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Success or failure? Interpreting and understanding the impact of interventions in four similar worksites

KARINA NIELSEN[1], HANNE FREDSLUND[2], KARL B. CHRISTENSEN[1], & KAREN ALBERTSEN[1]

[1]*National Institute of Occupational Health, Copenhagen, Denmark; and* [2]*Municipality of Græsted-Gilleleje, Denmark*

Abstract
While many studies of interventions have focused on their content and immediate effects, less research has focused on the processes that may explain these effects. The purpose of this study was to show how process evaluation can be used to interpret the results of an intervention study in four industrial canteens in Denmark. Two canteens acted as intervention groups and two as comparison groups. Effects were measured by surveys before and after interventions, and observations and interviews were conducted to provide an in-depth understanding of processes. Analyses were conducted based on the responses from 118 employees. Results showed, contrary to expectations, improvements in working conditions and well-being in one intervention group and in one comparison group, whereas no improvements were found in the two remaining groups. Data from the process evaluation enabled a meaningful interpretation of these results, raising the possibility of programme failure rather than theory failure, and thereby constituting an example of how process evaluation can shed light over the factors that may influence outcomes in controlled intervention studies.

Keywords: *Intervention, process evaluation, participatory action research, well-being, work-related stress*

Introduction

The purpose of this paper is to show the importance of using process evaluation when conducting intervention research in organizational settings. This paper presents the effect evaluation of an intervention study in four industrial canteens in Denmark and how process evaluation enabled an in-depth interpretation of the results.

The classical and still standard methodological paradigm for intervention research is the randomized controlled trial (RCT) and its various quasi-experimental alternatives (Randall, 2002; Randall, Griffiths, & Cox, 2005). However, it is increasingly recognized that using this design does not guarantee a successful or meaningful outcome (Reynolds, 1997). Although the randomized controlled trial and its variations potentially offer the opportunity to control a number of factors such as selection bias, confounding variables, and information bias (Cook, 1994), there are important factors that neither randomized controlled trials nor the various quasi-experiments can control (Victora, Habicht, & Bryce,

Correspondence: Dr. Karina Nielsen, Lerso Parkallé 105, DK-2100 Copenhagen, Denmark. Tel: +45 39 165 293. E-mail: kmn@ami.dk

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2004). It is increasingly understood that organizational interventions take place in complex environments that are challenging or nearly impossible to control; some authors even claim that this control may not be desirable (they emphasize the importance of "maturation," i.e., that organizations develop and become more knowledgeable with regard to issues of occupational health (Cox, Griffiths, Barlow, Randall, Thomson, & Rial-González, 2000; Cox, Randall, & Griffiths, 2002)). Many studies have focused on the content of interventions and their immediate effects on work stressors and employee health and well-being, but less research has focused on the processes that may help interpret these effects (Hurrell & Murphy, 1996). Due to the increasing awareness of the limitations of the various research designs, in recent years there has been a growing interest in the design of evaluation of intervention projects in order to gain more valuable insight into intervention projects (Harachi, Abbott, Catalan, Haggerty, & Fleming, 1999; Hugentobler, Israel, & Schurman, 1992; Landsbergis & Vivona-Vaughan, 1995). Job redesign and organizational change require both an accurate assessment of job stressors and knowledge of the dynamics and processes, so that potentially undesirable outcomes can be better understood and subsequently minimized (Hurrell & Murphy, 1996). In this paper, evaluation is defined as "individual, collective or management perceptions and actions in implementing any intervention and their influence on the overall result of the intervention" (Nytrø, Saksvik, Mikkelsen, Bohle, & Quinlan, 2000, p. 214). Important processes occur that may influence the quality of the evaluation design, the interpretability of results and the utility of the study. Examples are: (a) poor programme implementation, (b) interference with the control group, (c) poor retention of participants in programme and control conditions, (d) receipt of incomplete or inconsistent programmes, and finally, (e) attrition or incomplete follow-up measurement (Lipsey & Cordray, 2000). In support of this claim, results from one study suggested that organizational and contextual factors predicted work content stressors and therefore these should be considered when evaluating interventions aimed at changing individual or group-level factors (Hemingway & Smith, 1999). Despite the awareness of the pertinent need to understand implementation strategies and processes, there is still relatively little published research that provides us with information on how to evaluate such strategies and processes (Reynolds & Briner, 1994; Saksvik, Nytrø, Dahl-Jørgensen, & Mikkelsen, 2002). This may be due to a reluctance of organizations, researchers, and publishers to publish unsuccessful research projects (Nytrø et al., 2000). However, in a recently published process evaluation of an intervention project a range of issues were identified which helped to understand the somewhat disappointing results of the project and thus offered the opportunity for learning from failure (Saksvik et al., 2002).

This paper presents the results of an intervention study in four industrial canteens in Denmark and offers an example of how process evaluation can be used to interpret the impact of interventions. First, the survey methods and results are briefly presented for both the effect and the process evaluation. Second, these results are discussed in terms of how process evaluation can be used to understand the contextual processes influencing the impact of interventions.

Method

The study presented here is part of a larger project, Women at Work, investigating the working conditions and health and well-being in a number of female-dominated workplaces in Denmark. The main objectives of the overall project were two-fold: (1) to illuminate ways in which working conditions in female-dominated professions influence employee health

and well-being, absenteeism, and exclusion from the labour market and (2) to increase knowledge about the opportunities of addressing such problems through organizational-level interventions. The design of the project was such that researchers from the National Institute of Occupational Health (NIOH) conducted the evaluation of the project using a quasi-experimental pre-post design with comparison groups while occupational health practitioners and organizations were responsible for the planning and implementation of interventions and had project responsibility at intervention workplaces. The case study reported in this paper was initiated by an occupational health service wanting to promote health in an occupation that is often overlooked. A recent Danish report had concluded that large industrial canteens experience severe problems with regard to the health and well-being of employees (Christiansen & El-Salanti, 2000). Furthermore, it was the experience of the occupational service (providing services to the municipality under study) that current initiatives had little effect. Therefore it was decided to invite four large industrial canteens to participate in a project with the overall aim of health promotion and empowerment.

Research context

The case study presented here took part in the canteens in four hospitals/elderly care homes in Copenhagen. All canteens were run by the Municipality of Copenhagen and offered similar services to hospitals and elderly care homes. Two canteens acted as intervention groups (A, B) while the remaining two canteens acted as comparison groups (C, D). Both qualitative and quantitative data were collected.

Interventions

The aim of the project, according to the occupational health service, was health promotion and empowerment by means of integrating issues concerning work environment, lifestyle, gender issues, and the social responsibility of the workplace. The focus was primarily to change participants' appraisal of themselves and their working life. The aim was to introduce *renewing* activities, i.e., change the attitudes of participants so that they in the future would feel confident in undertaking health-promoting initiatives and take ownership of not only the worksite's shared competencies but also the employee's individual competencies. Therefore a participatory approach was chosen whereby ad hoc working groups were established to make decision on initiatives. Similar strategies have been used by Mikkelsen, Saksvik, and Landsbergis (2000).

The overall strategy for the project was as follows:

1. Universal solutions to problems relating to work stress are unlikely to be successful because they often require solutions targeted to problems that are more or less unique to the organization (Hurrell & Murphy, 1996). To identify issues specific to the groups, a thorough risk assessment was conducted by NIOH that also served as a baseline. Also, the annual risk assessment conducted by the organisation was analyzed in detail. Finally, the consultants conducted individual health profiles with all members of staff in the interventions groups. This profile consisted of a screening of the individual's health and well-being, physical condition, and issues at work. The issues identified were found to be similar to those often reported by this occupational group (Christiansen & El-Salanti, 2000). Based on the results of the three screenings, the consultants made a "shopping list" of interventions within the main themes: weight loss (as measured by Body Mass Index, BMI), smoking cessation, exercise,

teambuilding, work-related workshops, communication, IT training, the development of self-managing work teams, and physiotherapy.

2. A participative approach (Cornwall & Jewkes, 1995; Cotton, 1993; Goldenhar, LaMontagne, Katz, Heaney, & Landsbergis, 2001) was employed, and in collaboration with staff a number of ad hoc working groups were established focusing on specific themes, e.g., physical health. Canteens A and B each established two ad hoc working groups. These groups comprised management and employee representatives from the worksite. Each group had 6–8 participants, and they met on a regular basis. The themes of interventions in the two canteens remained the same; however, how the themes were translated into interventions differed across the groups. For example, canteen A chose to address the issue of exercise by organizing participation in mini-marathons and cycling to work, whereas canteen B chose to establish an exercise session in the morning. The activities were provided by the same occupational health service. In Table 1, an overview of activities is offered.

Table 1. Overview of the planned activities for the interventions groups A and B.

Theme	***Canteen A***	Status	***Canteen B***	Status
Individual health	Weight loss course	Abandoned	Weight loss course (7 participants★) ongoing	√
	Weekly exercise (19 participants)	Abandoned	Introduction of healthy breakfast	√
	Morning exercise (19 participants)	Abandoned	Workshop on health	
	Smoking cessation course (6 participants★)	√	Smoking cessation course (6 participants★)	√
	Massage (21 participants)	√	Massage (15 participants)	√
	Permanent introduction of health profiles to new staff	–	Permanent introduction of health profiles to new staff	√
	Exercise: Swimming (6 participants★)	√	Exercise: 2 mini-marathons (13 and 18 participants respectively★)	√
Team building activities	24-hour "Survival course"	√	Bowling, theatre, and museum visits (15)	√
Psychosocial activities	First aid training course	–	Workshop on the development of shared values (19 participants)	√
	Further empowerment of self-managing work teams	–	Implementation of pilot self-managing work group and wider implementation	√
			Review of effectiveness of personnel meetings	√
			Ongoing risk management	√
			Survey of user satisfaction	√
	IT training	–	IT training (19 participants★)	√
	Information about group supervision	–		
Physical environment			Noise regulation	√
	Review of ergonomics	–	Review of ergonomics	√
	Training on heavy lifting	–		–

Note: This table is based on the report by the occupational health consultants that also included a description of activities and their uptake by participating canteens. Status is as reported at the end of the study, either from items included in the questionnaire at time 2 (the uptake may be larger as only those who completed the questionnaire are included here) or from the managers' report of uptake (marked with ★). (Blædel, Hansen, Klausen, Kristensen, & Maarbjerg, 2003).
Status: √ = activity implemented; – = activity not implemented.

3. A collaboration strategy was selected by which representatives from the intervention canteens were encouraged to have regular meetings with each other, to ensure learning across units.

Effect evaluation

A questionnaire survey was designed and distributed to all employees (comparison and intervention groups) at the start of the study and at 20 months following. In all, 118 employees (response rate 85%) returned the questionnaire at pre-test while 103 (response rate 74%) employees completed the questionnaire at time 2. An overview of the number of participants in each canteen is given later. The questionnaire included demographic measures, measures of work organization, and health outcome measures drawn from the Copenhagen Psychosocial Questionnaire (COPSOQ) (Kristensen, 2001; Kristensen, Borg, & Hannerz, 2002). Based on the content of interventions, working conditions, and health and well-being outcomes were selected for analysis (outcome here includes both changes in working conditions and employee health and well-being indicators, as they are both to be possible outcomes of interventions). It was expected that social support would increase based on team-building activities and the implementation of self-managing work teams (Nielsen, 2003; van Mierlo, 2003). In addition, working in self-managing work teams has also been found to bring about opportunities for personal development, high levels of vitality and job satisfaction, and a decrease in stress symptoms (Melin, Lundberg, Söderlund, & Granqvist, 1999; Nielsen, 2003; van Mierlo, 2003). Physical health interventions such as healthy eating, exercise, and weight loss were hypothesized to bring about increased vitality and a lower BMI.

Preliminary analyses indicated that the four canteens differed only in terms of baseline levels and education: canteen A had 10% unskilled workers, canteen B had 27% unskilled workers, canteen C had 32% unskilled workers, and canteen D had 17% unskilled workers. The remainder of staff were skilled workers. Therefore education and baseline levels were controlled for in the analyses. Education was measured by asking employees to indicate their degree of education: No education, practical education, short formal education (less than 3 years), bachelor degree, or MSc or above.

Blinding was not possible; canteens C and D were aware that they were comparison groups. The selection of intervention and comparison groups was such that the occupational health consultants had invited the intervention groups to become part of the project, but they were then asked by the researchers also to include comparison groups. These were then selected before the project began.

Measures

The following measures were used in the analyses:

Social support was measured by a 4-item scale from the COPSOQ with the response categories: always/often/some times/rarely/never or hardly ever. An example of an item is: "How often do you get help and support from your colleagues?" Cronbach's α at pre-test was .73 and .71 at post-test.

Job satisfaction was measured by a 5-item scale investigating aspects of the individual's work situation. This was also taken from the COPSOQ. An example of an item is: "Regarding your work in general how satisfied are you with your work prospects?" The response categories were: very satisfied/satisfied/dissatisfied/very dissatisfied/not relevant.

"Not relevant" was excluded in the development of the scale. Cronbach's α at pre-test was .79 and at post-test .84.

Opportunities for personal development were measured by a 4-item scale from the COPSOQ. An example of an item is: "Do you have the opportunity for learning new things through your work?" The response categories were "to a large extent/to some extent/somewhat/not very much/to a very small extent." Cronbach's α at pre-test was .81 and post-test .75.

Symptoms of stress were measured by a 4-item scale measuring cognitive symptoms (Setterlind & Larsson, 1995). An example of an item is: "How much of the time during the past four weeks have you had problems concentrating?" The response categories were: always/often/sometimes/rarely/never or hardly ever. Cronbach's α at time 1 was .88 and at time 2 was .85.

Vitality was also measured with 4 items from the SF36 health questionnaire (Setterlind & Larsson, 1995). An example of an item is: "How much of the time during the past four weeks did you have a lot of energy?" The response categories were: all the time/most of the time/a lot of the time/some of the time/a small part of the time/never. Cronbach's α at time 1 was .90 and at time 2 was .91. All scales were transformed to range between 0 and 100.

Interventions were a mix of individual level and group level interventions; therefore two different kinds of analyses were used to assess the effects of activities. At the group level measures of opportunities for personal development, job satisfaction, and social support were analysed. When implementing activities that address issues at the workplace it is assumed that all employees, both newcomers and existing employees, would contribute to an overall level in the group. Therefore it was meaningful to include not only employees who participated in the study at both times but also people who only responded at one time. These factors were analysed using linear mixed models. This method enables us to match respondents who responded at both times to detect within-person changes, and also to compare overall levels for the workplace for those who only responded once. However, BMI, cognitive stress reactions, and vitality were only meaningfully measured by means of changes in individuals who participated in the study at both times. To analyse these factors, linear regression was used.

Process evaluation

One problem with process evaluation is the lack of theoretical basis on which to build a focus of the process evaluation (Saksvik et al., 2002). In order to address this issue a process evaluation tool was developed based on organizational theory. This tool uses the perspectives of four organizational theories: technical rational theory (focus on formal structures and the achievement of specific goals), humanistic theory (focus on informal structures and the different perspectives of various agents), political theory (focus on power structures), and loosely coupled theory (focus on the construction of meaning) (Fredslund & Strandgaard, 2005). This allows researchers to analyse data from different perspectives, providing an in-depth understanding of (1) the activities of the intervention programme, (2) the project organization and the involvement of employees, (3) identification of "ownership" of the intervention project and activities, and (4) the influence of other organizational changes and processes on the intervention project.

Between pre- and post-test, a process evaluation was conducted to provide an in-depth understanding of the processes. At workplaces A and B (intervention groups) this involved:

1. interim and final reports from the occupational health practitioners including the workplaces' own account of the project. Occupational health practitioners produced

Table 2. Response rates and participant numbers.

	Intervention groups				Comparison groups			
	Canteen A		Canteen B		Canteen C		Canteen D	
	%	N	%	N	%	N	%	N
Pre-test	96%	45/47	90%	26/29	69%	22/32	69%	25/36
Post-test	71%	30/42	90%	26/29	68%	19/28	67%	28/42
Completed the questionnaire at both time 1 and time 2		27		17		11		16

interim and final reports for the study describing the process and the results from their point of view, and their conclusions were included in the process evaluation.

2. Continuous workplace observations during the implementation period. Researchers would participate in work activities during one working day and have informal chats about work with staff throughout this day. Researchers also participated in steering group meetings.
3. Focus and individual interviews with staff, managers, and key stakeholders at the end of the implementation. At canteen A, we interviewed the manager, a middle manager, and eight employees (focus group). At canteen B, we interviewed the manager, a middle manager, and six employees (focus group). In addition, we interviewed the two occupational health practitioners responsible for the project.

For all, a semi-structured interview guide was used consisting of five themes. The themes explored were: (1) description of the intervention and what happened at the organization during the time of the project; (2) power structures and interests of key stakeholders; (3) evaluation of the interventions and implementation processes; (4) the role of external players; and (5) gender/family and work.

Interviews lasted between an hour and an hour and a half. Furthermore, at post-test, the questionnaire (including all four workplaces) contained specific process evaluation questions. As no formal interventions had been implemented in the comparison groups (C and D), the focus was somewhat different. In organization C, one manager and one employee were interviewed, and one manager was interviewed in organization D. This enabled the mapping of health promoting activities taking place between time 1 and time 2 and the influence of organizational changes and processes on observed changes within the organizations (themes 1 and 4 in the process evaluation). The main focus of the process evaluation in comparison groups were on the formal structural changes that took place during the intervention period, as described in written material and during the interviews. To validate our data about the comparison groups we gathered supplementary information from one of the occupational health practitioners working with the interventions at workplaces A and B, with knowledge of the comparison groups.

Results

Effect evaluation

In this section the results of the quantitative analyses are presented. First, linear mixed models (SAS 8) were used to explore the changes in workplace measures. The results can be seen in Table 3. First, means and standard deviations are described. Changes reflect mean

Table 3. Workplace level: Means, *SD*, and mean change score levels controlled for education and baseline level.

Variable	Workplace	Baseline mean (*SD*)	Follow-up mean (*SD*)	Change	95% CI
Opportunities for development	A (intervention)	66.6 (16.7)	63.3 (15.3)	−4.3	(−9.3; 0.8)
	B (intervention)	53.4 (23.1)	66.5 (14.7)	7.0*	(0.9; 13.2)
	C (comparison)	75.3 (15.2)	59.9 (20.1)	−9.9**	(−17.2; −2.69)
	D (comparison)	55.6 (20.5)	65.6 (16.5)	4.1	(−2.1; 10.4)
Job satisfaction	A (intervention)	62.3 (12.4)	59.6 (16.2)	−3.5	(−9.9; 3.0)
	B (intervention)	48.6 (19.0)	57.7 (22.1)	14.1***	(6.1; 22.1)
	C (comparison)	54.9 (16.3)	58.3 (21.6)	1.5	(−7.5; 10.6)
	D (comparison)	52.8 (21.8)	65.3 (15.8)	12.0**	(4.1; 19.9)
Social support	A (intervention)	59.8 (17.9)	59.6 (15.8)	0.2	(−6.9; 7.2)
	B (intervention)	49.2 (17.5)	57.7 (22.1)	7.0	(−1.3; 15.4)
	C (comparison)	60.2 (20.7)	58.3 (21.6)	−3.1	(−13.0; 6.7)
	D (comparison)	55.6 (13.7)	65.3 (15.8)	7.4	(−1.0; 15.8)

* $p < .05$; ** $p < .01$; *** $p < .001$

changes on a scale from 0–100. Workplaces B and D experienced an increase in opportunities for development, whereas workplaces A and C reported a decrease; however, the results were only significant for workplaces B and C. Canteens B and D experienced significant increases in job satisfaction whereas only minor changes were found in canteens A and C. A similar trend was found with regards to social support, it increased in canteens B and D while only negligible changes were observed in canteens A and C.

Individual-level changes can be seen in Table 4. Changes reflect changes on a scale from 0–100 for all scales except for BMI. Here changes reflect the change in BMI. As can be seen in Table 4, no pattern for BMI was found. Canteens A and C reported a large increase in cognitive stress reactions, significant at the .001 or .01 levels, whereas changes in canteens B and D were minor, significant at the .05 level. Workplaces A, B, and D experienced significant increases in vitality whereas the increase was smaller and non-significant at workplace C. Only respondents who completed the questionnaire at both times were included, and therefore the sample size is somewhat smaller. This is reflected in the high confidence intervals.

Table 4. Individual level: Means, *SD*, and mean change score level controlled for education and baseline level.

Variable	Workplace	Mean (*SD*)	Mean (*SD*)	Change	95% CI
BMI	A (intervention)	25.6 (3.9)	25.5 (3.7)	0.07	(−2.2; 3.7)
	B (intervention)	26.4 (4.4)	25.7 (4.4)	0.01	(−3.0; 3.2)
	C (comparison)	27.0 (4.8)	28.2 (3.6)	2.1	(−1.1; 5.3)
	D (comparison)	23.9 (3.6)	24.4 (3.6)	1.3	(−1.5; 4.1)
Cognitive stress reactions	A (intervention)	22.8 (18.8)	31.4 (22.7)	20.6**	(11.9; 29.2)
	B (intervention)	26.7 (18.7)	26.6 (20.8)	14.5*	(3.6; 25.5)
	C (comparison)	19.5 (22.1)	27.5 (16.9)	19.7**	(7.5; 31.8)
	D (comparison)	29.3 (19.9)	25.9 (17.3)	11.6*	(0.6; 22.6)
Vitality	A (intervention)	65.6 (18.3)	58.1 (23.5)	19.9*	(0.8; 39.0)
	B (intervention)	51.2 (22.5)	53.2 (29.2)	22.5*	(4.8; 39.0)
	C (comparison)	52.7 (18.8)	48.2 (22.7)	16.2	(−3.6; 36.0)
	D (comparison)	51.3 (20.5)	58.8 (16.2)	29.0**	(12.1; 46.0)

* $p < .05$; ** $p < .01$

Summary of results

As can be seen in Tables 2 and 3, the quantitative results revealed an unexpected pattern: it would have been expected that intervention workplaces A and B would experience positive changes. However, this was most apparent for organization B. Also unexpected was the finding that organization D, one of the comparison workplaces, experienced similar changes to those observed in organization B. The data collected during process evaluation was used to understand these findings.

Process evaluation: Intervention groups

The two intervention groups were similar and so was the content of the interventions at the two workplaces. In the process evaluation we found several phenomena that could contribute to understanding the unexpected results of the effect evaluation. Overall interpretations of the process evaluation of the two intervention groups were as follows:

1. The project organization did not work as intended. There were established several ad hoc working groups with different tasks but it became clear during the interviews that there was some confusion as to how roles and responsibilities should be allocated.
2. The desired cooperation between the two canteens with regards to interventions, including the exchange of experiences, was never established.
3. The overall external project management for both of the intervention groups underwent many changes, including the replacement of the leading project manager.
4. In general, a large proportion of the employees participated in the activities of the intervention and the overall evaluation was positive.

However, there were also several differences between the two contexts in which the interventions were implemented, of which we only mention the most important emerging from the process evaluation. At workplace A, the process evaluation highlighted several factors that affected the processes. First, the workplace had recently been through several organizational changes, e.g., fusions with other canteens, and employees reported a high level of "change fatigue." However, as many changes had been made, it was also reported that the organizational structure was highly developed and thus the scope for further development was limited. Second, there existed some fundamental conflicts in the group of employees at canteen A that took up a lot of energy. The interventions addressed these problems to some extent, but the employees did not feel that these problems were solved through the interventions. Third, the implementation of the intervention was affected by the fact that the overall administration introduced a non-smoking policy at the whole workplace at the time the interventions were implemented. That caused a negative atmosphere and disagreements among the employees during the intervention phase.

At workplace B the implementation of the interventions started at the same time as a new manager was employed. This seemed to be crucial for the implementation processes. The new manager had a radical different approach to leadership from the former, including a wish to decentralize the organization. The process evaluation indicated that the new manager would have implemented similar changes, e.g., self-managing work teams, regardless of the project. Thus, the intervention received maximum support from the immediate manager and the two types of change complemented each other. The employees found that the new manager had a great impact on the implementation of the interventions, but they had difficulties in distinguishing whether positive effects were caused by the interventions or by the new manager.

To illustrate the difference in commitment between the two intervention groups (see Table 1), an overview of implemented activities shows that at workplace A, three out of 14 activities planned had been abandoned, and another seven not been implemented at the time of evaluation whereas, in workplace B, 15 out of 16 activities had been implemented (Blædel, Hansen, Klausen, Kristensen, & Maarbjerg, 2003). At both workplaces, employees felt that the intervention projects resulted in increased pressure of work, because temporary staff were only provided to cover some of the time spent on project activities. But at workplace B, the employees found that the increased pressure of work and other new demands caused by the interventions were partly balanced by increased influence and opportunity to engage in their work.

Finally, the process evaluation highlighted the fact that two occupational health practitioners had each been responsible for their own intervention group and that they had different approaches to the interventions. In intervention group B, the focus of the consultant was on the individual, whereas the consultant in intervention group A had focused on worksite issues as well. Further, the occupational health practitioner in canteen B had been more directive, whereas the occupational health practitioner in intervention group A used a more process-oriented, participatory implementation strategy. The different strategies had different impacts on the process.

Process evaluation: Comparison groups

At workplace C, efforts were made to improve the work environment and working conditions:

1. A new training consultant was employed who focused more on developing the competencies of especially the unskilled employees in order to maintain them in the job.
2. Several health promotion initiatives were implemented during the intervention period (different physical and social activities). This was part of a vision of becoming "employer of choice."
3. A course on formulating the values of the employees and the workplace was carried out in order to prepare the employees and managers on working in self-managing work teams.

Workplace C was influenced by major structural changes and financial cuts at the beginning of the study period. First of all, it was decided to cut down on production and the workplace was left with uncertainty about how many jobs that would be cut. Five employees decided to leave the workplace due to this uncertainty. Second, two managers left the workplace in the beginning of the period. It was planned to replace these with one in order to create a less hierarchal structure with self-managing work teams but it was difficult to fill the vacancy, allegedly because of the job insecurity created by the cuts.

At workplace D some major structural changes happened during the intervention period but the canteen was not affected by parallel cuts as was the case at workplace C:

1. A new manager was employed in the beginning of the intervention period. The new manager implemented several organizational changes, including self-managing work teams. A team-building course for employees and other activities supported the changes. Some of the changes and activities were planned in cooperation with the occupational health service working with the intervention groups. It was reported by one of the occupational health practitioners that canteen D resented being "reduced"

to be a comparison group and therefore ordered similar services to those delivered to the intervention groups from the occupational health service.
2. The joint council at the workplace had been out of action for 1 year but was reactivated during the intervention period and started implementing new workplace policies.
3. During the intervention period the production in the kitchen was increased but was accompanied an increase in the staff.

At workplace D, no employees left their job over a period of 1 year. That was considered to be unusual for this sector.

Discussion

Results were contrary to expectations, i.e., that positive changes would be detected in the intervention groups above those identified in the comparison groups. Instead it appeared that, except for BMI, a consistent trend was found showing that one intervention group and one comparison group improved whereas the remaining two canteens reported negligible changes. Similar results have been found in a study in a public health agency where one intervention group experienced negative or negligible results while another intervention group experienced mixed results (Landsbergis & Vivona-Vaughan, 1995). The importance of conducting thorough process evaluation in order to understand unexpected results is emphasized in this study. The paper presents several important issues which should be addressed when conducting intervention research within occupational health psychology.

Ceiling effects

Group A experienced a slight decrease in opportunities for development whereas intervention group B experienced an increase. This may be due to the fact that group A had implemented self-managing work teams a couple of years before and continuously worked with organizational development. Self-managing work teams were a new concept in intervention group B. This is an interesting dilemma. Eklöf, Ingelgård, and Hagberg (2004) have argued that in order to implement successful interventions, organizations should have a certain level of "healthiness or readiness," i.e., workplaces with low demands, high levels of support, and low stress levels may have more time and resources to involve workers and managers in participation and integration of interventions. It is a paradox that these factors need, to some degree, to be present before you can improve conditions. On the other hand, as was the case in this study, highly developed organizations may have a limited scope for development. This indicates that not only is there a minimum level whereby organizations benefit from interventions, there may also be a ceiling effect; there may be a level at which organizations may benefit less from interventions. This concept has yet to be explored but it may be useful to screen organizations for maturity before starting interventions to get a realistic picture of what changes may be expected.

The importance of contextual factors

It is clear from this study that although effect evaluation revealed unexpected findings, learning may be extracted from the process evaluation to understand why unexpected results happen and how we can reduce or avoid these in the future. Part of the explanation as to why the two intervention groups differed could be other initiatives and structural changes going on in intervention groups A and B. Workplace A went through a turbulent

period with other initiatives possibly limiting the positive effects of the interventions. The organizational changes in workplace B, however, were found to support the interventions. This problem has previously been found in other studies (Mikkelsen & Saksvik, 1998; Saksvik et al., 2002). The latter even concluded that the problems they met in their study were not so much dependent on the design and content of interventions as on the structural changes and complexity of the modern-day working environment.

Within-group variability

An intervention can be implemented in a number of different ways, even within the same organization, against the backdrop of a variety of different contexts (Griffiths, Randall, Santos, & Cox, 2003; Randall, 2002; Randall et al., 2005). This was also found in this study, where the occupational health practitioners' report indicated differences in the context and implementation processes in the two workplaces. This, unsurprisingly, led to very different results in outcome. In order to implement successful interventions, contextual and implementation factors should be considered and accounted for. With-in group variability may reside in factors such as being informed about intervention projects, participation in activities, readiness for change, and shaping activities through a participatory approach. Thus the process of implementation may modify the intended exposure patterns; these should be taken into account in the evaluation of outcomes.

Contamination effects

A contamination effect may help explain the differences in the effect evaluation between comparison groups (Cook, 1994; Cook & Campbell, 1979). As blinding was not possible "compensatory rivalry" was observed: canteen D resented being the comparison group and thus worked harder to become better. Another possible contamination effect is that of "treatment diffusion." Canteen D copied some of the same interventions implemented in the project canteens; they even bought services similar to those delivered to the intervention groups from the occupational health service. This presents a problem often overlooked in intervention designs. Consultants and occupational health services may be reluctant to refuse services to comparison groups either for ethical reasons or because selling "services" is how they survive. Researchers are more often than not guests than hosts of intervention projects and thus may have limited authority to decide or influence such issues. Another possible explanation of the differences in the effect evaluations of the two comparison groups is the fact that the planned financial cuts at workplace C had a major negative impact on the employees' assessment of the work environment. At least, this is what we experienced in several other process evaluations in this research project, investigating interventions at a number of female-dominated workplaces in Denmark (Guichard et al., 2004).

Programme or theory failure?

A distinction between programme failure and theory failure has been introduced in an attempt to understand why intervention projects may not bring about expected changes (Kristensen, 2005). A programme failure happens when an intervention is not implemented as expected, whereas one can speak of theory failure when the theoretical underpinnings do not hold, i.e., when the intervention is successfully implemented but does not have the intended effect due to an ineffective theory. Programme failure has also been termed as type

III error (Lipsey & Cordray, 2000). The results of this study indicate that the reason why canteen A did not experience the expected changes may be due to a programme failure. Canteen B, where activities were implemented, and comparison group D, that copied the activities of the intervention groups, reported positive results. One may suspect that, under the right circumstances, the interventions would bring about the intended changes. However, we cannot entirely exclude theory failure, as we were not able to measure the working mechanisms of specific interventions. Nytrø et al. (2000) have previously warned that it is not always easy to tell the content of an intervention or to identify the nature of the implementation process. Introducing the concept of programme and theory failure enables the evaluator to conclude whether the intervention itself may be successful under other circumstances. This has important implications for external validity. The interventions developed and implemented in this study may be successfully implemented in other settings provided that consideration is given to the problematic issues identified in canteen A (e.g., conflicting initiatives, little scope for development, expectations of the consultancy role) and the facilitating factors reported in canteen B (e.g., the commitment of the manager and the supportive role of the consultant).

The benefits of using a participatory approach?

The use of a Participatory Action Research approach, which is the dominant approach used in interventions these days (Aust, Peter, & Siegrist, 1997; Cornwall & Jewkes, 1995; Cotton, 1993; Cox et al., 2000, 2002; Karasek & Theorell, 1990; Kompier & Cooper, 1999; Kompier, Cooper, & Geurts, 2000; Kompier, Geurts, Grundemann, Vink, & Smulders, 1998; Quick, Quick, Nelson, & Hurrell, 1997; Schurman & Israel, 1995), creates a great number of very different activities. The workplaces themselves chose which interventions to implement and may not have always established clear hypotheses as to how specific interventions bring about desired changes. As a result we are not able to detect the specific working mechanisms bringing about change. This may be a trade-off one has to accept when using a participatory approach to ensure appropriate and relevant interventions that create ownership and buy-in to change. In cases where we are not able to identify clear working mechanisms it becomes even more important to conduct a thorough process evaluation to understand change mechanisms. Further, in line with the ceiling effect, it appears that employees at workplace A were not able to appreciate the participatory approach of the consultant. They had little experience with workplace interventions and found it hard to address these issues themselves. This calls for a need to carefully consider how to shape intervention projects to include the characteristics of the particular occupational group in question. This study concerned women with little education and no prior experience of dealing with organizational development and health promotion, and the interviews indicated that they preferred a more directive consultancy style. It may very well be that in organizations with more experience of consultants and organizational development, the more directive consultancy style may not be desirable.

How do we measure impact?

Qualitative process evaluation is not only useful as a means of interpreting quantitative results. As many intervention studies are often most meaningfully implemented at local levels (e.g., teams or departments) it is often difficult to make valid quantitative analyses. In small samples, type II errors are likely to occur, i.e., due to the small sample sizes differences are not found that do exist. An alternative way of interpreting results may be to

look for trends, as was done in this study. In some samples it may also be desirable to put additional emphasis on qualitative evaluation methods (Randall, 2002). Qualitative process evaluation in this respect becomes an important triangulation tool as it enables us to either confirm or fail to confirm the results of the quantitative analyses. However, it should be recognized that process evaluation is time-consuming and requires many resources, and that outcome evaluation is still an important tool to persuade key stakeholders and decision-makers that action should be taken (Goldenhar et al., 2001).

Limitations

This study has a number of limitations that must be considered when interpreting the results. A limitation of this particular study was the reduced process evaluation in canteens C and D. On the basis of the limited focus, we are unable to say much about how, for example, employees experienced the development of the organization during the intervention period. Interviewing one manager and one employee, or only one manager, did not allow us to draw secure conclusions as to why the two canteens differed from each other and from the intervention workplaces (A and B). But since the same method and sample were used we were able to analyse the differences between canteens C and D. Another limitation in this study, as mentioned above, is the small sample size and as a consequence the statistical results should be interpreted with caution. However, as trends were consistent across outcome measures, response rates were high and qualitative analyses confirmed the quantitative results in the study we believe that analyses provide a clear picture of the effects of the interventions in this study. A similar strategy has previously been promoted by Kompier and Kristensen (2001) and Skov and Kristensen (1996). Response rates were somewhat lower in the comparison groups. This may have affected the results. Finally, it was only possible to conduct one follow-up; this makes it difficult to make conclusions upon the sustainability of effects over time.

Conclusions

In conclusion, the results from this study would, at a first glance, appear mixed as the project did not bring about the expected changes in both of the intervention groups. However, process evaluation in this study allowed us to learn from the exercise at two levels: (1) it helps us interpret the outcomes of effect evaluation for this project and draw tentative conclusions as to whether the unexpected results were due to programme or theory failure; and (2) as it seems that unexpected results were due to programme failure rather than theory failure it allows us to replicate interventions in other settings, minimizing the number of pitfalls associated with a given intervention (Goldenhar et al., 2001). This supports the claim by Saksvik et al. (2002) that it is important to learn from apparently failed studies. It may be helpful to redefine the concept of "success" to not only cover studies which bring about expected results but to include studies which bring about learning on what (not) to do when planning and implementing future intervention projects. This is supported by Semmer (2003) who emphasized the importance of detailed descriptions of projects rather than deploring poor designs and the difficulties in using rigorous designs. Also it raises questions about whether it is useful to talk about comparison and intervention groups in real-life research. It may be more useful to talk about case studies and study these in terms of intended and unintended changes (Kompier et al., 2000).

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