

ASSOCIATIONS OF PERCEIVED AESTHETICS AND ERGONOMICS TO WORK ENVIRONMENT, OCCUPATION AND HEALTH FACTORS.

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In a cross-sectional survey on 1961 employees' questionnaire data merging need for aesthetic and for ergonomic improvements were tested towards company file data on occupation/sick-leave/age, and questionnaire data on work environment, and health factors.

Between the responses to need for aesthetic and ergonomic improvements differences were seen. Significant associations between need for aesthetic improvements on one side and work environmental and health factors on the other side were found. Similarities to the associations between need for ergonomic improvements to part of the factors were found, independently, though. The results cautiously provide initial evidence that future health management programs may benefit on-the-job-productivity if expanded to include interventions targeting aesthetic work environments.

Ooccupational-health/sick-leave, ergonomics, aesthetics, back-pain, stress.

1. Introduction

Design related perceptions in work environment might be associated with health factors? Relations between health factors and ergonomic perception are shown (4,6,20,21,25) and the ergonomic relations to occupational health and work satisfaction is widely documented and impact on these problems by ergonomic intervention programs has been shown (1,2,3,13,22).

As work has changed from physical to mental in nature, the job characteristics have changed significantly the past decades. Exploratory analysis may begin to shed light on whether or not aesthetic perception can have an impact (positive or negative) on the-job-productivity, and well-being. A supportive and harmonic physical environment might be just as necessary in influencing how employees view their workplace as well as how they might fare with regard to their own health (21,25).

In a study on office design's influences on health and job satisfaction, the lack of use of the scientific knowledge concerning office environments influences on its users' health is pointed out (5). The distance between scientific environmental work place knowledge, as ergonomic and psychosocial factors, to the architects' design process can be wide (8). The authors suggest more easily available scientific results in the design issue aiming to increase also architects' and designers' implementations for healthy work-places.

2. Objectives

The present study will examine a subset of results from a larger employee survey performed at The Broadcasting Company for Television and a Symphony Orchestra at The Broadcasting Company for Radio. To capture background data for future studies this study focuses on ratings on needs for "aesthetic" as well as "ergonomic" improvements

and company file data on occupation/organisation, age/gender, and sick-leave, and work related, environmental and health conditions reported in a questionnaire by employees.

The overall aim was to investigate the possible impact of aesthetic needs on job performance and to compare it with the impact of ergonomic needs.

The hypotheses were:

1. there are no associations between aesthetic needs and work environmental factors, occupational position, health and disease (sick-leave, stress related symptoms, and musculoskeletal pain), socio-demography, and life style.
2. the response distribution of need for aesthetic improvements is not equal to need for ergonomic improvements.

3. Methods

All employees at the television broadcasting company and all employees at the symphony orchestra at the radio broadcasting company who fulfilled the inclusion criteria (>6 month presence at the work place the last 12 months) were asked to respond a questionnaire with pre-tested and standardized questions with regard to the past 12 months. Company file data on age, gender, occupation and sick-leave for the same period were also used. Questions on need for “aesthetic” and “ergonomic” changes were included in the questionnaire. ‘Do you consider that your work place environment needs to be improved aesthetically?’ and ‘Do you consider that your work place environment needs to be improved ergonomically?’ The answer categories were: ‘yes, definitely’, ‘yes, in high degree’, ‘yes, in some degree and ‘no, not at all’. The “aesthetic” and “ergonomic” needs respectively were outcome variables. The study was approved by the Ethical Committee North at Karolinska Institutet (Dnr 02-199). All participants gave informed consent.

4. Results

A number of 1961 persons (74%) completed the questionnaire. Non-participants (26%) did not differ from participants in age, gender and education. The mean age was 48 yrs (21-67), 57% were males and 43% females. Of the participants 53% had no sick-day. More than 95% were white-collar workers in all different levels.

High aesthetic needs were significantly related to 10/19 and high ergonomic needs to 15/19 of presented variables. Both were associated to sick-leave due to musculoskeletal pain, whereas only ergonomic needs were associated to sick-leave due to stress. The association results to environmental, health, socio-demographic/life-style factors are shown in Table 1- 3. All significant correlations were positive. Logistic regression analyses did not change the results. In Figure 3 details regarding musculoskeletal pain are depicted.

The responses in categories within in the two questions in the total group on need for “aesthetic” and “ergonomic” improvements respectively were differently distributed in 58%, ($p < 0.001$). The same was valid for two of the four separate response categories. The need for “aesthetic” improvements was higher rated. There were no differences between genders. Between 11 included occupation groups there were significant differences between responses to “aesthetic” and “ergonomic” needs ($p < 0.001$). The same was valid for two of the four separate response categories.

The answer distribution in occupations is depicted in Figure 1 and 2.

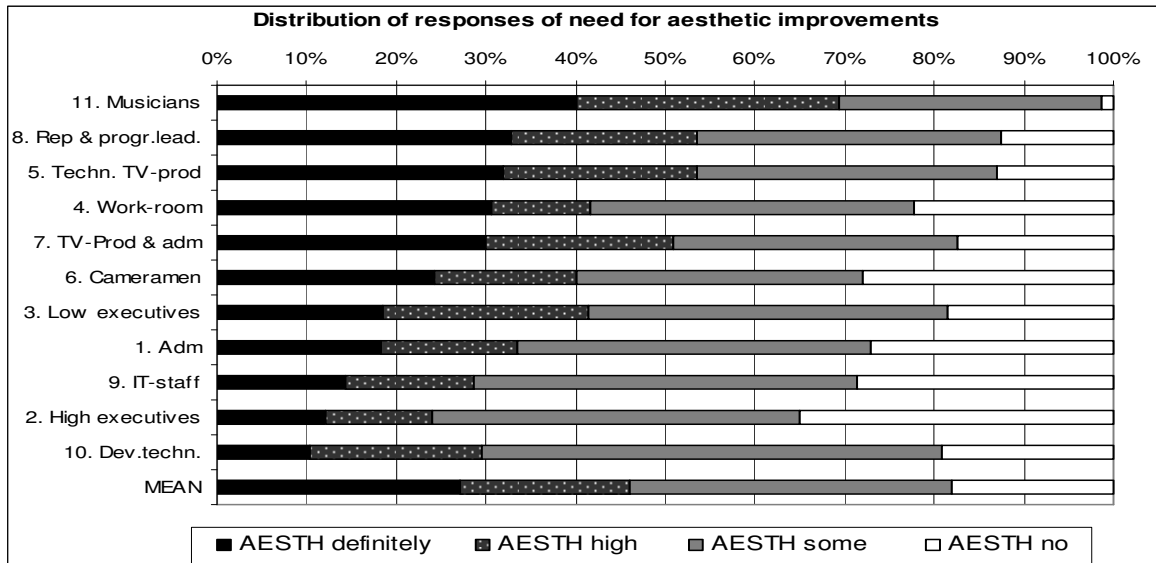


Figure 1. Distribution of responses on need for aesthetic improvements in 11 occupational groups and total group mean. AESTH definitely=Yes definitely; AESTH high= Yes, high need; AESTH some= Yes, some need; AESTH no= No, not at all.

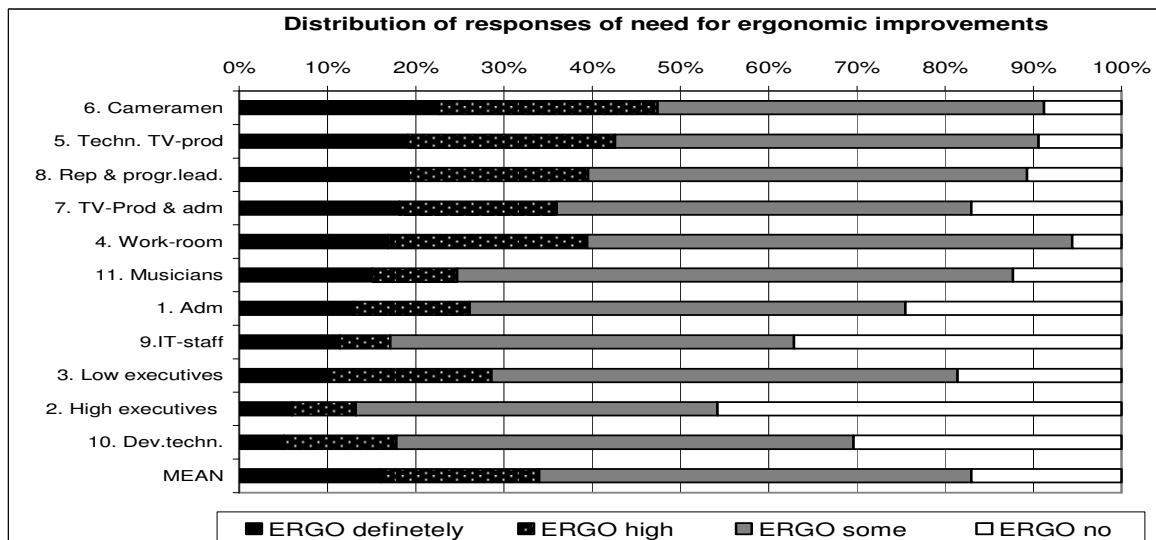


Figure 2. Distribution of responses on need for ergonomic improvements in 11 occupational groups and total group mean. ERGO definitely=Yes definitely; ERGO high= Yes, high need; ERGO some= Yes, some need; ERGO no= No, not at all

Table 1. Need for “aesthetic” and “ergonomic” improvements in relation to work environmental factors. All significant associations were positive.

Environmental work factors	Need for aesthetic improvements p-value	Need for ergonomic improvements p-value
- Stress at work	<0.001	<0.001
- Problems at work	<0.001	<0.001
- Low influence on own work	ns	0.006
- Dissatisfaction with work circumstances and work problems in general	0.003	<0.001
- Disturbing noise	0.035	<0.001
- Psychologically strenuous work	<0.001	<0.001
- Physically strenuous work (heavy lifting)	ns	<0.001

Table 2. Need for “aesthetic” and “ergonomic” improvements in relation to health factors including sick-leave. All significant associations were positive

Health factors	Need for aesthetic improvements p-value	Need for ergonomic improvements p-value
- Sick-leave due to anything	ns	0.016
- Sleeping disturbances (Yes, definitely and yes, often was reported by 54 % of participants)	ns	<0.001
- Worry about own health (Yes, often was responded by 54 % of participants)	ns	0.004
- Sick leave due to stress/depression (9 % of participants)	ns	0.021
- Sick leave due to pain (neck/shoulder/back) (8 % of participants)	0.015	0.036
- Pain intensity (neck, shoulder, upper and low back, and other musculoskeletal organs)	<0.001-0.040	<0.001

Table 3. Need for aesthetic and ergonomic improvements in relation to socio-demography and life style. All significant associations were positive

Socio-demography & life-style	Need for aesthetic improvements p-value	Need for ergonomic improvements p-value
- Age (lower)	<0.001	<0.001
- Gender	ns	ns
- Satisfaction with life circumstances in general	ns	0.001
- Education level	ns	ns
- High intensity training (>30min/>3 times per week)	0.001	ns
- Daily smoking	0.010	ns

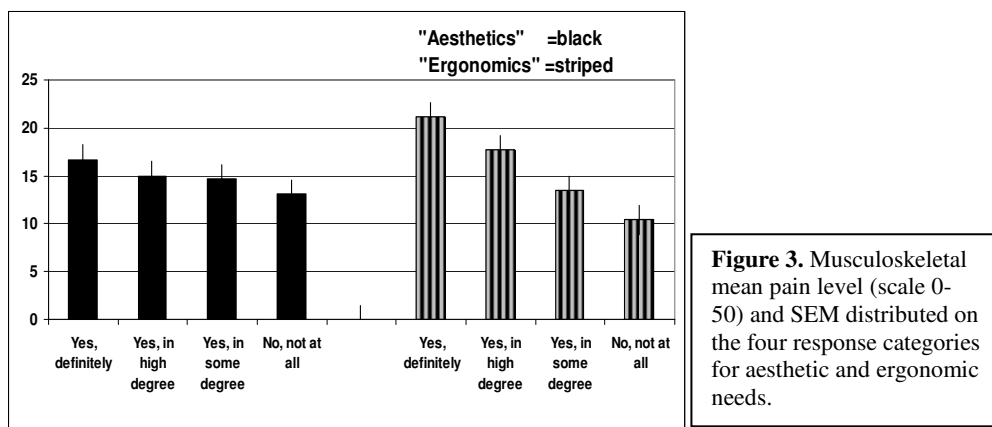


Figure 3. Musculoskeletal mean pain level (scale 0-50) and SEM distributed on the four response categories for aesthetic and ergonomic needs.

Logistic regression analyses: Eight variables representing the different study parts were included namely: age, gender, education level, stress at work, problems at work, sleeping disturbances, smoking, leisure time training (>30 min at least three times per week) as explanatory variables, and each one of need for “aesthetic” improvements and need for “ergonomic” improvements as outcome variables. The following results were found:

- Need for “aesthetic” improvements were directly and independently related to: lower age, work stress, problems at work, training and smoking ($p < 0.001-0.023$), whereas it did not show any independent association with gender, education level, and sleeping disturbances.

- Need for “ergonomic” improvements were directly and independently related to: lower age, work stress, sleeping disturbances, problems at work ($p < 0.001-0.002$), whereas it did not show any independent association with gender, education level, training, and smoking.

Neither “aesthetic” nor “ergonomic” needs were related to gender differences and differences in education levels. Both were related to lower age, work stress, problems at work, and sick-leave - only due to musculoskeletal pain though.

5. Discussion

The findings in the current study were that high need for “aesthetic” improvements were associated to work environmental factors, health factors and socio-demography/life-style factors. The hypothesis was rejected. These results were partly similar to the associations to high need for “ergonomic” improvements, independently though.

However, the associations between high need for “aesthetic” improvements and the health and disease factors were fewer and they were less strong than to high need for “ergonomic” improvements. The associations to sleeping disturbances, sick leave due to stress or any reason, were related only to “ergonomic” needs. So was influence on own work.

Neither “aesthetic” nor “ergonomic” needs were related to gender, and differences in education levels. Both were related to lower age, work stress, problems at work, and sick-leave due to pain.

The answer distribution of aesthetic needs and ergonomic needs were significantly differently distributed in the total group, and in occupational groups. The rated need for “aesthetic” improvements was higher rated. The hypothesis was corroborated. Since these ratings were associated to important work life factors the results may indicate that lack of perceived good “aesthetics” (or work place design) should be considered in occupational health promotion.

Considerations: The choice, according to our methods, to leave to the respondents to estimate what they put in their judgement of work place “aesthetics” should be considered when interpreting the results (25). So also that the definition of “ergonomics” was left out due to the consideration that the participants were sufficiently familiar with the term. In a large company with work environmental policies and an occupational health department including ergonomic staff, the participants were expected to be fairly familiar with the term, mainly regarding work equipment, workplace performance, static and/or heavy work positions, though. In this first phase the purpose was to capture the subjective evaluations on these issues according to the 1961 questionnaire responses.

Self-reporting is a method called in question for measuring work load according to Heinrich et al (12) but it is recommended as very useful for ergonomic exposure according to Dane et al (7).

Waldenstrom et al (24) found that over-reporting of demands or under-reporting of work control is unlikely at the levels of psychological distress they studied. For large population groups, questionnaire as a study method is superior and can for instance elucidate interdisciplinary complex mechanisms leading to musculoskeletal diseases, as presented by Rugulies et al (23).

The observed relationships with “ergonomics” were expected. This physical and psychosocial work environmental factor’s relationship to e.g. pain, and work health have already been described (9,10,11,14,15,16,17,18,19,22) with findings on causality included.

Since studies on the role of “aesthetics” and work place design as a work environmental factor are rare in the literature, the current study’s result might be of use in future study designs

Conclusion: Although the study has limitations due to its cross-sectional and mainly self-reporting character, it does demonstrate significant associations between self-reported need for aesthetic improvements on one side and problems at work, stress, musculoskeletal pain and related sick-leave and lower age on the other side. The associations show similarities to self-reported need for ergonomic improvements, independently, though. The study results provide cautiously initial evidence that future health management programs may benefit on-the-job-productivity if expanded to include interventions targeting aesthetic work environments.

6. References

1. Amick B.C 3rd, Robertson M.M, De Rango K, Bazzani L, Moore A, Rooney T, Harrist R. Effect of office ergonomics intervention on reducing musculoskeletal symptoms, *Spine*, 2003, 28, 2706-11.
2. Anema J.R. Cuelenaere B, van der Beek A.J, Knol D.L, de Vet H.C, van Mechelen W. The effectiveness of ergonomic interventions on return-to-work after low back pain; a prospective two year cohort study in six countries on low back pain patients sick-listed for 3-4 months. *Occupational and Environment Medicine*, 61, 2004, 289-94.
3. Arnetz B.B, Sjogren B, RydÉhn B, Meisel R. Early workplace intervention for employees with musculoskeletal-related absenteeism: a prospective controlled intervention study. *Journal Occupational Environmental Medicine*, 2003, 45, 499-506.
4. Danielsson K. Office Environment, Health & Job Satisfaction: An explorative study of Office Design’s Influence. In licentiate thesis in Technology and Health. Stockholm, Sweden. Article in: Licentiate thesis in Technology and Health, 2005, Stockholm, Sweden, ISBN: 91-7178-168-4.
5. Danielsson K. The Approaches to Office Design; A review of environmental influences. In licentiate thesis in Technology and Health, 2005, Stockholm, Sweden, ISBN: 91-7178-168-4.
6. Danielsson K, Bodin L. Office type in relation to Health, Well-Being & Job Satisfaction among Employees. In the Licentiate thesis in Technology and Health, 2005, Stockholm, Sweden, ISBN: 91-7178-168-4. Submitted.
7. Dane D, Feuerstein, M, Huang G.D, Dimberg L, Ali D, Lincoln A. Measurement properties of a self-report index of ergonomic exposures for use in an office work environment. *Journal of Occupational and Environment Medicine*, 2002, 44, 73-81
8. Dekker S.W, Nyce J.M. How can ergonomics influence design? Moving from research findings to future systems. *Ergonomics*, 2004, 47, 1624-39.
9. Evans O, Steptoe A. The contribution of gender-role orientation, work factors and home stressors to psychological well-being and sickness absence in male- and female-dominated occupational groups. *Social Science Medicine*, 2002, 54, 481-92.
10. Hansson T, Westerholm P (Editors) 2001. Arbete och besvär i rörelseorganen. En vetenskaplig värdering av frågor om samband (in Swedish). Arbete och hälsa, vetenskaplig skriftserie, Arbetslivsinstitutet, ISBN 91-7045-610-0.
11. Feyer A.M, Herbison P, Williamson A.M, de Silva I, Mandryk J, Hendrie L, Hely M.C. The role of physical and psychological factors in occupational low back pain: a prospective cohort study. *Occupational and Environment Medicine*, 2000, 57, 116-20.
12. Heinrich J, Blatter B. M, Bongers P.M. A comparison of methods for the assessment of postural load and duration of computer use. *Occupational and Environment Medicine*, 2004, 61, 1027-31.
13. Hess D. Employee perceived stress. Relationship to the development of repetitive strain injury symptoms. *AAOHN Journal*, 1997, 45, 115-23.
14. Hoogendoorn W.E, van Poppel M.N, Bongers, P.M, Koes B.W, Bouter L.M. Systematic review of psychosocial factors at work and private life s risk factors for back pain, *Spine*, 2000, 25, 2114-25.
15. Huang G.D, Feuerstein M. Identifying work organization targets for a work-related musculoskeletal symptom prevention program. *Journal of Occupational Rehabilitation*, 2004, 14, 13-30.
16. Johansson, J.A. Psychosocial work factors, physical work load and associated musculoskeletal symptoms among home care workers. *Scandinavian Journal of Psychology*, 1995, 36, 113-29.
17. Johansson, J.A, Rubenowitz S. Risk indicators in the psychosocial and physical work environment for work-related neck, shoulder and low back symptoms: a study among blue- and white-collar workers in eight companies. *Scandinavian Journal of Rehabilitation Medicine*, 1994, 26, 131-42.
18. Karasek R, Theorell T, 1990, Healthy work. Stress productivity, and the reconstruction of working life, (New York, Basic books, inc.)
19. Linton S.J. A review of psychological risk factors in back and neck pain. *Spine*, 2000, 25, 1148-56.
20. Lowe G.S, Schellenberg G, Shannon H.S. Correlates of employees’ perceptions of a healthy work environment. *American Journal of Health Promotion*, 2003, 17, 390-9.
21. Norman K, Nilsson T, Hagberg M, Tornqvist, E.W, Toomingas A. Working conditions and health among female and male employees at a call centre in Sweden. *American Journal Industrial Medicine*, 2004, 46, 55-62.
22. Robertson M.M, O’Neill M.J. Reducing musculoskeletal discomfort: effects of an office ergonomics workplace and training intervention. *International Journal of Occupational Safety and Ergonomics*, 2003, 9, 491-502.
23. Rugulies R, Braff J, Frank J.W, Aust B, Gillen M, Yen I.H, Bhatia R, Ames G, Gordon D.R. Janowitz I, Oman D, Jacobs B.P, Blanc P. The psychosocial work environment and musculoskeletal disorders: design of a comprehensive interviewer-administered questionnaire. *American Journal of Industrial Medicine*, 2004, 45, 428-39.
24. Waldenstrom K, Lundberg I, Waldenstrom M., Harenstam A, MOA Research Group. Does psychological distress influence reporting of demands and control at work? *Occupational and Environment Medicine*, 2003, 60, 887-91.
25. Vilnai-Yavetz I, Rafaeli A, Schneider Yaacov C. Instrumentality, Aesthetics, and Symbolism of Office Design DOI: 10.1177/0013916504270695 *Environment and Behaviour* 2005;37; 533. <http://eab.sagepub.com/cgi/content/abstract/37/4/533>