


The Physical Impact of IT use on Children


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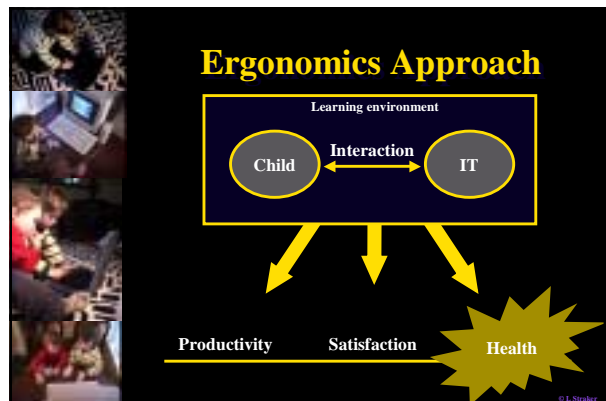


Outline

- Ergonomics approach
- Health risk and IT
- Risk nature and magnitude
 - Epidemiological studies
 - Laboratory studies
 - Planned studies



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IT use associated with musculoskeletal disorders in adults

- 75% adult computer users report neck and upper limb pain
- Small % have severe disabling symptoms



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Increasing IT use by children

- 95% Australian children use computers
- 74% use computers frequently
- Used for educational and leisure purposes
- Second highest participation as leisure activity
 - Watching TV 97%
 - Computer games 69%

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Concerns raised for health of children

- International Ergonomics Association
 - Special session at triennial congress in 2000
 - Special interest group established in 2000
- Frequent requests for information from parents, teachers and education authorities
- Substantial media interest
 - BBC, ABC...
 - New York Times, The Times, The Australian....




Is working with computers a risk to health?

- Establishing causal link between risk factors and musculoskeletal disorders is difficult
 - Epidemiological studies evaluate association between exposure to risk factors and health outcomes
 - Laboratory studies explored how contributory factors alter risk factors



Is working with computers a risk to the health of children?

- Epidemiological evidence
 - Laptop schools study
 - Case-comparison classes study
 - RASCALS study
- Laboratory evidence
 - Upper quadrant posture
 - Neck and shoulder muscle activity




Laptop Schools Study

- 314 10-17 year old students at schools with mandatory laptop programs



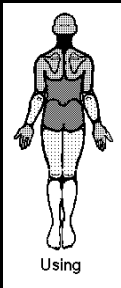
Laptop Schools Study - exposures

- 3hrs/day use
- 17hrs/week use
- 66% non desk sitting use



Laptop Schools Study - outcomes

- 60% students reported discomfort
- Neck and shoulders most common location
- Max. time on task and discomfort relationship



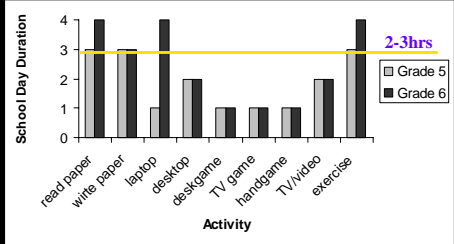
Case-comparison Classes Study

- 40 12 year old students with 6 months laptop experience
- 34 11 year old students with 2hrs/week computer lab experience



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Case-comparison Classes Study - exposures



Activity	Grade 5	Grade 6
read paper	3.0	4.0
write paper	3.0	3.0
laptop	1.0	4.0
desktop	2.0	2.0
TV game	1.0	1.0
handgame	1.0	1.0
TV/video	2.0	2.0
exercise	3.0	4.0

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Case-comparison Classes Study - outcomes

- 11&12yr - 16% frequent discomfort with paper IT use
- 11yr - 9% frequent discomfort with computer use
- 12yr - 36% frequent discomfort with computer use
- Discomfort commonly in head and neck
- 5-10% reporting high intensity discomfort

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Randomly Ascertained Sample Cohort Longitudinal Study

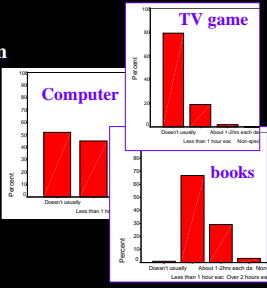
- 10% sample of children born in 1995 in Western Australia
- Followed annually with a questionnaire investigating range of health issues
- ~80% compliance
- 2 pages on IT exposure and outcomes
- Preliminary data from ~760 5year olds analysed



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RASCALS - exposures


- TV/video
- Computer game on TV
- Hand held computer game
- Computer
- Reading book
- Writing/painting
- Vigorous activity



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RASCALS - outcomes

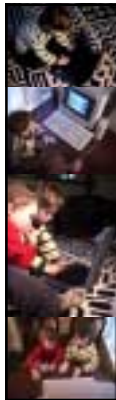
- Only 1% reporting sore/tired muscles with computer use
- Only 1.8% reporting sore/tired eyes with computer use



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Summary of Epidemiological Evidence

- Weak evidence suggests real and significant problem which requires better understanding
- High % children report discomfort with computer use – increasing with age
- Prevalence and intensity of discomfort may be greater with computer than paper



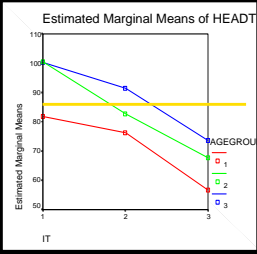
Upper Quadrant Posture Study

- 33 4-17 year old children
- Read from paper, laptop and desktop
- Peak motion analysis



Upper Quadrant Posture Study Results


- Increasing head tilt and neck flexion from desktop to laptop to paper
- But laptop closest to resting head posture



IT	AGEGROUP 1	AGEGROUP 2	AGEGROUP 3
1	~85	~100	~105
2	~75	~85	~95
3	~65	~75	~85

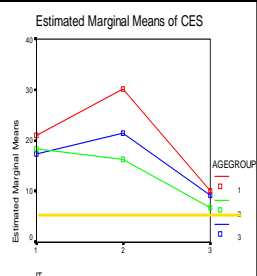
Neck and Shoulder Muscle Activity Study

- Same subjects and tasks
- Physiometer normalised EMG
- Cervical Erector Spinae and Upper Trapezius muscles



Neck and Shoulder Muscle Activity Study Results


- CES higher for paper and laptop
- Trap higher for laptop



IT	AGEGROUP 1	AGEGROUP 2	AGEGROUP 3
1	~20	~18	~18
2	~30	~18	~22
3	~10	~8	~10



Summary of Laboratory Evidence

- Early evidence suggest different physical stresses
- Not clear whether computer IT stresses worse than paper IT or not



Planned Field Studies

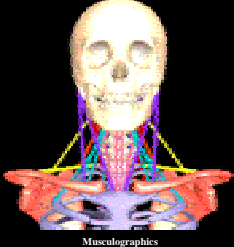
- Development of valid measures of exposure and outcome
 - Questionnaires for children, teachers, parents
 - Observations at school and home
 - Physical measures of EMG, posture, heart rate

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Planned Laboratory Studies

- 3D head and neck posture measurement
- Computer modelling of tissue stresses




Musculographics

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Conclusion

- Computer use by children results in different physical stresses
- Experience of adults suggests if interaction not well managed negative outcomes likely
- Early evidence from children suggests similar problem
- Urgent need for quality research



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