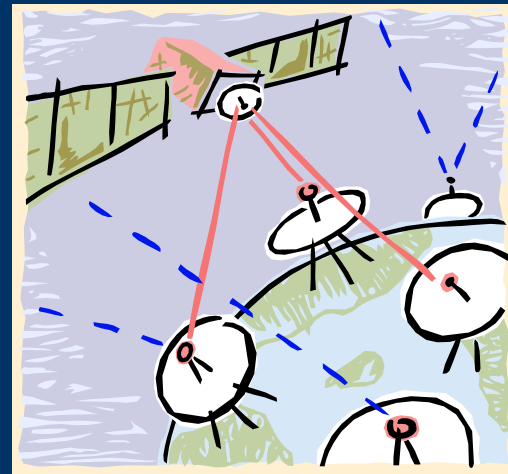
- Participation can increase commitment to goals, change, and process.
- Often there is no follow up with telecommuters
- Participation can have many levels
 - Comment
 - Suggest
 - Influence
 - Guide
 - Decide
- Don't forget guidelines for handheld (e.g. Blackberry) usage in vehicles or wherever other equipment may be stolen.

Expand Participation

- Training may help expand participation
 - Teamwork and interpersonal skills to establish trust.
 - Decision making processes for the group.
 - Management skills to relate to workers making decisions.

Increase Communication

- Send and Receive
 - Providing more information on risk, causes, and solutions.
 - Asking for more information and participation.



Increase Open Communication

- Use formal and informal communication systems.
- Encourage and reinforce new ideas.
- Increase positive recognition.
- Avoid focusing on negative behaviors and start looking to encourage positive.

Macroergonomics Applications

Manage Change

- Participation in the development and implementation of the changes can lead to more commitment to the change.
- Communication can influence willingness to change.
- Recognize individual differences and the need for a process of change.

Macroergonomic Summary

- Evaluate the process as well as the technical content.
- Recognize importance of psychosocial issues.
- Provide clear communication to the evaluators, workers and managers on scope, expectations, and process.
- Ask the worker for their perception, understanding and satisfaction with the process.

Six Characteristics of a Successful Organizational Response

- Effective worker involvement
- Strong project leader
- Organizational flexibility
- Action consistent with stated goals of the organization
- Resource commitment
- Injury management integrated in response

Pransky, Snyder, Himmelstein 1996

Questions?

References and Resources

- Robertson, M. & Courtney, T., Office ergonomics: Analyzing problems and creating solutions. *Professional Safety*. April 2001: 25-31.
- Robertson, M., Maynard, W. and McDevitt, J., Telecommuting: Managing the Safety of Workers in Home Office Environments, *Professional Safety*, April 2003: 30-36
- Robertson, M. & O'Neill, B. (1999) Effects of environmental control on stress, performance and group effectiveness. *Proceedings of the Human Factors and Ergo Society 43rd annual meeting*. (pp 552-556) Santa Monica, Ca: HFES
- Hendrick, H. "Organizational Design and Macroergonomics" in *Handbook of Human Factors and Ergonomics*, G. Salvendy, ed. New York: John Wiley & Sons, 1997.

References and Resources

- Passmore, W. A. *Design of Effective Organizations* as cited in Kleiner, B. “Macroergonomics in Large-Scale Organizational Change” in *Macroergonomics* H. Hendrick & B. Kleiner, ed. Mahway, NJ: Lawrence Erlbaum, 2002.
- Sauter S., Murphy, L., Colligan, M., Swanson N., Hurrell J., Scharf F., Sinclair R., Grubb P., Goldenhar L., Alterman T., Johnston J., Hamilton A., Tisdale, J., *Stress At Work, DHHS(NIOSH) Publication No 99-101.*
- Pransky G., Snyder T. B., Himmelstein J., *The Organizational Response, Influence of Cumulative Trauma Disorders in the Workplace, as found in, Moon S. D., Sauter S. L., (eds) Beyond Biomechanics, Psychosocial Aspects of Musculoskeletal Disorders in Office Work, Taylor & Francis Ltd., 1996*