

Området for medisin og helse

**Rapport fra evaluering av
intervensjonsforskning
1995–2000**



**Norges
forskningsråd**

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Forord

Programmet *Helse i arbeidslivet* 1994-2000 gjennomførte en egen satsing på intervensjonsforskning i perioden 1995-99. Delprogrammet ble finansiert med til sammen 16 mill. kr. 12 forskere deltok, dels organisert som deltakere i 2 større paraplyer, dels med enkeltprosjekter. Sluttrapporter ble mottatt i 2000/2001.

Forskning på intervensjoner og tiltak i arbeidslivet er ett av 5 prioriterte temaer pekt ut i programplanen for programmet *Arbeid og helse* for perioden 2001-2005. Styret vedtok i januar 2001 at man ville gjennomføre en uavhengig evaluering av resultatene av forskningen om helseeffekter av tiltak før man fattet beslutning om videreføring av denne satsingen.

Til å forestå evalueringen ble oppnevnt Professor Kari Lindström (psykolog), National Institute of Occupational Health, Helsinki, Finland, og Professor Dag Thelle (lege), Sahlgrenska Universitetssjukehuset i Göteborg, Sverige.

Publisert materiale fra 12 deltakende miljøer samt fra ett prosjekt fra programmet *Inneklima og helse* ble lagt til grunn for evalueringen.

Mandatet og instruksene for evalueringen fremgår av brevet til forskningsmiljøene, som gjengis som vedlegg. Rapporten har vært lagt fram for deltakende miljøer til kommentar.

Programstyret vil takke forskerne og evaluererne for deltakelsen.

Oslo, desember 2002

Stein Knardahl, prof. dr. med
programstyreleder
Programmet *Arbeid og helse*

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Bakgrunn

Ved etableringen av forskningsprogrammet *Helse i arbeidslivet* i 1993 var en av forutsetningene at store deler av virksomheten skulle stimulere forskning om helseeffekter av tiltak i arbeidslivet. Bevilgende departementer og programstyret ønsket at forskning på intervensjoner ble tverrfaglig med samarbeid mellom flere miljøer.

Utvikling av prosjektene

Programmet arrangerte et seminar 5.-6.05.94 med følgende målsetting:

Tverrfaglig samarbeid om intervensjonsstudier for helse i arbeidslivet

Enighet om mål, rammer, hovedproblemstillinger og overordnet metode for evaluering.

De inviterte miljøene sendte inn oversikt over sin kompetanse, problemstillinger man arbeidet med, intervensjoner og tiltak man har deltatt i, og målemetoder som man benyttet.

Seminalet gjennomgikk følgende tema:

1. Gjennomgang av forskningsmiljøenes kompetanse (presentasjon av hvert miljø).
2. Utvikling av problemstillinger: forskningsbehov.
3. Intervensjonstyper: tiltak.
4. Noen av forskningsmiljøene la frem sine modeller for ideell intervensjonsforskning.
5. Evaluering av effekt (resultater av tiltak).
6. Målemetoder og instrumenter for kartlegging og evaluering.
7. Generelt om videre oppfølging.

Programleders vurdering av seminaret var at det kom frem få klare synspunkter på forskningsbehov, få presiserte problemstillinger om eksponeringsfaktorer, få presiserte problemstillinger om intervensjoner, og en del motstridende synspunkter på gjennomføring og evaluering av intervensjonsforskning. Det utkrystalliserte seg ikke åpenbare prosjekter eller samarbeidskonstellasjoner.

Forskningsmiljøene ble deretter invitert til å søke om midler til forprosjekter for å utvikle de ideene og samarbeidsintensjoner som forelå. Flere av disse forprosjektene ble finansiert høsten 1994.

Programstyret og programleder fant ingen enkelt person med de nødvendige kvalifikasjoner til å lede og utføre forskning på intervensjoner i arbeidslivet. Forprosjektsøknadene var lite overbevisende. Man valgte derfor en løsning med frie søknader, tilbakemelding til forskerne, fagfelleevaluering (referees), og krav til endelige prosjekter (som skissert under 3). Det synes som om denne fremgangsmåte har bidratt til å øke standarden på denne forskningen betydelig.

Det ble invitert til seminar om intervensjonsprosjekter 02.11.94 for å gi tilbakemelding om forprosjektene. Forut for seminaret ble det sendt brev til de inviterte miljøene om ønsker for de endelige prosjektene. Hensikten med seminaret var å gi tilbakemelding til forskningsmiljøene, og gi miljøene mulighet for å utvikle nye samarbeidsakser. Det ble påpekt at svært mange av forprosjektene inneholdt allerede eksisterende tiltak, og at mange av disse allerede var delvis gjennomført. Noen av disse prosjektene hadde mer

preg av konsulentarbeid enn forskning med adekvat dokumentasjon. Det ble påpekt at flere av miljøene manglet epidemiologisk kompetanse, at eksponeringsparametre som intervensjonene rettet seg mot, ikke var spesifisert, at innholdet i intervensjonene ikke var tilstrekkelig beskrevet, at problemstillinger ikke var faglig velbegrunnet, og at man ikke hadde allokert tilstrekkelig tid til det aktuelle prosjektet.

Følgende momenter ble presentert for forskerne:

1. Eksponeringsfaktorer (årsaksfaktorer, risikofaktorer) må være definert
 - Fokus for tiltakene må kunne begrunnes
 - Sikre overførbarhet til andre virksomheter
2. Hensikt med tiltakene skal være å endre eksponeringsfaktorer for "Belastningslidelser"
 - Helseproblemer som berører mange
3. Bør inneholde flere forskjellige intervensjonstyper
 - Evt variasjon med intervensjoner i flere typer bedrifter
4. Skal inneholde gruppe(r) som ikke gjennomgår intervensjon
5. Longitudinelt, prospektivt design
6. Skal inneholde evaluering av følgende deler
 - Intervensjon Intervensjonens faktiske innhold (prosessevaluering)
 - Arbeidsmiljø Registrering av eksponering
 - Helse Effekter av intervensjon(er)
7. Epidemiologisk kompetanse
8. Utpeke prosjektkoordinator (>50 % av sin tid til prosjektet, direkte ansvarlig overfor programstyret)

Man ba om at : Eksponeringsfaktorer/risikofaktorer må beskrives mer presist, begreper må operasjonaliseres. Type intervensjon/tiltak må begrunnes. Antall personer som inkluderes i hver gruppe (hver yrkesgruppe) må være tilstrekkelig i forhold til forventet effekt, til at man kan trekke konklusjoner.

Etter dette seminaret satte man en endelig søknadsfrist 28.02.95 for søknad om midler til intervensjonsforskning. Søknadene ble bedømt av 6 fagfeller fra 4 nordiske land som avholdt et møte før endelig uttalelse ble avgitt.

På bakgrunn av fagfelleuttalelser gjorde programstyret vedtak om bevilgning etter følgende mønster: en prosjektparaply som fagfellene hadde funnet klart støtteverdig fikk tilsagn om bevilgning dersom spesifiserte krav om endringer ble gjennomført (se vedlegg). Et paraplyprosjekt med delprosjekter ble bedt om å sende ny prosjektsøknad for tilsagn etter ny behandling. Andre søknader ble avslått.

Prosjektsøknadene ble revidert i henhold til krav fra programstyret. Programstyret bevilget midler til to paraplyprosjekter sommeren 1995. Et delprosjekt med mål å mulige helsegevinster ved tiltak basert på aksjonsforskning fikk støtte på betingelse av at man anvendte de samme evalueringsinstrumenter som første paraplyprosjekt, slik at resultater fra intervensjonen kan sammenlignes med effektene av de andre intervensjonene (dette prosjektet var av fagfellene bedømt som ikke støtteverdig).

Det ble utviklet samarbeid på tvers av de to paraplyprosjektene, slik at samme prosessevaluering ble utført i begge prosjekter (ved Saksvik, NTNU).

Paraplyprosjekt I var basert ved Universitetet i Bergen og hadde tilknyttete prosjekter drevet av Rogalandsforskning (Mikkelsen), NTNU (Saksvik), Høgskolesenteret i Rogaland/Arbeidsforskningsinstituttet (Mykletun/Sørensen) og Statens arbeidsmiljøinstitutt (Knardahl).

Paraplyprosjekt II var basert ved SINTEF-IFIM i Trondheim og hadde to tilknyttede prosjekter drevet av NTNU (Westgaard og Saksvik).

Undersøkelsene fokuserte på flere forskjellige yrkesgrupper, og det ble forsinkelser grunnet vanskeligheter med rekruttering av deltakere i mindre bedrifter/mindre enheter. Også reorganisering i en stor bedrift som deltok, førte til at prosjektene ble forsinket.

Parallelt med utvikling av større tverrfaglige forskningsprosjekter på intervensjoner har programmet støttet prosjekter på avgrensede, fokuserte tiltak. Disse prosjekter ble utformet som frie søknader uten krav fra Programstyret om tverrfaglighet eller samarbeid (eksempel SINTEF-UNIMED: Oftedal).

I tillegg har man videreført støtten å til ferdigstille undersøkelsen av effekten av nedvinklede EDB-skjermer (VDU-units: Lie/Fostervold) og av effekter av optimalisering av rombelysning (Aarås).

Evaluation of research into the health effects of interventions at the workplace

The Research Council of Norway

The object of evaluation

The Work and Health Programme was started in 2001, aiming at continuing and consolidating the research field. The Research Council of Norway supported research into the health effects of interventions at the workplace with approximately NOK 16 m. in the period 1995-99 through the programme Health at Work.

The previous programme had focussed on four main objectives:

1. Assess intervention aiming at health promotion and prevention to reduce absenteeism.
2. Diseases of the muskuloskeletal system induced by occupational strain
3. Psychological and psychosocial conditions in occupational life
4. Working environment problems at working places with a majority of female employees

Before allocating more resources to the theme health effects of interventions at the workplace, the Program Committee wants to take a position on the following:

- (1) whether the quality of the research carried out to date merits further investment in research into the health effects of interventions at the workplace
- (2) whether certain methods or approaches have proven particularly fruitful.

The Programme Committee has given a highly positive assessment of the concluded programme period with special emphasis on cross-disciplinary collaboration, increased standards of research quality as well as being internationally recognised. They also emphasise the opportunities for close collaboration on major intervention studies between different research areas, and work life including both employers and employees. The programme is thought to have ignited more profound interest in areas of basic science related to occupational health.

The Program Committee has found it necessary to evaluate the quality and outcome of studies carried out in Norway on the health effects of interventions at the workplace. The object of the evaluation was to provide a basis for decisions on future research into interventions at the workplace.

Evaluation Committee and its task

As an aid to the decisions of the Program Committee, an Evaluation Committee was appointed. The evaluation was carried out by a Committee of two experts, Professor Dag Thelle of Sahlgrenska Hospital and Professor Kari Lindström from the Finnish Institute of Occupational Health. Its task was to evaluate the following aspects of research:

1. The quality of publications.
2. The output of published results.
3. The design and methods employed. Are the methods adequate for conclusions to be drawn on the effects of interventions?
4. The usability of the results obtained. Interventions are often expensive, and documentation of effects or a lack of effects is useful for decision-makers who consider whether interventions should be undertaken.

The evaluation was based upon published material from the projects and upon literature search in electronic libraries. The Evaluation Committee based its evaluation on the following materials:

1. Articles presenting original results in international journals with peer reviews.
2. Reports and articles presenting original results in journals without peer reviews.
3. Doctoral theses.
4. Abstracts and summaries for conferences.
5. Review articles and book chapters pertaining to interventions at the work place.
6. Popular science articles discussing interventions at the workplace.
7. A list of 1-6.
8. A list of oral presentations about effects of interventions.
9. A list of present research projects and follow-up studies in the field (containing the following information: project title, grant sources, type of workplace, type of intervention, number of subjects included, outcome parameters studied)

The groups have submitted 4 doctoral theses, about 25 original articles, 2 review articles, and other reports. In addition to original articles, the review articles and methodological articles are relevant. In addition, about 15 abstracts have been produced. Some of the publications received do not necessary address interventions and may be excluded from the evaluation. But it was hard for the evaluators decide which ones should be excluded. Only some of the participating groups have mentioned present research projects and follow-up projects in the field.

A joint report from the members of the Committee was requested. The evaluation should be based exclusively on publications that

- (1) present data from interventions at the workplace, and were
- (2) supported by the program Health at Work.

One project from the program Indoor Climate and Health was also invited to participate.

Institutions that received grants from the program Health and Work were invited to participate in the evaluation through the administration of the umbrella organizing research efforts.

Participating groups and institutes

The research activities have been organised in two major groups, located in Bergen and Trondheim respectively. They have in their turn collaborated with researchers associated with other institutions located in Stavanger and Oslo. The Bergen and Trondheim groups have been designated the Bergen and Trondheim networks; in order to emphasise their collaborative roles.

Outputs from following groups/institutes are evaluated separately, because they were listed separately in the letter defining the task of the evaluators:

1. The Trondheim network tested different interventions at service work
SINTEF IFIM, now renamed SINTEF Industrial Management, Institute of Social Research in Industry
 - Carla Dahl-Jørgensen
 - Ulla Forseth
 - Rolf Westgaard
 - Per Øystein Saksvik, Norwegian University of Science and Technology, NTNU
2. The Bergen network tested four interventions
Institute of Biological and Medical Psychology:
 - Holger Ursin et al
 - Aslaug Mikkelsen (Rogaland Research Institute)
 - Per Øystein Saksvik, Norwegian University of Science and Technology, NTNU
3. SINTEF IFIM
 - Kjell Nytrø
4. SINTEF UNIMED
 - Gunnhild Oftedal VDUfilters
5. Department of Medicine, Norwegian University of Science and Technology, NTNU
 - Sven Svebak: compared effects of different types of exercise on MS complaints
6. Work Research Institute
 - Bjørg Aase Sørensen in collaboration with Reidar Mykletun (Stavanger College) tested effects of WRI's action research model
7. Alcatel Norway
 - Arne Aarås: ergonomic interventions
8. Department of Psychology, University of Oslo
 - Knut Fostervoll: effect of lowering VDU
9. Department of General Medicine, University of Oslo
 - Kitty Strand: interventions to help pregnant workers stay at work
10. Department of Medicine, NIOH Norway
 - Knut Skyberg: interventions to improve office climate.

Evaluation criteria and assessments

The programme was strongly supported by central governmental authorities that were concerned about the increase in absence of sickness, and wanted a stronger scientific basis for the political actions. The research programme will therefore have many of the characteristics of applied science, even if major parts of it must be assessed as basic research.

Generalisability

The assessment of research programmes may take many directions. In the area of occupational health and especially the effects of interventions, applicability and thereby generalisability are of major interest. Equally important is publishing results both to other researchers, decision-makers and those involved in occupational health.

Generalisability is a criterion, which expresses the external validity of the findings. This depends heavily upon study design as well as study population. We will therefore assess whether the participants in the different major studies are representative of the work force in this part of occupational life.

Research quality

The current international referee system is the major instrument to secure that research maintains an acceptable quality. This implies that more weight will be given to projects, which have been published in international journals, than more local report series. We are quite aware of the publication bias, which may be introduced in this assessment, and good research may well exist beyond that which has reached the journals. Still, we do feel that international publishing is a sine qua non for a small country where the room for criticism may be limited.

Popular publication and relevance

The programme committee emphasised the need for spreading the results to other than the pure researchers, and the degree of popularised versions of the results will also be assessed.

Lastly, we will assess the relevance of the research areas and topics. This is far more controversial part than the criteria mentioned above. Even if this research has a strong applied character, there are elements, which are of basic scientific nature. Basic science is relevant in its own sense, and to ask whether such projects are relevant is really to assess the future, which neither of the members in the evaluation committee feels obliged to.

Evaluation of the published materials available from the projects

The following is a more detailed assessment of each of the centres as well as single research projects. Only a few of the submitted papers and reports will be listed as references in the report.

On this basis an overall conclusion was drawn. The evaluation text of the networks/group has the following outline:

0. List of available materials
1. Quality of publications
2. Output of published results
3. Design and methods used
4. Usability of results

1. The Trondheim Network/SINTEF IFIM

Test of effects on individual and organizational levels of three interventions

- Three-step strategy
- Extended spells of self-reported sickness absenteeism
- Small-group discussions (on stress)

One of the main topics studied by the Trondheim network is the assessment of factors contributing to strain and pain in the neck and shoulders. The group is also associated with intervention studies aiming at reducing sick absence.

It was somewhat difficult to determine in the material submitted which the specific interventions carried out and evaluated by the Trondheim group were, because the list of publications from Trondheim included those from Westgaard. So it was decided to evaluate them together, although these last-mentioned publications deal partly with musculoskeletal and ergonomic issues, which was apparently not the aim of any intervention.

0. Available published materials

- **Doctoral thesis in sociology**

Ulla Forseth: "Boundless work - Emotional labour and emotional exhaustion in interactive service work", 2001.

- The thesis describes how the nature of paid work is shifting towards symbolic forms of production where emotions are important 'tools' of labour.
- Four theoretical and empirical research questions are put.

- **Book chapters**

- "Belastningsergonomiska förändringsstrategier" (in Människan i arbetslivet) (Westgaard)
- "Kjønn, arbeid og grensesetting blant kvinner i frontlinjeyrker" by Dahl-Jørgensen and Damman in "Hvor går grænsen"?, a theoretical and empirical analysis and review

- **Conference papers**

- Three conference papers by Westgaard and three conference abstracts by Dahl-Jørgensen

- **Articles/with referee**

One published and one submitted article about the interventions and evaluations

- "Improving subjective health and reducing absenteeism in natural work life interventions" by Saksvik & Nytrø, about interventions aiming at reducing absenteeism in a natural work life setting
- "An evaluation of the impact of three workplace interventions in the health care service workers" by Dahl-Jørgensen, Forseth, Opdahl-Mo, Saksvik, submitted manuscript
- Service workers: a municipality (n=349), shopping mall (n=98)
 - 1) Three-step strategy
 - 2) Extended spells of self reported sickness absenteeism
 - 3) Small-group discussion (on stress)

Four articles in referee based journals and one submitted by Westgaard

- "Trapezius muscle activity and shoulder and neck pain in female service workers with low biomechanical exposure." Ergonomics 2001.
- "Ergonomic intervention research for improved musculoskeletal health. A critical review." Int J Ind Erg 1997.
- "Shoulder and neck complaints in customer relations." Ergonomics 2001.
- "Improving subjective health and reducing absenteeism in natural work interventions." Accepted for publication by Scand J Psychology.
- "Daytime trapezius muscle activity and shoulder-neck pain of service workers with work stress and low biomechanical exposure", submitted for publication.

- **Hovedfagsoppgave**

- "Ledernes roll for ansattes deltakelse"
- "Butikkansattes deltakelse i en intervension"

- **Present research project**

Intervention for reducing sickness absenteeism: A multi-center study. A preliminary project in cooperation with Rogalands forskning and NTNU, funded by The Research Council of Norway, will be resubmitted in June 2001. The project is in the process of designing: the type of workplaces, type of interventions, number of subjects and outcome of parameters to be studied.

1. The quality of publications

The Trondheim Network group has submitted a list of papers, articles and theses comprising six oral papers, four accepted manuscripts, three in the pipeline and three

master and doctoral theses. The group comprises six researchers and co-workers. The three enclosed theses are either a monograph such as the one on Emotional Labour and Emotional Exhaustion in Interactive Service Work, or in Norwegian, which is unlikely to reach a broader audience.

The quality of publications within the Trondheim network dealing with analysis of service work and interventions among service workers is variable, but they give a many-sided picture of the issues.

Three papers on musculoskeletal health and a review of an ergonomic intervention have been published in referee-based journals (Westgaard), and the intervention about reducing absenteeism in the natural work life context has been accepted for publication (Saksvik & Nytrø). This article deals with one of the three interventions on improving subjective health and reducing absenteeism.

The manuscript of the paper describing and evaluating all three interventions, the three-step strategy, the small-group discussion on reducing stress and extended spells of self-reported sickness absenteeism is still very superficial and far from being ready for submitting to any journal.

One doctoral thesis about "boundless work, emotional labour and emotional exhaustion in interactive work" has been completed (Ulla Forseth). Both quantitative and qualitative data have been collected among service employees. It is a very good thesis analyzing emotional work and emotional exhaustion theoretically and empirically and contextualized them to the societal level.

Six conference papers and abstracts are included. The abstracts deal with some theoretical and methodological aspects of the interventions. Organizational interventions are topics in three conference abstracts. Three conference papers about MSD/ergonomic issues (Westgaard) from Nordic or international conferences are included. These describe the assessment of risk factors.

In addition, one practical book chapter in a Swedish book "Människan i arbetslivet" about "Belastningsergonomiska förändringsstrategier" has been published.

2. The output of published results

The results published deal mainly with results from the analysis and assessment of the current situation of two service sectors, municipal and shopping mall employee groups. The output of the published results is varying. Especially, the MSD/ergonomic approach has been reported more thoroughly and clearly. But the reporting of the organizational interventions is still at the draft level. Only the reduction in sickness absenteeism intervention is well reported.

The ergonomic and MSD approach concentrates on the assessment phase conceptually and methodologically in an excellent way. But there are no interventions concerning them, which is probably according to the original plan.

The sociological and psychological aspects of service work are analyzed in a innovative way and reported thoroughly in the doctoral thesis by Ulla Forseth.

Forseth's thesis is a theoretical work with an empirical base from the study of care and bank workers as well as public statistics. The author addresses issues such as the service-management, emotion-management perspectives, the impact of emotional exhaustion, and emotional labour. The thesis is very comprehensive, but not easily accessible, and the author should be encouraged to publish more popularised papers in this field.

The two interventions in the Trondheim network, the three-step strategy, and the small-group discussion (stress) have not been reported accurately. The "hovedfsgoppgaven" and the article manuscript describe some parts of the intervention processes.

The master thesis by Anne Øwre-Johnsen aiming at stress prevention and management among employees in 45 stores did not show any measurable effects of the interventions. Kari Hanne Gjeilos thesis aims at the role of managers and leaders within the health care industry. Her conclusion is that the leaders are important with regard to workplace interventions, but that the opening created by the leaders varied with regard to administrative level, working hours and other conditions particular for health care workers.

The book chapter "Kjønn, arbeid og grensesetning blant kvinner i frontlinje yrken", (Dahl-Jørgensen & Damman) describes in a fresh and innovative way the new type of service and care work. The work is unlimited and centers on the physical body. Its sociocultural significance has been described well. This approach offers new vistas of service work in the postmodern society.

However, in this field controlled interventions are still in the distant future, as compared to ergonomic interventions, which already have a long tradition. It has not been determined how to intervene in the emotional work load and no generally accepted models and strategies exist. The applied three-step strategy and small discussion groups are rather trials or pilot type, the way they are now described.

The review article on ergonomic interventions is based on a very good and comprehensive review of earlier ergonomic intervention research into improvement of musculoskeletal health (Westgaard & Winkel, *Int. J. Industrial Ergonomics* 1997). The other articles describe the risk factors for the musculoskeletal health problems in service workers and their assessment. This part of the research work would be a very good basis for future intervention focusing on MSD and ergonomics.

3. The designs and methods used

No ready-made procedures are available for interventions dealing with the emotional load. They could greatly benefit the ways how stress management, job redesign and a general participatory organizational intervention have been carried out methodologically. Therefore, a review article similar to the one on the ergonomic intervention would also be needed for this field before carrying out interventions at the workplace.

The article by Nytrø et al (Work & Stress 2000) on key factors in the implementation of occupational stress interventions partly highlights this issue. However, it should have been done before the interventions (see Bergen network). Nytrø et al has provided an extensive discussion on the key factors that may influence the effect of stress interventions. Their conclusion is optimistic with regard to the possibilities for achieving changes provided that certain conditions are fulfilled on beforehand.

Nytrø has also contributed with a book chapter in Norwegian on this issue, aiming at a broader public. Per Øystein Saksvik has submitted additional papers not referred to above. Two of these will be mentioned here; A process evaluation of individual and organizational occupational health interventions, and Understanding the organizational culture of work groups - a prerequisite for successful interventions at work. In the first of these papers, the authors are examining the impact of four process dimensions on the effects of interventions. They conclude that middle management, reorganization and competing projects influenced the results. The second paper emphasises the importance of the local culture within the working group before embarking upon interventions at all.

The three workplace interventions in the municipal workplace and in the shopping mall were evaluated using participant observations and interviews. The interventions were a three-step strategy, extended spells of self-reported sickness absenteeism and small-group discussions. All interventions were initiated from the outside, the first and third were perceived negatively by the employees. These two interventions did not seem suitable for the organizational contexts and situations. The involvement and participation of personnel and active support from leaders were probably lacking. If implementation is not done properly, the effects cannot good. Of course, outside constraints can destroy a well-planned intervention. Only a few effects interpreted as a consequence of observational attention were found.

One of the conclusions with regard to this intervention studies aiming at reducing sick absenteeism, is that the effects of interventions in order to improve health at work are difficult to demonstrate. Contextual factors and notions of gender affected the interventions. The group has applied experimental or quasiexperimental designs in their attempts to affect the sick absence. One may argue that absenteeism is too complicated to be affected by relatively simple measures such as providing options for self-administered sick leave.

The group concludes that more sophisticated research designs should be applied for future workplace interventions.

The study of muscle strain and related factors disclosed a remarkable lack of association between work strain and the degree of muscle pain. The researchers under the auspices of Rolf H. Westgaard, conclude that this may be due to imprecise measurements of variables associated with work strain, and that the problems are due to factors both at the work place and off work. The results are published internationally.

The history of the target group and the organizational context were probably not considered and described adequately. The social significance of the message from the intervention was not analysed. Many questions remain open, which makes it difficult to

draw any clear conclusions on the effects. I would suggest that this kind of approach should be maintained but with a much better control of individual, temporal and organizational factors, if possible.

4. The usability of the results

The analysis of the current situation in service work, health care and a shopping mall is done and described innovatively. The results on the current state of ergonomic interventions and the consequences of poor ergonomic conditions were well described and reviewed.

The possible effects of the intervention done to improve subjective health and reduce absenteeism in a natural work life situation showed that "self-administered sick leave" had no effect on overall absenteeism.

However, the interventions carried out have been described only partly or in a very fragmented way, which makes it difficult to evaluate their usability as a good practice example. A new awareness has arisen about the new emotional type of workload in service work.

Because the interventions were based upon the theory of participation, dialogue and workplace democracy, a critical theoretical and empirical review of the earlier reported studies and theoretical writings should have been done in this field. Now, "terms" are rather used as "slogans". The roots of these approaches and methods can be found in earlier organizational theories, in industrial democracy and in sociotechnical approaches.

5. General assessment

The Trondheim group organised an experimental longitudinal study in order to assess whether interventions aiming at muscle strain and pain, stress at work in order to decrease sick absence in service workers. For both these topics the findings are that a) the association between muscle strain and work place factors is weaker than anticipated, b) interventions such as those carried out are not effective. The interventions were to some extent gender specific, aiming at identifying factors, which were particular for the female work force. The studies have contributed to our understanding of the complex of factors underlying absenteeism, but the current approaches are most likely too simple and without a proper assessment of the expected results before the interventions were started. The quality of the fieldwork is satisfactory, but a more programmatic description of all the activities in a broader context would have made it easier to assess the researcher efforts. This is also reflected in the fact that the Trondheim group has published papers varying from theoretical considerations to very practical intervention assessments. Still, both the ergonomic approach and the attempt to identify the factors that influence or even constrain the interventions are promising, and the group should be encouraged to follow those lines of research.

2. The Bergen network

- Test of four interventions

The "Bergen Umbrella" was a multidisciplinary superstructure developing and offering standardized observation systems and standardized interventions for randomised, controlled intervention trials. The central experiment was a large, controlled study of

four interventions, stress management training (SMT), physical exercise (PE), an integrated health program (IHP), and organizational development. The trial lasted from 1996 until 1998. 1061 men and women recruited from the postal service took part in the study, giving a participation rate of 68%.

The group has listed 27 publications and three submitted manuscripts to refereed journals during the programme period, as well as a large number of book chapters, abstracts and popular science articles. Two doctoral theses that are directly related to the programme have been completed, and another is in the pipeline.

The group comprises six core members and four affiliated collaborators.

Researchers from the R-F Rogaland Research have successfully taken part in the projects.

The Bergen report was from the core group of the Bergen Umbrella. Since this was an integrated project, the report is also "integrated". The umbrella included peripheral collaborating parties, but they have not been able to report on their progress or benefits from the collaboration.

0. Available published materials

- **Doctoral thesis** / supervisor Prof. Ursin
 - Eriksen: "Stress and coping: Does it really matter for subjective complaints", 1998 + 5 articles.
 - Mikkelsen A: "Effects of learning opportunities and learning climate on occupational health", 1998 + 5 articles.

- **Articles, with referees**
 - Five articles on interventions and their evaluations
 - Eriksen and Ursin: "Subjective health complaints: is coping more important than control?" *Work and Stress* 1999.
 - Mikkelsen et al: "Impact of an integrative ... findings from a state enterprise in Norway." *Review of Public Personnel Adm.* 1997.
 - Mikkelsen & Saksvik: "Learning from parallel organizational development efforts in two public sector settings." *Int. J. Health Services* 1999.
 - Mikkelsen & Saksvik: "Impact of a participatory organizational intervention on job characteristics and job stress." *Review of Public Personnel Adm.* 1998.
 - Mikkelsen et al: "The impact of participating organizational intervention on job stress in community health care institutions." *Work and Stress* 2000.
 - Three submitted article manuscripts.

- **Review articles, book chapters**
 - Eriksen et al: "Coping with subjective health complaints in an organization", Book chapter 2000.
 - Mikkelsen: "Work design and health: Two paradigms contrasted." *EAWOP Congress Book* 2000.

- **Popular articles**
 - Eriksen & Ursin: "Tiltak for å fremme helse på arbeidsplassen." *Den norske psykologforening* 1996.

In addition, some submitted papers from the intervention study are listed, but not included, e.g.:

- Eriksen, Ihlebæk, Mikkelsen, Grønningsæter, Sandal, Ursin: (2000) "Improving subjective health at the work site: a randomized controlled trial of stress management training, physical exercise, and an integrated health program." Submitted to Occupational and Environment Medicine.

- Mikkelsen: (1999) "Gender differences in environmental and individual predictors of occupational health among federal postal workers." Submitted to the European Journal of Work and Organizational Psychology.

- Saksvik, Nytrø, Bungum, Mikkelsen: (1998) "Organizational Learning during the Implementation of Individual and Organizational Interventions - An Evaluation." Submitted to Journal of Organization and Occupational Psychology.

1. Quality of publications

The network has produced two doctoral theses: one on stress and coping and the other on the effects of learning organizations and learning climate on occupational health.

Five peer-reviewed articles on the intervention have been published and three have been submitted for publication. The articles are a useful set of reporting and help to understand the logic of the approach applied.

In addition, one book chapter and one full conference presentation text is included.

A list of 23 conference papers is included. No copies of the papers are attached, making it hard to decide which of them belong directly to the Work and Health program.

2. The impact of published results

The doctoral thesis of Mikkelsen on learning climate and learning opportunities conceptualize and theorize on one of the key concepts of the interventions, "the organizational learning climate". The main effect of the thesis is to create theoretical and methodological bases for intervention documentation and evaluation. The other doctoral thesis, by Eriksen, deals with stress and coping. It goes deeper in defining, measurement of coping with stress and health as an outcome. It is also an important basis for the health intervention.

An review article "Coping with subjective health complaints in organizations" by Eriksen et al comprises a review of the results of psychological factors contributing to a lack of health and individual and organizational interventions relevant to health outcomes. This is a good basis for the planned interventions in the entire program.

A number of cross-sectional results have been published from this study, but the final results of the intervention are only available in a report to the Research Council dated March this year, and the following conclusions are based upon this report. The intervention did not result in differences in sickness leave or job stress. Intermediate

endpoints such as general health, physical strength and stress management improved however in the intervention group. The lack of effect on sick absence may be due to a selection of relatively healthy subjects thereby reducing the power of the trial, but this is difficult to assess until more detailed data are made available. The major report is awaiting publication. A previous report from the same group in a high-risk group did not see any difference in return to work after a multimode intervention. In a study of patients with low back pain however, early intervention with mobilisation programme did reduce long-term sick leave. These issues will be further discussed at the end of this evaluation report.

The following description of intervention is based on the report on the Bergen Umbrella. The organizational interventions were applied to several work situations. The main experiment was done in 1996 and 1997 in four locations, with a one-year follow up. The interventions lasted for 12 weeks (24 hours). In this part of the project, 1061 employees (401 men and 659 women) participated. No significant effects were seen between or within any of the groups on SHC, sickness leave, or job stress. However, the subjective experiences of favourable effects were strong (odds ratios ranging from 7 to 26), and specific for each intervention. Physical Exercise improved general health, physical fitness, and relieved muscle pain. Stress Management Training improved stress management. The Integrated Health Program showed the strongest effects, affecting most goals set for the treatment. Organizational development improved the individual evaluation of the organization. The effects were still seen at the one-year follow-up.

The role of individual factors, demographic factors, and psychosocial factors as risk factors for SHC in working life has been analyzed. These were important as a basis for the choice of interventions. These data may also help in identifying those who benefit from the interventions.

The articles included covered following aspects:

The first article describes factors relevant in coping with work-related health problems (Eriksen & Ursin 1999), applying the same measurement methods as were used in the post office and hospital intervention studies.

The article "Impacts of performance appraisal system or perceived management quality and working environment" describes some measurement models (structural modelling) when using aforementioned methods (Mikkelsen et al 1997).

The article by Mikkelsen & Saksvik 1998, Public Personnel Administration describes and documents the organizational interventions carried out in postal service. The theoretical background of the review is relevant. The study design and measurement methods are well planned. The intervention processes are described in detail and the results are discussed well. The impacts of this participatory organizational intervention on job characteristics and stress are presented thoroughly in an article published in Int J of Health Services 1999 by Mikkelsen & Saksvik. The emphasis in this article is on quantitative results.

The results from a similar intervention in health care institutions are reported by Mikkelsen, Saksvik and Landsbergis in Work and Stress 2000. The quantitative results are presented, but the article also discusses process evaluation and qualitative data. This

is a very good way to report the intervention. The results of this study indicated that the participation process itself had a favourable effect on well-being and on reducing job stress and a modifying effect on hazards in the work environment.

3. The design and methods used

To evaluate the need for and the effect of interventions to improve health and reduce sickness absenteeism, it is also necessary to measure the main causes of illness and sickness in doctors' certificates.

Instrument development led to two main instruments, one for scoring subjective health complaints (SHC) and another for scoring coping and defense mechanisms (CODE). These instruments have been published (Eriksen, Oloff, and Ursin 1997, Eriksen, Svendsrød, Ursin, and Ursin 1998, Eriksen, Ihlebæk and Ursin 1999) and are now, according to the report from the Bergen network, used in several countries and many experiments in Norway. They have also been widely used in randomized clinical interventions, particularly in interventions directed at low-back pain, a major cause for sickness absence, encounters with medical service, and reduced health in Norwegian working life.

Subjective health complaints (SHC) comprise muscle pain, gastrointestinal complaints, and complaints like fatigue, dizziness, and mood disturbances ("pseudoneurology"). The prevalence of these complaints has been studied in several populations, in Norway and in the other Nordic countries (Eriksen, Ihlebæk and Ursin 1999, Ihlebæk 2001). The interventions were directed at alleviation, increased tolerance, and adequate behavior for reducing the complaints. The Bergen team developed a service system for researchers using these batteries in controlled clinical trials for alleviation of muscle pain, in particular low-back pain (Research Unit, National Back Pain Network).

Work-related "stress" factors have also been mapped, and parts of the interventions are directed at these factors (Eriksen, Oloff and Ursin 1997, Mikkelsen, Saksvik and Ursin 1998).

The designs applied in intervention were traditional controlled field experiments with before and after measurement using experimental/intervention and control groups. These traditional designs were as such successful when the natural intervention was implemented; although simultaneous other changes, e.g., reorganizations, interfered with them. However, when process evaluations of the intervention were also made using the logic of case study reasoning, the result was successful. The control group had their own natural, unplanned changes, which could be compared with the planned ones in intervention groups. To date, only the organizational intervention has been reported on. The other approaches remain unreported.

4. The usability of the results obtained

This study provided important and to a certain extent new information about the association between subjective health and a number of individual and background variables. An example is that individual coping and defence strategies are more important than organisational structure for subjective health. The research group intends to perform a similar trial in a high-risk group of employees where the likelihood of a positive effect is higher.

The organizational learning approach in connection with the organizational intervention was fruitful. Relations between job stress and learning were shown.

The main advantage of the results was the theorizing and conceptualizing on the intervention procedure, the process and outcomes. Especially, the use of both qualitative measures and process evaluation together was advantageous.

The role of the consultant or the leader of the intervention as well as the implementation were somewhat inadequately or superficially documented in the reports. The context of the organization is mentioned but the context or its content has not been described sufficiently. However, the reports from SINTEF IFIM together with researchers from Bergen describe and discuss these aspects more thoroughly.

To date, the interventions by the Bergen network have been only partly reported. Most of the publications and articles deal with the organizational intervention and its evaluation. However, there is no documentation and evaluation of stress management training (SMT), physical exercise (PE) and the integrated health program (IHP). For some reason, the main interest in reporting has been in organizational intervention and the evaluation itself.

5. General assessment

The group has embarked on a project where the endpoints (sickness absence) are heavily influenced by external conditions such as unemployment and labour scarcity. Any intervention will therefore have to be assessed in this light. The group has clearly shown that they are able to run relatively large trials, using standardised instruments with established validity. They have a high productivity with publications in recognised journals, and one may expect an increasing publication rate of original papers when the major report has been published. The group has a widespread international network, and is highly recognised as being in the forefront in the area of subjective health research. The research areas as well as the specific study objectives are highly relevant for this programme.

3. SINTEF/IFIM

- Kjell Nytrø + Per Øystein Saksvik

The task of SINTEF/IFIM was to evaluate the quality and outcome of intervention results of this program. Both researchers have contributed to the publications with researchers from the Bergen and mainly from Trondheim Umbrella. It was not quite clear which publications belong under this institute/group.

0. Available published materials

- **Book chapter**

Nytrø, Endringskompetanse, som forutsetning for utvikling av virksomheter og mennesker, ss. 165-186, 2000

- **Conference papers**

One conference paper and two abstracts are included and a list mentions another seven. All are about the effects and impacts of organizational interventions.

- **Articles with referees**

Four articles were included

- One published in Nordisk Psykologi, 2000
 - "Arbeidsgruppens organisationskultur" by Saksvik and Forseth
- One published in Scand J Psychol. 2001
 - "To reduce absenteeism" by Saksvik and Nytrø
- One in press, Work & Stress 2001
- "Appraisal of implementation of occupational stress intervention" by Nytrø et al
- One submitted
- "Process evaluation of individual and organizational interventions" by Saksvik et al

In addition, 7 articles with Saksvik or Nytrø as coauthors have been submitted for publication by the two Umbrellas.

- **Lectures**

- Four courses relating to intervention research, 1998-2001, Department of Psychology, NTNU
- Two lectures in other seminars

1. The quality of publications

Four peer-reviewed articles have been published. The articles deal with understanding of the organizational culture of a work group as a prerequisite for a successful organizational intervention, natural work life intervention to reduce absenteeism (see also Trondheim network), process evaluation in individual and organizational occupational health interventions (submitted) and appraisal of key factors in the implementation of occupational stress interventions. One Norwegian book chapter dealing with change competence as a prerequisite for development is also included.

In addition, three conference papers on intervention evaluation are included.

These publications described at the general level, on the basis of earlier publications, the nature of organizational interventions and their evaluation as well as evaluations of interventions carried out in this research program.

2. The output of published results

The articles attempt to document and evaluate the various phases of intervention processes and describe the possible effects.

Important issues for all interventions according to the authors of the publications are the creation of a social climate for individual and organizational learning. When designing interventions, opportunities should be offered for multilevel participation and negotiation. Awareness of tacit and informal organizational behavior is also important. The definition of roles and responsibilities before and during an intervention period are of central importance (Nytrø 2000). This article partly defines the practical principles of intervention evaluation.

The article in *Nordisk Psykologi* (2000) emphasizes the organizational culture of the work group as a basic factor to be considered when implementing and organizing an intervention. The results from an intervention (discussion forum) in the Norwegian telecommunication company were related to the organizational context.

The third article published in *Scand. J. Psychol.* 2001 describes improving subjective health and reducing absenteeism in a natural work life intervention. The results are also discussed here in the light of a local culture.

The fourth article on individual and organizational interventions (submitted to *Work & Strain*) was a process evaluation of the same interventions. The above-mentioned key factors are included and the role of a middle manager and external consultants are added. Combining qualitative and quantitative methods and undertaking a pilot study as well as the maturity of the organization are regarded as important for a successful intervention. This last manuscript is somewhat diffuse, as it lacks the documentation of the concrete intervention process and methods used in the analysis of qualitative data.

3. Design and methods employed

Quantitative and qualitative methods should be used in combination when organizational interventions are evaluated. Methods used in implementing the intervention were in many cases diffusely defined and the commitment of people was not checked. The central role of the consultant and facilitator in intervention processes is not clearly described or evaluated.

The key factors and process evaluation articles cover the main strengths and weaknesses found in the intervention processes.

The seven individual and organizational interventions were evaluated jointly from the four process viewpoints and their impact. These viewpoints were:

- To establish a social climate of learning from failure
- To provide opportunities for multilevel participation and negotiation in the design of intervention
- Awareness of tacit and informal organizational behaviors that undermine the objective of an intervention
- Defining the roles and responsibilities before and during an intervention

The general notion was that it is impossible to carry out a well-controlled intervention in an organization. Pilot testing is necessary. Participatory strategies in interventions are necessary. External forces may always play a strong role, i.e. unexpected factors.

4. The usability of the results obtained

These publications and results are only part of the contribution of these two researchers, because they have contributed to the evaluations published under the two umbrellas. Therefore, it might be somewhat unjust to evaluate usability on the basis of only these articles.

The evaluation of the intervention showed that good participatory planning of the intervention would have improved its success. I feel that flexible and dynamic

replanning throughout the process is necessary, but the development intervention project is a planned action and all projects require good planning and management.

All these documentations of the interventions seem have a gap between the general and context-specific knowledge about the problems and the implementation of the intervention. An intervention should be based on the organizational context.

Careful planning using existing research data and the tacit knowledge of experienced consultants seemed to have been lacking for some reason when the planning and implementation of these interventions were started or they were not documented initially and during the process by those who were responsible for the process. The pre-during-post measurement are all necessary as well as interviews and observations during the process. Consultants or facilitators should be highly competent to carry out an intervention.

The repetition of problems and faults should be avoided.

As for the ergonomic interventions (Westgaard), a critical review would have been needed in advance also about reported organizational and individual interventions as well as the theoretical bases of changing organizational or individual behavior. Now, only quantitative stress interventions by Erikson & Ursin were reviewed. A more comprehensive review about organizational intervention evaluations was done only at the time of evaluation of the completed intervention and its processes.

The main input from these interventions might be that the competence of the researcher in implementing and evaluating interventions has increased. It is to be hoped that the target organizations can apply next time what they have learned during this process.

The usability of the content of these articles about organizational intervention evaluation by Saksvik, Nytrø and Mikkelsen is very important and valuable. No similar evaluation has been done earlier and it will benefit future interventions. However, this could have been done earlier.

4. SINTEF UNIMED

- Oftedal; VDU-filters

0. Available published materials

- **Article with referees**
 - "Long-term effects on symptoms by reducing electric fields from VDUs" Scand WEH, 1999 by Oftedal, Nyvang & Moen
- **Abstract and conference papers**
 - 4 conference papers from 1995-98, dealing with the same study.

1. Quality of publications

One peer-reviewed article was published in Scand WEH in 1999 and four conference papers were presented, one in a national meeting, two in a Nordic meeting and one in an international meeting.

2. The output of published results

The main output was that the earlier finding of a possible interaction between reducing electric fields from the VDU at the subjects' workstation and skin symptoms could not be reproduced. Skin, eye or nervous system symptoms could not be reduced by reducing VDU electric fields.

3. The design and method used

She has undertaken a double blind controlled intervention on eye and central nervous system from visual display units.

This association was not found any longer when a double blind intervention design was used. The methods and design were better controlled than in the earlier study. Earlier favorable findings could not be reproduced.

4. The usability of the results obtained

The results are useful for experts tracing the sources of symptoms of VDT users and in controlling electric fields from VDUs.

In conclusion, this study with a limited but important goal was carried out adequately, published in a peer-reviewed journal and offering usability for users and those responsible for the occupational safety of VDUs.

However, there should have been more collaboration with the other research groups studying work at VDTs in the research program.

5. General assessment

She concludes that the reduction of VDU electric fields do not affect the occurrence of such symptoms. The study is well performed and the results have to be assessed in conjunction with those observed by Skulberg et al.

5. Department of Medicine, NTNU

0. Available published materials

Three papers (submitted and accepted) document the project in international journals as well as number of chapters and reviews.

The only paper we found assessing the effects of physical activity is the following:
Kurtze N, Svebak S. Related Articles

Oldervoll LM, Ro M, Zwart JA, Svebak S. Related Articles
Comparison of two physical exercise programs for the early intervention of pain in the neck, shoulders and lower back in female hospital staff.
J Rehabil Med. 2001 Jul;33(4):156-61.

1. Quality of publications

The paper is well written and shows that it is possible to organise trials within a working environment.

2. The output of published results

The authors tested the hypothesis that physical activity might affect the occurrence of neck, shoulder and low back pain. They organised a trial assessing the effects of condition and strength training. The effects differed between different categories of hospital employees, and psychological factors such as bitterness and feeling of guilt were also associated with the results. In general however, positive effects on subjective health and physical condition were achieved in an individually aimed programme among hospital employees.

3. The design and method used

—

4. The usability of the results obtained

The study is important as it demonstrates a relatively easy programme, which might be suitable and applicable also in other workplaces.

5. General assessment

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6 Work Research Institute (WRI)

- Testing the effects of WRI's action research model

0. Available published materials

The following three reports were submitted: Psykologiske, organisatoriske og sosiale faktorer i arbeid av betydning for helse. Arbeid og arbeidshelse i pleie og omsorgsektoren, samt ...når de ansatte vil endre sykehjemmets miljø og organisasjon.

1. Quality of publications

Bjørg Aase Sørensen is together with other researchers at the Work Research Institute responsible for three reports on "the state of the art" of research on psychological, organizational and social factors impact on occupational health. One of the discussion papers is focusing upon the use of intervention studies as models of real life situations and the possible use of action research as a health promoter.

2. The output of published results

This discussion paper is important because it embraces some of the basic problems in doing research on amalgated variables such as health. One of the reports addresses changes which took place in a nursing home in Oslo, but the report as such cannot be assessed as a scientific paper. The systematic review of current knowledge about work and occupational health among healthcare workers is very comprehensive and may be used as guide for future projects.

3. The design and method used

Interviews, questionnaires and group work form the database for the analyses of these reports.

4. The usability of the results obtained

The systematic review of current knowledge about work and occupational health among health care workers is very comprehensive and may be used as guide for future projects.

5. General assessment

The reports are all in Norwegian and not easily accessible. The focus is not too clear, but parts do form interesting theoretical considerations which may be of importance in more focused research.

7. Alcatel Norway

- Arne Aarås, ergonomic interventions in VDT work
- Interventions**
- A new lighting system
- A new workplace
- Optometric examination and correction, if needed.

0. Available published materials

- **Articles with referees**

Aarås et al: "Musculoskeletal, visual and psychosocial stress in VDU operators before and after multidisciplinary ergonomic interventions." Applied Ergonomics, 1998.

- Covers the first part of the study, 2 years
- Comments by Prof. Schackel in Applied Ergonomics 2000

Aarås et al: "Musculoskeletal, visual and psychosocial stress in VDU operators before and after multidisciplinary ergonomic interventions. A six year prospective study." Accepted for publication in Applied Ergonomics.

- Covers the second part of the study, from 2 years to 6 years.

- **Conference papers**

- 11 conference papers covering the various interventions reported in the above-mentioned journal articles.

1. The quality of publication

This intervention study of VDT with two- and six-year prospective designs has been reported in a well-qualified way in a good peer-reviewed journal, *Applied Ergonomics*. In addition, the three interventions have been reported in eleven conference papers internationally. Especially, the journal articles are well-structured and report the main results very clearly.

2. The output of published results

Aarås et al reported on the improvement of musculoskeletal, visual and psychosocial stress in VDU operators after multidisciplinary ergonomic interventions. They showed that interventions in VDU operators reduced the occurrence of shoulder pain.

As outcomes, the intervention study and the follow-up use musculoskeletal, visual and psychosocial stress measures, which very well cover the main potential adverse effects of VDU work.

3. The design and methods used

Two intervention groups and one control group were used in three serial interventions, first a new lighting system, then a new type of workstation and, lastly, an optometric examination with correction if needed. Significant reduction in shoulder pain was found after the intervention but not in the forearm and hand.

Later on, these same interventions were carried out in the former control group and similar findings were obtained. The decrease in symptoms also continued in the six-year follow-up partly in two former interventions groups. Organizational and psychosocial factors were controlled for.

The follow-up and prospective design are strengths of this study, as well as the natural workplace context. The outcome measures also cover relevant aspects of health and well-being complaints in VDT work. The conclusions drawn from this study design and methods are relevant.

4. The usability of results obtained

These findings were followed up in a later report covering a six-year period with 3.5 years of intervention. The results were maintained and further improvements were observed. The study is a well-documented and controlled study with clear results, which are directly applicable when constructing work stations.

Professor Schackel from the UK has commented on the results of the first part of the study in *Applied Ergonomics* (2000). He found it an important study, because it is one of the most thorough and properly controlled studies in the field and because it seems to benefit of ergonomic attention to implement the EU and ISO recommendations.

The aforementioned comment is true of the whole study, including the prospective part, in terms of the usability of the results.

8. Department of Psychology, University of Oslo

Knut Fostervoll/Ivar Lie

Content of intervention

- Effects of lowering VDU
- + optical correction

0. Available published materials

The literature list comprises four articles from international proceedings, a final report in Norwegian as well as a book chapter, and two Nordic conference proceedings.

- **Slutrapport (Final report):** En ny modell for skjermarbeidsplassen - en todelt intervensjonsstudie.
- **Conference abstract / papers**
4 conference papers, published in conference proceedings
- **Utkast / Draft** for an English peer-reviewed article, exists but is not included.

1. The quality of publications

Fostervoll and Lie (deceased before the project was finished) were responsible for an intervention study on long term effects of VDU work with downward and standard gaze inclination in ordinary office environments. The doctoral thesis will be finished by spring 2002.

The quality of publications is still on a preliminary level. The technical project report has been finalized, and four conference papers/abstracts have been prepared on the basis of the results. The manuscript for an English peer review article is under preparation. This article should be part of the project investigator's doctoral thesis in psychology.

The delay in reporting is due to the illness and subsequent death of the former project leader.

2. The output of published results

The technical project report and conference presentations describe the main results of the study.

The aim was to implement downward gaze inclination in an ordinary office environment and to investigate whether this factor also reduced complaints in natural settings. The results from the field study showed reduction both in symptom frequency and intensity with a downward gaze inclination compared with standard gaze

inclination. Objective health criteria also showed better results with downward gaze inclination.

The health effects of optical full correction as a standard optometric correction were also studied. No interaction was found between optical correction and downward gaze inclination.

3. The design and methods used

The study involved 150 participants who took part in the different intervention changes. The outcome variables were subjective symptoms as well as measured posture changes.

The methods used were a questionnaire on subjective symptoms, health examination and interview, sight examination and EMG recording during the study.

The study was a two-year experimental field study with baseline measurement and measurement after one year. A sample of 111 women and 39 men were randomly divided into a downward gaze and a standard gaze group. The study lasted one year. The control of the task characteristics used is not known.

So far, reporting on the study has not been scientifically clear, and the results not have not been compared to earlier results or discussed by the investigators. Therefore, the adequacy of methods and design is somewhat difficult to evaluate.

4. The usability of results obtained

The use of downward gaze inclination seems to be advantageous from the health point of view, although its possible limitations are not discussed. The existing reports do not include any critical review of existing knowledge relevant for the study objects and results.

The authors emphasise that the results are modest, but that further research is needed to improve the ergonomic situations for workers at VDUs.

9. Department of General Medicine, University of Oslo

- Kitty Strand

The authors assessed the effect of job adjustment as a means to reduce sickness absence during pregnancy.

Intervention helping pregnant workers to stay at work

0. Available published materials

- **Doctoral thesis:** Pregnancy at work, 2001
Includes four original papers, one of them dealing with the intervention

- Strand et al. "Job adjustment as a means to reduce sickness absence during pregnancy", Scand WEH 1997
- Second article manuscript submitted: "Perceptions of satisfactory job adjustment during pregnancy. The case of nurses and executive officers."
- NBased on 30 interviews of pregnant nurses and executive officers
- **Reports**, three technical reports
 - Gravid i arbejd, En tillstandsrapport, 1995
 - Graviditet og arbejd ved kirurgiske sengeposter. Slutrapport 1998.
 - Graviditet og saksbehandlingssarbeid i staten, 1999.

1. Quality of publications

One doctoral thesis on "Pregnancy and work" was completed. As part of it, a peer-reviewed article published in Scand WEH 1997 describes the intervention aiming at reduction of sickness absence during pregnancy.

In addition, three technical projects reports were published. One of them describes the present situation of pregnant women doing hospital or office work. The other report describes an intervention carried out in a department of surgery. The third report describes an intervention in public administration.

2. The output of published results

The background and state of art at these two workplaces are clearly described as well as the intervention and its consequences. The doctoral thesis brings the intervention into a wider context scientifically and practically.

They conclude based upon a sample of 2713 women that job adjustment did reduce sickness absence, but that this at least partly depended of the size of the workplace. The authors have also published the results of intervention studies aiming at job adjustments in different types of workers, but the results have so far only been published in internal reports.

3. The design and method used

The general national data used was somewhat old and collected for other purposes. The natural intervention was carried out adequately, and the design and methods were relevant. Problems were encountered in the implementation of the intervention in public administration with early planning ("tidlig plan").

4. The usability of the results obtained

The results are presented in such a way that they can also be applied in other organizational contexts. The approach is innovative. Practical advice is included in the doctoral thesis in its last article dealing with "perceptions of satisfactory job adjustment during pregnancy". Nurses and executive officers were studied. On the whole, this was a well-planned and implemented intervention with a high applicability.

10. Department of Medicine, NIOH

Knut Skyberg

"Interventions to improve the office climate,
The "Indoor Climate and Health" program

0. Available published materials

The Indoor Air Research Group at the National institute of occupational health has submitted a list of four original papers, of which one is accepted, five other scientific reports, one unfinished doctoral thesis and a large number of oral abstracts, summaries and chapters and popular science reports. The group consists of a project leader, one senior researcher, a doctoral fellow and a number of associated co-workers.

- **Articles with referees**
 - Skulberg et al: "Effects of skin symptoms from electric field reduction on visual display units." Scand WEH, 2001, accepted for publication
- **Reports and articles without peer reviews**
 - Two reports from Statens arbeidsmiljøinstitutt, on:
 - Antistatic treatment of VDUs
 - Reduction of airborne dust, cleaning
- **Abstracts, conference summaries, international**
 - 11 abstracts
- Abstracts and summaries
 - 6 abstracts or summaries, Nordic + 1 Norwegian
- Popular science articles
 - 5 articles
- Lectures
 - 7 lectures

1. The quality of publications

The results of one of the three indoor climate interventions have been reported in a peer-reviewed article manuscript accepted for publication in Scand WEH 2001. The article describes the effects on skin symptoms of electric field reduction of VDUs .

Two study reports from the intervention are included: one dealing with antistatic treatment of VDUs and the other with comprehensive cleaning in offices.

Study results have been frequently presented in conferences. Totally, 11 international conference abstracts/summaries and six Nordic summaries are attached. These all describe the results of the various interventions.

The investigators have published numerous popularized articles dealing with the interventions and their issues.

2. The output of published results

The results showed that skin reactions were reduced as a result of the antistatic treatment of VDUs when dust concentrations were high in offices.

3. The design and methods used

A controlled randomised double blinded intervention trial was undertaken to assess the effect of reducing static electric fields. The study was based upon a screening of 4566 office workers in 11 companies. The authors conclude that removing static electric fields may reduce the incidence of skin complaints. The study is well organised and a good example of how an epidemiological design may be used in the assessment of occupational health issues.

Double-blind intervention design was applied with the study and control groups. The study was based on a screening survey among 4556 office employees from 11 companies. Of 227 subjects reporting facial skin problems, 120 were randomly selected to the study. Electric fields, dust concentrations, health complaints and psychological behavioral tests were measured before and after the intervention.

4. The usability of results obtained

The group is relatively small, but has maintained a high productivity with regard to popularising their findings and spreading new knowledge to employers, employee organisations and researchers in this field.

The results can be applied by occupational safety and health personnel when monitoring the work environment of VDT workers. The results have been actively disseminated to the scientific community and people at the workplaces.

The reporting of the results is somewhat confusing and overlapping. It is therefore slightly difficult to get a clear overall picture of the study and the results.

Overall evaluation of the program

Focus of interventions, methods and designs

The programme has induced a high level of activity in the research centres.

The intervention studies in the program can be roughly divided into:

- Organizational interventions in organizational practices and health including the Norwegian tradition
- Interventions in VDU work; ergonomic, indoor air, industrial hygiene
- Interventions in musculoskeletal and psychosocial health in the service sector

VDU work interventions are different from organizational or social interventions. In limited interventions such as the VDU one, it is easier to plan controlled study designs and quantitative methods for the measurement of effects than in organizational interventions. The organizational interventions also seemed to have a planned structure and design, but their structure must be flexible for dealing with the turbulent environment of workplaces. Therefore, the documentation of the facts, changes and feelings during the whole process is important in organizational interventions for the interpretation of the results. In the evaluation of organizational interventions, the effects and processes have usually been studied and reported very well. However, more attention should have been paid to the documentation of concrete facts.

The combination of quantitative and qualitative methods has produced new innovative methodology and increased the understanding of natural interventions. However, the qualitative methods and their analysis should have been more systematic and reliable in the same way as the quantitative ones were.

The selection of target groups from both private and public sector workplaces was well-planned.

Competence in planning and implementing interventions

The choice of research topics varies from relatively simple models of exposure and effect to multimode intervention aiming at the complex variable absenteeism. A few of the researchers have addressed the research problem from a more theoretical point of view, and particularly Nytrø and Saksvik will be highlighted here. Those who have embarked on relatively simple interventions such as Svebak, Oftedahl and Skyberg, or selected high-risk groups with defined diseases seem to be able to show effect, whereas the multimode approach may be more questionable. The quality of the research is by and large reasonable, but the research groups should be encouraged to publish for a larger audience. This implies that monographic theses should be avoided. The distribution of research results to the general public is difficult to assess, but the National Institute of Occupational Health and Alcatel, Norway should be mentioned in this context.

It seems that the competence of those implementing the organizational/participatory intervention was not sufficiently high, because some of them seem unorganized without clear goals and responsibilities. Or it might be that the structure and concrete changes during the process are simply not documented well enough. The interviews and observation of the participating people gave qualitative data, but this is not enough for valid conclusions. More attention should be paid to the analysis of the data.

The service sector intervention, three-step strategy and small-group discussion are more like pilot studies.

Democratic dialogue and participation can easily be but slogans; therefore, the goals should be defined more clearly. Careful planning and documentation of the processes are extremely important, because the structure of intervention also greatly influences social processes. Emotional issues at the workplace are hard to deal with, and not much earlier experience is available for intervening in them.

Effect and process evaluation

Intervention against absenteeism: is it a researchable domain?

The study of occupational health is closely related to general epidemiology where the aim is to study causes of diseases (aetiology), and to assess methods and actions aiming at prevention or treatment.

Disease aetiology and epidemiology

The study of disease aetiology implies a systematic assessment of exposure to the potential causal factors and an accurate description of disease endpoints. There are in principle two distinctive etiological issues; one to identify why a group of people differ from another with regard to risk of disease, the other to understand why a certain individual happens to become the next patient. The ascertainment of exposure concerns both assessing the dosage of the exposure as well as duration and pattern. Occupational health studies are mainly studying a limited time window of exposure starting with the beginning of the employment situation and lasting until the end of employment or a limited time afterwards. Health problems however may be considered the results of genetic disposition and the environmental exposure throughout the individual's lifetime, and it may be impossible to distinguish between health problems due to particular occupational hazards, and those induced by factors outside the occupational situation.

Intervention studies on complex endpoints

The main objective of this part of the occupational health programme was to develop strategies and methods to curb absenteeism. In this case absenteeism is considered a proxy for health problems or an epidemiological endpoint. The aim of basic epidemiological research would therefore be to identify the factors, which determine the variation of absenteeism, and use this knowledge as basis for intervention programmes. The major problem with absenteeism however is that it contains a number of disease entities with different aetiology. This implies that reducing absenteeism has to follow two strategic lines; one to identify why a group of people differ from another with regard to risk of disease, the other to develop methods for increasing the threshold for being absent while ill. The latter is obviously related to coping and the subjective experience of health, two issues that have been central in the research programme. So far none of the strategies used in the studies have managed to show decreased

absenteeism with the exception of intervention with physical activity among hospital employees and high-risk subjects with a defined disorder. This may, as some of the researchers claim, be due to lack of power of the studies, but one should consider whether absenteeism is a too complex endpoint. It may be impossible to demonstrate the effect of individual intervention efforts on absenteeism, even if subjective health and coping have improved. Too many other factors may determine the variation. It is striking that studies aiming at improving defined exposure variables are more likely to have positive results, see e.g. physical activity in hospital workers and ergonomic situations for VDU operators. The multiple approaches aiming at the total work population seems unlikely to achieve such results.

The work group of Mikkelsen, Saksvik, Nytrø has done valuable work in evaluating the organizational intervention and processes. This brings added value to the whole program. One could ask whether this field of the literature could have been reviewed earlier before the implementation of interventions.

One can say now that some of the interventions are fruitful cases for the evaluation in showing how they should have been carried out and what were the drawbacks and successes. Very little can be said about small group discussion, three-step strategy (Trondheim) and stress management training, physical exercise and integrated health program (Bergen), because those have not been completely reported or evaluated.

The lack of effect from multimodal intervention may have as its parallel in the community intervention studies, which were started during the 1970s. It has been exceedingly difficult to see any effects of these interventions, an observation that led a Swedish agency to conclude that community interventions were waste of time and money. The Research Council should assess this question in a broader context as it has profound consequences on the future support of intervention studies.

Innovative elements

One of the important contributions made by the program lies in conceptualizing and modelling of evaluation processes, especially for organizational interventions.

The new qualitative approach to the nature of service work increases and changes our understanding of the nature of work. Both the emotional load and physical nature of service work are new important issues.

Critical literature reviews

The study program has had the advantage that the interventions have often been based on reviews of work-related factors affecting health and reviews about intervening in health matters. This is true especially for musculoskeletal/ergonomic interventions and job stress interventions.

A critical literature review of the process evaluation of organizational interventions would also have been fruitful and increased the understanding of processes before the implementation of interventions.

Collaboration within the program

It seems that the program structure has succeeded in promoting collaboration among research groups, e.g. Trondheim and Bergen network. The evaluation projects contributed by SINTEF/IFIM have given additional value with favourable effects to the evaluation of organizational interventions, also internationally.

The groups of intervention in VDU work should have had more collaboration with each other in terms of the designs, measurement of exposures, mediators/moderators and outcomes.

It is worthwhile to give financial support to those research groups that have invested in methods, intervention and evaluation development and have been able to report on their work in good referee-based journals. Workplace interventions are long-term projects, and the evaluation phase makes them even longer. Therefore, investing in only one single project is not feasible. A more sustained plan supporting promising work and health intervention would benefit workplaces in their practical work and Norwegian research in this field internationally.

Vedlegg

Brev til deltagerne

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Our ref.

2001/00584

Your ref.**Oslo,**

01.06.2001

Evaluation of research on health effects of interventions at the workplace – Invitation to participate

The Research Council of Norway has supported research on health effects of interventions at the workplace with approximately NOK 16 mill from 1995-99. This effort was organized by the *Health at Work* program.

Work and Health, a new program started in 2000, aims at continuing and consolidating this research area. However, before allocating more resources to this field, the program committee needs to take a position on the following:

- (1) whether the quality of the research performed so far merits further investment in research on health effects of interventions at the workplace
- (2) whether certain methods or approaches have proven particularly fruitful.

Therefore, the program committee has found it necessary to evaluate the quality and outcome of research which has been performed in Norway on health effects of interventions at the workplace.

The object of the evaluation is to provide a basis for decisions on future research on interventions at the workplace.

As an aid to the decision of the program committee, an evaluation committee will be appointed with the mandate to evaluate the following aspects of this research:

1. The quality of the publications.
2. The output of published results.
3. The design and methods employed. Are the methods adequate to draw conclusions about effects of interventions?
4. The usability of the results obtained. Interventions are often expensive, and being able to document effects or the lack of effects, is useful to decision makers who consider whether to undertake interventions (Analyses of cost/benefit-ratio of the findings are beyond the scope of this evaluation).

The evaluation will primarily be based on published material from the projects. The evaluation committee should base its evaluation on the following material:

1. Articles presenting original results, in international journals with peer review.
2. Reports and articles presenting original results in journals without peer review.
3. Doctoral theses.
4. Abstracts and summaries for conferences.
5. Review articles and book chapters which pertain to interventions at the work place.
6. Popular science articles discussing interventions at the workplace.
7. A list of 1-6.
8. A list of lectures about effects of interventions.
9. A list of present research projects and follow-up studies in this area, containing the following information: Project title, grant source, type of workplace, type of intervention, number of subjects included, outcome parameters studied.

The evaluation should be based exclusively on publications that (1) present of data from interventions at the workplace, and are (2) supported by the program *Health at Work*. One project from the program *Indoor Climate and Health* will also be invited to participate. If the evaluators find it necessary, a site visit may be arranged.

Institutions that received grants from the program *Health and Work* are invited to participate in the evaluation through the administration of the umbrella that organized the research-effort.

It is important that material is not submitted which does not pertain to interventions or that are not relevant for this evaluation.

Not mandatory: If the research institutions want to, they may include a project report that explains or discusses their project.

Since this evaluation is one of the bases for granting money for 2002 – 2004, it is important that the work start as soon as possible. Therefore, the deadline for submitting the material is March 8th 2001.

Two sets of the material should be sent c/o adviser Ivar Bermann, The Medicine and Health Division, The Research Council of Norway, Bos 2700, St. Hanshaugen, 0131 Oslo.

Yours sincerely,
The Research Council of Norway

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