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A Systematic Review of the Effectiveness of Ergonomic Interventions in Call Centres

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Background

- 862,070 people estimated to work in customer contact
- 1 million in UK by 2012 (CCA,2010)
- HSE started to examine call centre working practices in 1999
- LAC 94/1 First issued November 1999 (Original authors *Phoebe Smith & Christine Sprigg* both at HSL)
- Subsequent reports to HSE & journal papers: *Sprigg, Smith & Jackson, 2003; Sprigg & Jackson, 2006; Sprigg, Stride, Wall, Holman & Smith, 2007*



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A Controversial Work Context?

- *'Call centres are "Satanic Mills"? Have I woken up in 1998?'* (James West for Call Centre Focus) 2nd Week in March 2011
- *'Are call centres the factories of the 21st Century?'* (Alex Hudson BBC News Magazine) 3rd March 2011
- *'Mark Serwotka: Call centres are the new dark satanic mills'* (The Guardian) 10 April 2010
- *'UK call centres branded satanic'* (BBC News) 9th January 2004
- *'Call centres are not "satanic mills"'* (BPS Press Release) 7th January 2004



Background

- No known systematic literature review on the effectiveness of interventions designed to improve physical health & psychological well-being of employees in call centres
- A decade on from the HSL/HSE call centre research seems timely to systematically review



Method

- Databases Searched
 - MEDLINE (1951 to 3rd Week Feb 2011)
 - Web of Knowledge: Soc Sci, Arts & Humanities, Science (1900 to 3rd Week Feb 2011)
 - PsycINFO (1967 to 3rd Week Feb 2011)



Method

Search Terms

- “Call centres”, “call centers”, “customer service centres” and “customer contact centres”

Plus

- Random*, Trial, Control*, Experimental, Intervention, Intervention study/studies, Quasi-experiment* and work redesign



Method

Exclusions:

- Not written in English & conference proceedings
- Not concerned with interventions to improve health, psychological well-being or performance
- Simulations in a laboratory setting with students



Results

- Many 'hits' on the term "call centre"
- 1,125 initial hits across the 3 databases on "call centre"
- Just six 'ergonomics' papers met the strict inclusion/exclusion criteria when searching these three databases



Results

1. *Lindgaard & Caple (2001)*
2. *Smith & Bayehi (2003)*
3. *Cook & Burgess-Limerick (2004)*
4. *Rempel, Krause, Goldberg, Benner, Hudes & Urbriel Goldner (2006)*
5. *Cook, Downes & Bowman (2008)*
6. *Chi & Lin (2009)*



Lindgaard & Caple (2001)

Aims

- Participatory design (PD) approach to keyboard changes
- Two functional keys to be sacrificed

Methodology

- PD principles of involving end user in design process
- Observation of keyboard use
- Objective measure of key usage & keyboard ergonomics
- Five focus groups – 28/35 keys not changed after first group
- Data from software & groups matched well
- Operators perceptions of usage are accurate



Lindgaard & Caple (2001) (cont.,)

Results/Conclusions:

- Involving end users in PD is a viable option even when several thousand of them!

Evaluation of the study:

- Strong design & execution
- Good sample size & response rate
- Weakness: too many focus groups conducted?



Smith & Bayehi (2003)

Aims

- Does improving ergonomic characteristics of workstations improve productivity in retail call centre?

Methodology

- Used 3 levels of ergonomic intervention
 - Group C: Training for all users + customised adjustments
 - Group B: Same as Group C + specific workstation accessories
 - Group A: Same as Group B + improved chair



Smith & Bayehi (2003)

Results/ Conclusions

- The group (A) with the most ergonomic improvements did not yield greatest productivity increase

Evaluation of Study

- Conclusions unclear despite an initially strong research design & efforts to measure productivity in detail
- Unexpected findings not well-explained & no statistical analysis
- Appears to show a benefit from the intervention
- An early call centre intervention study though!



Cook & Burgess-Limerick (2004)

Aims

- RCT of provision of forearm support in newspaper call centre
- Examines whether adjusting a conventional workstation to allow forearm support decreased MSDs in neck/shoulder and wrist/hand

Methodology

- 30 in intervention group & 29 control
- Over six weeks; with control getting intervention after six weeks (because open-plan office)



Cook & Burgess-Limerick (2004)

The Intervention

1. Workstation adjustments to enable forearm (but no elbow) support, keyboard re-positioning (so that top row of keys level with fingertips when forearms supported), and mouse re-positioning (so at least half forearm supported)
2. Keyboard, desk and chair heights recorded
3. Participants monitored for first few hours to make sure working posture was good (i.e., no trunk flexion, shoulder elevation, or increased wrist extension)
4. Participants given prompt sheet about maintenance of forearm position
5. Weekly compliance visits



Cook & Burgess-Limerick (2004)

Controls

- For control group there were simply desk, chair and monitor height adjustments where needed

Questionnaires

- At weeks 1,6, & 12: work patterns, hours at computer, mouse use (home & work), break frequency & duration
- Nordic & shoulder flexion measures used



Cook & Burgess-Limerick (2004)

Results/ Conclusions

- With support reported discomfort reduced within 6 weeks for both groups
- Significant decrease in neck, back, forearm and wrist discomfort
- Significant reductions in wrist & forearm discomfort at 12 weeks



Cook & Burgess-Limerick (2004)

Conclusions

Cook and Burgess-Limerick (2004) conclude that *“the study confirms that use of forearm support has a number of advantages over a traditional floating posture and should be considered as an alternate posture for keyboard users”* (p.341).



Cook & Burgess-Limerick (2004)

Evaluation of Study

- Well-designed with a reasonable sample size
- Makes a practical contribution as it provides call centre managers with a steer for tackling forearm discomfort and the productivity consequences of it



Rempel, Krause, Goldberg, Benner, Hudes & Urbriel Goldner (2006)

Aims

- Examines whether a forearm support board or trackball would reduce incidence of upper body MSDs and pain severity

Design/ Methodology

- Randomised intervention trial with 4 treatment arms
- 2 call centre sites of large healthcare organisation



Rempel, Krause, Goldberg, Benner, Hudes & Urbriel Goldner (2006)

The Interventions

1. Ergonomics training
2. Trackball & ergonomics training
3. Forearm support and ergonomics training
4. Forearm support, trackball and ergonomics training

182 participants randomly assigned to one of the groups (1-4)

Questionnaire

- 52 weeks completion
- Work schedules, medication for pain & acute injury events
- 3 body regions assessed



Rempel, Krause, Goldberg, Benner, Hudes & Urbriel Goldner (2006)

Results/ Conclusions

- Arm-board reduced risk of neck/shoulder disorder by half
- Arm-board also reduced rate of left upper extremity disorders (only marginal significance)
- Trackball led to significant reduction of left upper extremity disorders (no effect on right)
- No significant interactions between arm-board & trackball



Rempel, Krause, Goldberg, Benner, Hudes & Urbriel Goldner (2006)

Impact on Pain Scores

- For arm-board a significant decline in neck/shoulder pain & right upper extremity pain
- Trackball also associated with reduced pain in these regions but **NOT** significant
- Arm-board support prevented neck/shoulder disorders when compared with ergonomics training alone – matching what participants themselves thought
- Trackball yielded more inconsistent pattern of results: only reducing pain & MSDs in left upper extremity
- Rempel et al., find results difficult to explain



Rempel, Krause, Goldberg, Benner, Hudes & Urbriel Goldner (2006)

Conclusions

- Employers can consider offering forearm supports to computer users in customer service roles to reduce MSD risks
- To continue to provide ergonomics training etc

Evaluation of Study

- Strong in research design (and execution) with good practical recommendations



Cook, Downes & Bowman (2008)

Aims

- Follow-up study to Cook & Burgess-Limerick (2004)
- Examines longer-term impact of forearm support at 21mths post-intervention

Methodology

- Same newspaper call centre; 59% of original sample
- Same questionnaire, inc. Nordic and additional questions on comfort & use of support, posture etc



Cook, Downes & Bowman (2008)

Results/ Conclusions

- Looked at symptoms for previous 7 days & 12 months
- For 12 months: Neck discomfort **decreased significantly** between pre-intervention & follow-up
- For 7 days: Symptom prevalence for one or more body region increased from 38% post-intervention to 57% at 21mths (non-significant)

***The only significant decrease between pre-intervention and follow-up was neck discomfort**



Cook, Downes & Bowman (2008)

Conclusions

- Most changes not sustained at 21 months
- Employees accepted the forearm support; 80% continued to use
- Future studies must include greater examination of organisational & psychosocial factors – because more job stress at follow-up
- Because of an increase in shoulder discomfort then Cook et al., (2008) suggest that concave desks better if forearm support working posture adopted



Chi & Lin (2009)

Aims

- Evaluation of effectiveness of screen filters for relieving visual fatigue

Methodology

- 22 disabled call centre employees (those with visual disabilities removed) & no control group
- Effectiveness evaluated using: subjective rating scale of visual fatigue, CFF, accommodation power & visual acuity
- Measurements taken – before filter & at 2.5mths, 5mths & 12mths. Measures taken morning & afternoon



Chi & Lin (2009)

Results

- Visual acuity found to be improved significantly after using filter
- Double-vision improved at 2.5mths but that improvement disappeared at 5 and 12 months

Conclusions

- Only practical approach to relieve visual fatigue in call centre employees is to limit screen time...

Evaluation of Study

- Weakened by small sample size & no controls



Overall Conclusions

- **Six** papers from the ergonomic domain (using these 3 databases) matched the review criteria as intervention research...
- Do you know of more? If 'yes' - please do let us know!
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Practical Recommendations

- i) involve call centre users in a participatory design process (even with several thousand end users)
- ii) use of forearm support has advantages over a traditional posture
- iii) forearm support had a positive impact on neck discomfort after a 21 month follow-up
- iv) visual acuity for call centre employees was found to be significantly improved after using a screen filter



Conclusions

- Valuable to do the systematic review - useful to draw studies together in one place
- Just **16** call centre intervention papers in the full review which includes 3 other domains (e.g., physical work environment, work design & organisational, and health interventions)
- Limited number of studies somewhat surprising?



Implications

- My domain of work psychology only covers part of the psychosocial & physical health risk story of call centres
- Work psychologists (and others) need to work in a much more *interdisciplinary* manner if we are to positively intervene in these complex modern work contexts...



Call Centres Today?

Research “Impact” : Something to mull over!

- Sector remains an important source of UK employment
- Is working in a UK call centre any different now than it was a decade ago?
- Lin et al (2010) study of a Taiwan banking call centre found *“the perceived job stress in the call center profoundly affected worker health”* (p.349)



Call Centres Today?

Boyte's (2009) study of job design and wellness in New Zealand contact centres concludes:

“Despite over 10 years of academic research regarding the Contact Centre industry and recommendations on improvements, it is concluded that very little change has permeated through to Contact Centre practices” (p.66)

NB: Butterworth et al (2011) – The transition from unemployment to a poor quality job was more detrimental than remaining unemployed...



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Final Conclusion

- **Our work here is not done!**

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