

INTERVENTION RESEARCH ON WORK ORGANIZATION AND HEALTH: RESEARCH DESIGN AND PRELIMINARY RESULTS ON MENTAL HEALTH

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This project is supported by Cooperative Agreement Number R01 OH007647 from the Centers for Disease Control and Prevention. Content of the publication is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute for Occupational Safety and Health. Chantal Brisson held a Scientist Award from the Canadian Institutes of Health Research, and Renée Bourbonnais held a research award from the Fonds de la recherche en santé du Québec at the time of data collection.

ABSTRACT

This article presents the overall research design and preliminary results of an intervention study on work organization and health which integrates the 3 phases of intervention research: development, implementation, and effectiveness. The demand-latitude-support and effort-reward-imbalance models were used to assess adverse work organization factors. Psychological distress was measured using the Psychiatric Symptoms Index. The intervention development phase in a major department of a public organization revealed an excess of psychological demands, job strain, low reward, effort-reward imbalance, and psychological distress compared to reference populations, and allowed workers to identify 5 priorities for action. The implementation phase showed that changes that were put into effect were consistent with those priorities.

In industrialized countries, mental health problems are the first or second most frequent causes of long-term sick leave (Karttunen, 1995; Vézina, 1998) and incur considerable disability costs (Gabriel & Liimatainen, 2000). Over the past decades, strong evidence for the deleterious effect of adverse work organization factors on mental and physical health has been found.

The demand-latitude model (Karasek & Theorell, 1990) identifies two factors that have detrimental effects on health: high psychological demands (PD) and low decision latitude (DL). PD refers to the quantity of work, to mental requirements, and to time constraints. DL refers to the opportunity to make decisions about work and to be creative, and to the possibility of using and developing skills. A combination of high PD and low DL is presumed to result in job strain, increasing the risk of health problems in workers. Poor social support (SS) at work is a third adverse work organization factor added to the model (Johnson, Hall, & Theorell, 1989), to create the demand-latitude-support model. The effort-reward-imbalance model (Siegrist, 1996) further proposes that an imbalance between efforts contributed and rewards received increases the risk of illness. While the notion of effort is close to that of psychological demands, reward refers to esteem, respect, job status, remuneration, and career opportunities (Siegrist & Peter, 2000).

Several cross-sectional and longitudinal studies have shown that workers exposed to job strain and low SS have a higher prevalence or incidence of mental health problems (Bourbonnais, Comeau, Dion, & Vézina, 1998; Cheng, Kawachi, Coakley, Schwartz, & Colditz, 2000; Cropley, Steptoe, & Joeke, 1999; Niedhammer, Goldberg, Leclerc, Bugel, & David, 1998; Stansfeld, North, & Marmot, 1995). An imbalance between efforts and reward has also been associated with psychological well-being (for a review, see van Vegchel, de Jonge, Bosma, & Schaufeli, 2005).

However, little is known about the efficacy of preventive interventions targeting adverse work organization factors and their health impacts. Indeed, previous intervention studies have had a number of limitations: (a) interventions have primarily targeted individual employees rather than the work organization; (b) a systematic prior risk evaluation has often been overlooked, resulting in the possibility that interventions have not targeted those most in need; (c) there has been a shortage of intervention evaluations, and those that have been conducted lacked a solid research design; and (d) involvement of senior management, a necessary condition for success, has frequently been lacking (Kompier &

Kristensen, 2000). Van der Hek and Plomp (1997) also noted the frequent absence of a theory-based concept of adverse work organization factors as the basis for intervention, the lack of a control group, and an insufficient follow-up period. More recently, Murphy and Sauter (2004) and Kristensen (2005) also emphasized the importance of using better study designs and of paying increased attention to factors surrounding the successful implementation of interventions such as whether the intervention was carried out as intended and actually reached workers.

To conduct rigorous intervention effectiveness research, a three-phase framework has been proposed (Goldenhar, LaMontagne, Katz, Heaney, & Landsbergis, 2001). The first phase, development, aims at identifying the changes needed to enhance the health of a target population and the best ways to bring about these changes. The second phase, implementation, aims at systematically documenting how an intervention is carried out. The last phase, effectiveness, evaluates whether the intervention was successful in reducing the prevalence of adverse work factors and health problems. However, few intervention studies on work organization and health integrate these three phases of intervention research. The aim of the current article is to present the overall design and preliminary results of an intervention study on work organization and health which integrates those three phases.

OVERALL RESEARCH DESIGN

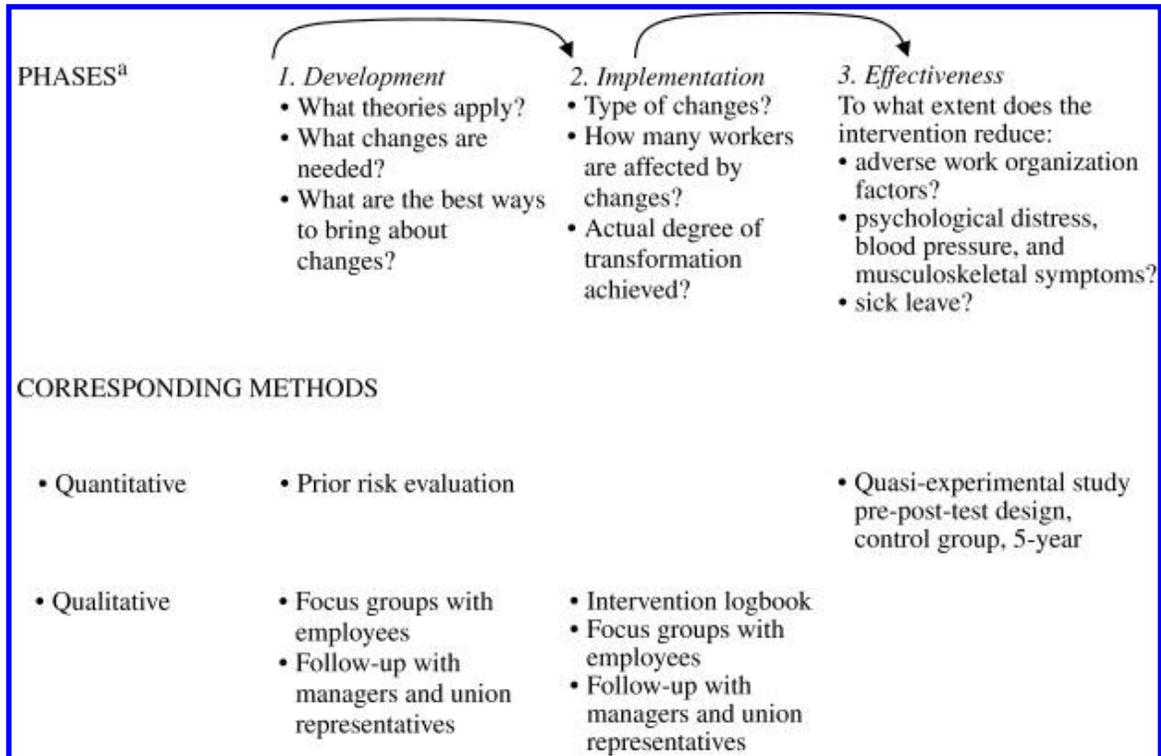
The general objective of this ongoing study is to evaluate interventions aimed at reducing four well-documented adverse work organization factors (high PD, low DL, low SS, and low reward) and a comprehensive range of their health effects as measured by psychological distress, ambulatory blood pressure, musculoskeletal symptoms, and certified sick leave.

The study is divided into three phases; namely, development, implementation, and effectiveness (Goldenhar et al., 2001). Each phase aims to answer complementary questions through corresponding quantitative and qualitative methods, as summarized in Figure 1. The development phase sought to determine what theories applied to the specific situation, what changes were needed to improve the health of the target population, and how to best implement those changes. To answer these questions, a quantitative prior risk evaluation was used to provide a portrait of the target population with regard to adverse work organization factors and health. In addition, focus groups with employees and follow-up meetings with managers and union representatives were complementary tools that contributed to the development of well-adapted interventions.

The implementation phase aimed to answer questions related to the types of changes carried out, the number of workers affected by these changes, and the actual degree of transformation achieved. In the current study, an intervention logbook was used to systematically document the changes that constituted the intervention. In addition, focus groups with employees and follow-up meetings with managers and union representatives provided complementary perspectives on these changes.

The final phase of this ongoing study, the effectiveness phase, will measure the extent to which the intervention was successful in improving work organization factors and health outcomes. For this, a 5-year prospective study using a quasi-experimental design with pre- and post-test measures and a control group will be used. Data are collected at three points in time over the 5-year project for each

Figure 1
Research Phases and Methods



Note. ^aThe research phases were adapted from Goldenhar et al. (2001).

group (experimental and control groups): before the intervention, at 18 months, and at 36 months after the intervention. Effectiveness evaluation will be based on pre- and post-measures of adverse work organization factors and health indicators to assess the impact of the intervention within the organization and between the study and control group populations. Baseline data used for the prior risk evaluation constitute the pre-intervention measure.

The next sections present a description of the methodology used in the development and implementation phases as well as specific results from one major department to illustrate these phases. Since follow-up data are not yet available, results of the effectiveness phase will not be presented here.

GENERAL METHODS

Study Population

The study population is composed of 1,630 white-collar workers employed by a large public organization. Their jobs encompass the full range of white-collar positions, including senior and middle

managers, professionals, technicians, and office workers. The organization's main activities are the organization and delivery of insurance services. The organization is structured in six branches according to different functions (for example, administration and finance, services to clients), which are further subdivided into 12 departments. A total of 1,307 workers (812 women and 495 men) participated at baseline, representing 80.2% of all eligible employees. Nearly half were older than 45 years. They were generally well educated (40% had a university degree and 30% had a junior college degree). The distribution of occupations was as follows: 57% were technicians and office personnel, 38% were professionals, and 5% were managers.

The control group is composed of 1,028 workers employed in two comparable public organizations involved in similar activities. Workers share professional characteristics with the study population and are exposed to comparable political, economic, and social circumstances. The participation rate in the control group at baseline was 75%. Before the intervention, the experimental and control groups were comparable in terms of job category, prevalence of some adverse work organization factors (low SS, low reward) and health problems (psychological distress, musculoskeletal symptoms, and hypertension). However, in the experimental group there was a higher proportion of women (62 vs. 44%), fewer workers aged 45 years or over (48 vs. 57%), and more workers exposed to high PD (48 vs. 34%) or effort-reward imbalance (27 vs. 19%) than in the control group. All differences are accounted for in the analyses. Data from the control group will be used only in the effectiveness phase to assess the impact of the intervention.

Measures

Data collection took place in the workplace. Employees were contacted by phone and provided with information regarding the study. An appointment was scheduled with those who agreed to participate. All participants signed a consent form providing information about the study and were free to withdraw at any time. Participants received personal health reports following data collection and were presented with their department's results following each phase of the study. The project was approved by the Research Ethics Committee at Laval University.

The prior risk evaluation involved the administration of a questionnaire to measure work organization factors and psychological distress. Other health measures were also obtained (musculoskeletal health symptoms, ambulatory blood pressure, certified sick leave), but will not be presented here.

PD, DL (9 items each), and SS from colleagues and their supervisor (6 and 5 items, respectively) were evaluated using the Job Content Questionnaire (JCQ; Karasek, 1985). The psychometric qualities of this questionnaire's French version have been demonstrated (Larocque, Brisson, & Blanchette, 1998). PD and DL were dichotomized at the median observed in a random sample of all Quebec workers (Santé Québec, 1989). Most previous studies on these factors have used the median cut-off (Belkic, Landsbergis, Schnall, & Baker, 2004). The combination of the dichotomized PD and DL scales were computed into four exposure levels: job strain (high PD and low DL), active (high PD and high DL), passive (low PD and low DL), and low strain (low PD and high DL). Scores on SS were divided in tertiles.

Reward was measured using the 11 items recommended by Siegrist (2003). The factorial validity and internal consistency of both the original English and French versions have been demonstrated (Niedhammer, 2002; Siegrist, 2003). Efforts were measured with two original items (“over the past few years, my job has become more and more demanding” and “I am regularly forced to work overtime) (Siegrist, 2003), and with two items close in meaning to the original items (“my tasks are often interrupted before they can be completed, requiring attention at a later time” and “I have enough time to do my work”) (Cronbach’s alpha = 0.69). Responses were given along a 4-point scale from 1 = *strongly disagree* to 4 = *strongly agree*. The effort/reward ratio was calculated and data were divided in tertiles (Niedhammer, Siegrist, Landre, Goldberg, & Leclerc, 2000).

Psychological distress was evaluated with the Psychiatric Symptoms Index (PSI; Ilfeld, 1976), a 14-item validated measure of anxiety, depression, cognitive, and anger symptoms (Préville, Boyer, Potvin, Perreault, & Légaré, 1992). This instrument measures the frequency of symptoms of depression (6 items), anxiety (4 items), cognitive disturbances (2 items), and anger (2 items) during the previous week on a scale from 1 = *never* to 4 = *very often*. The PSI-14 has good concomitant validity with regard to four other measures of mental health: consulting a health professional for a mental health problem, being hospitalized for this type of problem, having suicidal thoughts or attempting suicide, and consuming psychotropic medication (Préville et al., 1992). A total score for psychological distress was calculated from the answers to the 14 items of the PSI. Participants with scores ≥ 26.19 for psychological distress, which represent the highest quintile observed in a general population sample (Daveluy, Pica, Audet, Courtemanche, & Lapointe, 2000), were considered prevalent cases of psychological distress.

All potential confounding or modifying factors reported in the literature were also assessed. The sociodemographic characteristics measured were age (< 40, 40–49, > 49), sex, education level (university, junior college, high school or less), income (in tertiles), and civil status (married, other). The work-related variables were work category (manager, professional or technician, office personnel, and labourer), work status (permanent vs. other), occurrence of work intimidation or physical violence, and client contact (yes, no). The personal variables were domestic load (low, medium, high), assessed with a 4-item measure derived from a domestic load index (Brisson et al., 1999), and stressful life events over the past 12 months (none, 1 or 2, 3 or more), measured with a 10-item scale adapted from the Social Readjustment Rating (Holmes & Rahe, 1967) used in the Quebec Health Survey (Daveluy et al., 2000). These factors were assessed in the analysis of the baseline associations between adverse work organization factors and psychological distress, which is presented in this paper. Additional factors associated with high blood pressure and musculoskeletal problems were also measured, but are not used in the analyses presented in this paper.

PROCEDURE AND SAMPLE RESULTS

In this section the procedure used in the development and implementation phases of the study is described. In addition, specific results from the development and implementation phases in one major department are presented to illustrate these phases. This department (Department A) is composed of 146 office employees (28 men and 118 women) whose work consists of following up clients and answering clients’ requests in accordance with pre-established rules. Although the sample results

presented here are specific to Department A, the same methodology was used in the other units of the study population.

Development Phase

Prior risk evaluation

Baseline associations between adverse work organization factors and psychological distress. One goal of the prior risk evaluation was to identify adverse work organization factors associated with an impairment in the health of the target population. A preliminary step was to identify likely risk factors in this population and to estimate their significance. For this purpose, associations between adverse work organization factors and psychological distress were assessed in the study population. Logistic regression models were performed and potential confounders introducing a change of odds ratios (*OR*) superior or equal to 10% were included as adjustment variables in the final model (Table 1). All analyses were performed separately for men and women to take into account the potential modifying effect of gender (Vermeulen & Mustard, 2000). The results show that women exposed to job strain, low SS, and effort-reward imbalance had a higher prevalence of psychological distress (adjusted *ORs*: 2.66, 95% confidence interval [*CI*] 1.46–4.83; 1.92, 95% *CI* 1.32–2.80; and 3.46, 95% *CI* 2.29–5.24). For men, exposure to job strain, low SS, and effort-reward imbalance was also associated with psychological distress (adjusted *ORs*: 1.70, 95% *CI* 0.84–3.41; 2.41, 95% *CI* 1.38–4.20; and 1.92, 95% *CI* 1.10–3.35).

Risk assessment. The next step was to identify which groups were most at risk within the study population. However, such risk assessment of adverse work organization factors faces unique challenges. While research on chemical or physical hazards typically allows the specification of exposure standards which can be used in the regulation of exposure to potential sources of illness, such thresholds are not available for most measures of adverse work organization factors. It is therefore difficult to determine what levels of exposure to work organization factors should be considered harmful and warrant prevention efforts. The approach used in this study draws on benchmarking practices to compare the psychosocial work environment in the study organization with appropriate reference populations, thus providing a “barometer” of the importance of adverse work organization factors within the study population.

To this end, the prevalence of adverse work organization factors, psychological distress, and musculoskeletal symptoms in each branch was compared with those observed among other workers of the organization and among two external reference populations for whom data were available from previous studies that used the same measures. These reference populations should not be confused with the control group that is used exclusively in the effectiveness evaluation phase, and for whom data collection is not yet complete. The first reference population was made up of 11,485 workers who constituted a representative sample of Quebec workers (Daveluy et al., 2000). This sample comes from the 1998 Quebec Social and Health Survey. The comparison determined whether the prevalence of work organization factors, psychological distress, and musculoskeletal symptoms was higher in the study population than in Quebec workers in general. The second reference population was composed of 5,879 workers employed in 20 public institutions who participated in a cardiovascular health study

Table 1
Crude and Adjusted Odds Ratios (OR) and 95% Confidence Intervals (CI 95%) for the Associations
Between Psychological Distress Prevalence and Work Organization Factors (Development Phase)

Work organization factors	Crude		Adjusted ^a	
	OR	CI 95%	OR	CI 95%
Women (N = 812)				
Job strain				
Low strain	1.00		1.00	
Passive	1.75	1.04–2.95	1.63	0.92–2.88
Active	2.79	1.62–4.81	2.33	1.28–4.22
High strain	3.16	1.83–5.43	2.66	1.46–4.83
Social support at work				
High	1.00		1.00	
Moderate	1.10	0.76–1.59	1.20	0.80–1.81
Low	1.85	1.32–2.60	1.92	1.32–2.80
Effort-reward imbalance				
Low	1.00		1.00	
Intermediate	1.44	1.00–2.07	1.42	0.95–2.13
High	3.39	2.35–4.88	3.46	2.29–5.24
Men (N = 495)				
Job strain				
Low strain	1.00		1.00	
Passive	1.15	0.62–2.13	1.05	0.53–2.08
Active	1.07	0.58–1.95	1.18	0.61–2.28
High strain	1.71	0.91–3.24	1.70	0.84–3.41
Social support at work				
High	1.00		1.00	
Moderate	1.23	0.73–2.05	1.17	0.66–2.05
Low	2.27	1.39–3.73	2.41	1.38–4.20
Effort-reward imbalance				
Low	1.00		1.00	
Intermediate	1.73	1.05–2.87	1.88	1.07–3.32
High	1.76	1.07–2.89	1.92	1.10–3.35

Note. ^aAdjusted for age, education, civil status, work status, violence at work, intimidation at work, client contact, stressful events over the last year, and domestic load.

(Brisson, Larocque, Moisan, Vézina, & Dagenais, 2000). This comparison determined whether the prevalence of problems was higher in the study population than among other white-collar workers employed in similar Quebec public administration institutions. The sociodemographic characteristics of the experimental and reference populations are presented in Table 2. When the numbers allowed ($N = 100$ or more), a prior risk evaluation was conducted for specific subgroups (usually specific departments) within one branch. Comparisons between specific branches or departments and the

Table 2
Sociodemographic Characteristics of the Experimental Group and Reference Populations Used in the Prior Risk Evaluation (Development Phase)

	Experimental group <i>N</i> (%)	Reference population 1: General working population sample <i>N</i> (%)	Reference population 2: Workers from 19 public institutions <i>N</i> (%)
Total	1,307	11,485	5,879
Gender**			
Men	495 (37.9)	6,390 (55.6)	2,874 (48.9)
Women	812 (62.1)	5,095 (44.4)	3,005 (51.1)
Age**			
< 35	146 (11.2)	4,239 (36.9)	332 (5.7)
35–44	531 (40.6)	3,599 (31.3)	2,193 (37.3)
≥ 45	630 (48.2)	3,647 (31.8)	3,354 (57.0)
Job category**			
Managers	73 (5.6)	N/A	598 (10.2)
Professional	472 (36.2)	N/A	2,240 (38.1)
Technicians and office personnel	760 (58.2)	N/A	3,041 (51.7)
Education**			
University	522 (40.0)	2,435 (21.5)	2,723 (46.6)
College	400 (30.6)	3,129 (27.5)	1,621 (27.8)
High school	384 (29.4)	5,799 (51.0)	1,494 (25.6)

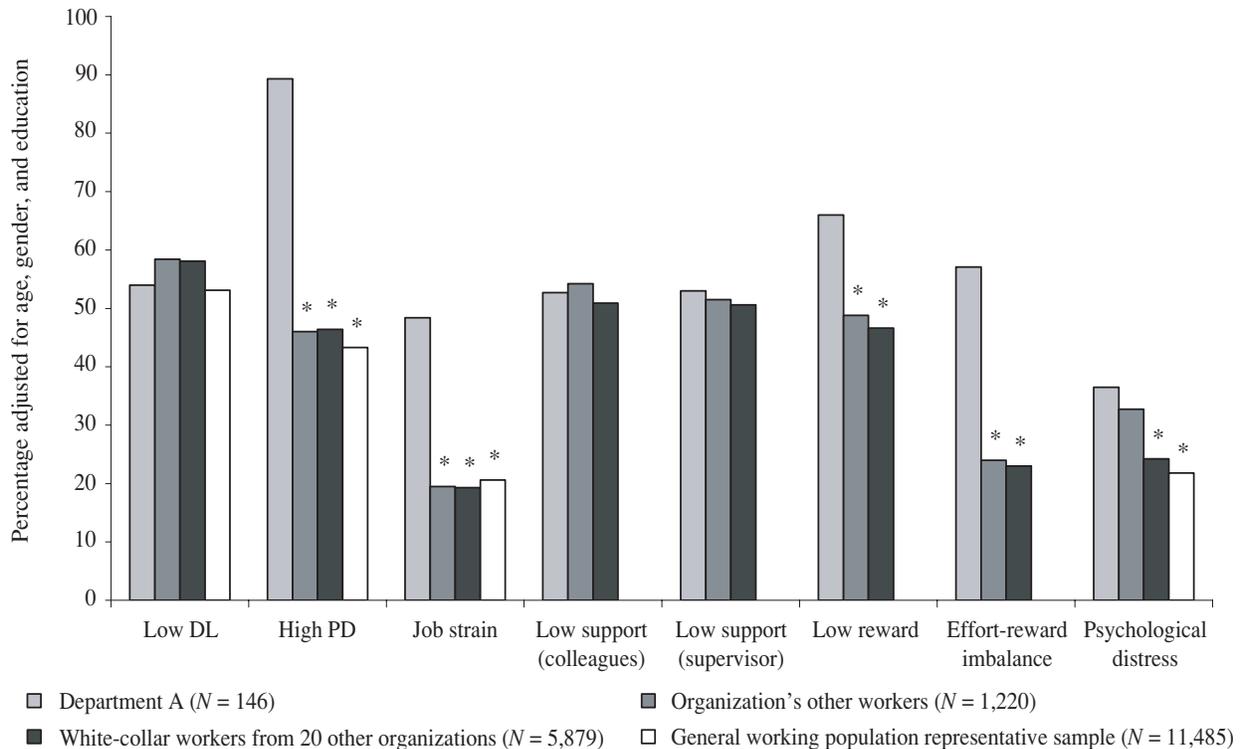
Note. N/A = not available.

** $p < .001$.

reference populations were made using the log-binomial model, with the likelihood ratio statistics for type 3 analysis (Skov, Deddens, Petersen, & Endahl, 1998), adjusting for age, gender, and education. Within each branch or department, those adverse work organization factors whose prevalence was found to be greater than that in the reference populations were deemed “in excess” and identified as targets for preventive interventions.

Results from Department A. In Department A, the prevalences of all four adverse work organization factors (high PD, low DL, low SS, and low reward) and that of psychological distress were significantly higher than in the reference populations (Figure 2). More specifically, for high PD, job strain, and effort-reward imbalance, the prevalences observed in Department A (89.3%, 48.4%, and 57.1% respectively) were more than twice as high as those observed in the reference populations. The prevalence of low reward was also high (66% compared to around 48% in the reference populations). Psychological distress was slightly higher than in the remainder of the organization (36.5% vs. 32.7%), but much higher than in the other reference populations where prevalences were around 23%.

Figure 2
Prevalence of Adverse Work Organization Factors and Psychological Distress in Department A Compared to the Reference Populations (Development Phase)



Note. The number of men in Department A was insufficient to perform separate analyses by gender.

DL = decision latitude; PD = psychological demands.

* $p < .05$.

Focus groups with employees. Focus groups led by two researchers were undertaken in each branch or department targeted for intervention to obtain a more in-depth understanding of the main problems identified through the prior risk evaluation. Each group comprised 8 to 14 workers who volunteered to participate. The group discussion was taped and subsequently transcribed verbatim. A detailed content analysis (L'Écuyer, 1987, 1990) was performed to identify themes and subthemes expressed by the participants and related to adverse work organization factors. A report was produced, and validated by the participants in a subsequent meeting.

The goal of a third focus group meeting involving the same participants was to establish five priorities for intervention, using the nominal group technique (Ouellet, 1987). This technique required participants to answer one question individually before sharing their ideas with the group and building consensus on five priorities through a voting procedure. The question was the following: "What should be changed in priority to improve the work organization?"

Results from Department A. In Department A, 14 employees volunteered to participate in the focus group. In their first meeting, they confirmed that their work involves high PD and low reward. In the third focus group meeting, participants established five priorities for action, described in Table 3. Those priorities were to hire additional staff, to set up a floating team, to temporarily level off on work organization changes, to implement quality control, and to consult employees about work organization changes. The first three priorities were related to PD and the last two to reward.

Table 3
Adverse Work Organization Factors and Priorities for Action Identified in Department A (Development Phase)

Adverse work organization factors identified through the prior risk evaluation	Priorities for action identified by the focus group
1. High psychological demand	1. Hiring new staff
2. Low reward	2. Setting up a floating team
3. Job strain	3. Temporarily levelling off on work organization changes
4. Effort-reward imbalance	4. Implementing quality control
	5. Consulting employees about work organization changes

Follow-up with managers and union representatives. The results of the prior risk evaluation were presented to the senior management committee, including the president, and to the joint employer/union committee by members of the research team. Results specific to each branch were presented to managers and union representatives of that branch. In addition, synthesized reports from each focus group were presented to each head manager, along with an executive summary. The executive summaries, which focused on intervention targets, were also distributed to other management team members and to the joint employer/union committee. To gain a better understanding of the intervention context, one research team member was delegated as an observer in each branch and attended relevant meetings involving the head manager, the management team, and the joint union-management committee.

Results from Department A. In Department A, a meeting with managers was held to discuss the results of the prior risk evaluation. The managers expressed strong interest in the reports and an understanding that additional meetings were necessary in order to develop responses to employees' requests. Presentations of the results were also made to the joint employer-union committee and to the employees.

To summarize, the development phase provided evidence that adverse work organization factors were associated with impaired mental health in the organization, and provided managers with information as to how their employees fared with regard to the adverse work organization factors and health as compared to reference populations. Managers also received information regarding which priorities for action were identified by workers.

Implementation Phase

The goal of the implementation phase was to systematically document how the intervention was carried out. The intervention was defined as the organizational changes undertaken by the organization in order to reduce adverse work organization factors. Any objective organizational change introduced with the explicit goal (or clear consequence) of improving the employees' situation with regard to one of the four adverse work organization factors was considered part of the intervention. Decisions concerning these changes were made by managers who were in charge of defining and implementing the intervention. The implementation of the intervention was monitored primarily with qualitative research tools: an intervention logbook, focus groups with workers, and follow-up meetings with managers and union representatives.

Intervention logbook. In each of the departments targeted for intervention, a professional was appointed by the head manager to collect information and to keep a record of every activity introduced in the workplace to improve on the four adverse work organization factors. A separate logbook was completed for each department. A member of the research team met the registrars to provide detailed explanations on how to complete the logbooks and to emphasize the importance of the task. In addition to the description of the activity, the following information was recorded in the logbooks for each activity: (a) the goal (or problem targeted), (b) the administrative unit involved, (c) the date or date range of the activity, (d) the number of employees involved, (e) the work organization factor(s) targeted, and (f) the improvement expected from each activity (weak, medium, strong).

The intervention logbooks were submitted to the president of the organization as well as to the research team. Each logbook was updated twice. A qualitative analysis of the activities recorded in the logbooks provided a description of the nature and intensity of the changes implemented as part of the intervention. As a first step, the large number of activities recorded in the logbooks were categorized into specific types of activities (for example, training, restructuring, social events, etc.). These categories were subsequently aggregated, through content analysis, into five main organizational dimensions: (a) participative management, (b) interpersonal concerns and support, (c) work organization, (d) strategy, culture, and leadership, and (e) training, development, and career progression. These organizational dimensions were informed (but not prescribed) by the main dimensions of work organization (National Institute of Occupational Safety and Health, 1996) as well as by models of organization performance and change (Burke, 2002; Peters & Waterman, 1982). This classification of activities allowed researchers to assess the intervention in terms of frequency for each category of activity and organizational dimension. However, focusing solely on frequency may be misleading, as certain activities may have a stronger impact than others. For this reason, the second step of the analysis consisted of identifying major changes in collaboration with key informants in the organization. The intensity of those changes was assessed based on an evaluation of the number of employees exposed to the change and the actual degree of transformation achieved.

Results from Department A. Department A's logbook described 48 activities that were implemented as part of the intervention. High PD and low reward were targeted by 35% and 54% of the activities, respectively. The categories of activities recorded most frequently were employee recognition (13%), social events initiated by and involving management (10%), and the hosting of work

committees and workshops (10%). The highest number of activities (38%) could be classified under the *interpersonal concerns and support* dimension, which refers to a work context in which the individual's self-esteem needs may be filled and which is conducive to the establishment of good relations with managers and colleagues.

Five major changes were implemented:

1. The workload was reduced by increasing the workforce and by levelling off on an important project to provide time for employees to adapt to earlier changes before implementing other changes.
2. Important restructurings aimed at increasing collaboration between work units were implemented.
3. Communication between management and employees was increased.
4. New employee recognition practices were developed.
5. The promotion of employee health and well-being was identified as a priority.

These major changes are presented in Table 4.

Table 4
Changes Introduced in Department A (Implementation Phase)

According to the logbook	According to the focus group
<ol style="list-style-type: none"> 1. Decrease the workload by <ul style="list-style-type: none"> • increasing the workforce • levelling off on a major project 2. Organizational restructuring 3. Increased manager /employee communications 4. New employee recognition practices 5. Employee health and well-being as a priority 	<ol style="list-style-type: none"> 1. Increased workforce 2. Arrival of support staff 3. Organizational restructuring and changes in management 4. Implementation of new projects 5. Increased employee recognition 6. Availability of new compressed schedules

Focus groups with workers. The implementation phase was also monitored through a subsequent focus group meeting conducted with the same participants. The aim was to identify the changes introduced in the work organization during the intervention period and to determine whether or not those changes actually reduced adverse work organization factors from the employees' point of view. In addition, these meetings allowed researchers to assess the participants' satisfaction with the focus group process and its contribution to the intervention.

Results from Department A. In Department A, 7 of the initial 14 focus group participants were available for this last meeting, held after an 18-month period of intervention. Two declined to participate, two had left, one was ill, and two were unavailable. Six main changes were identified and discussed by the participants:

1. The increase in the workforce was assessed positively, but its effects were moderated by an ever-increasing workload.

2. The arrival of support staff helped to decrease the workload, but this change was perceived as a temporary solution.
3. Organizational restructuring and changes in the management team were evaluated positively in terms of collaboration and management preoccupation with employees needs.
4. New projects that had been implemented had pros and cons.
5. Employee recognition had increased.
6. Compressed schedules were offered to employees, but with no concomitant adjustments to the workload, these schedules resulted in an increased work tempo.

Reactions to the focus groups were generally positive: participants felt that they could express their views on organizational problems honestly, that their opinions were respected by the researchers, and that confidentiality would be maintained. However, participants felt that feedback from management was lacking regarding the focus groups' reports and which solutions were retained for intervention.

Follow-up with managers and union representatives. A meeting was held with the logbook registrars to obtain complementary information and to validate the logbook analysis. This meeting helped researchers to better understand the context of the intervention, and to obtain information concerning employee and management reactions to the changes implemented. Final reports on the logbook analysis and on the focus groups with workers were presented to the head manager, along with an executive summary which was subsequently distributed to managers and union representatives. Again, these presentations provided opportunities to further discuss the intervention.

DISCUSSION

Overall Design

The study described in this paper integrates the three phases of the intervention research process. The development phase used a clear and appropriate theoretical approach to target workplace factors with documented relevance for health. It also used validated measures to perform a systematic prior risk evaluation that included a comparison with reference populations. The relevance of using the demand-control-support and effort-reward-imbalance models was supported by significant associations between the models and the prevalence of psychological distress in the target organization. Although the cross-sectional nature of these baseline data limit their value for causal inferences, the results are in line with those of previous studies that used longitudinal data (Cheng et al., 2000; Fuhrer, Stansfeld, Chemali, & Shipley, 1999; Kawakami, Haratani, & Araki, 1992; Mino, Shigemi, Tsuda, Yasuda, & Bebbington, 1999; Niedhammer, Bugel, Goldberg, Leclerc, & Guéguen, 1998; Stansfeld, Fuhrer, Shipley, & Marmot, 1999; Stansfeld, Rael, Head, Shipley, & Marmot, 1997), suggesting that positive effects on health may be expected in this population when adverse work organization factors are actually reduced. The prior risk evaluation also identified which groups of employees and which problems to target. Results of the prior risk evaluation were well received by the organization, and provided a sound basis for managers and union representatives to enhance their understanding of the nature and extent of the problems.

The implementation phase documented the intervention and assessed whether or not the intervention was actually carried out and reached the employees (Kristensen, 2005). In addition, the implementation phase provided managers with feedback from the employees on those changes, feedback that could be used to further improve the intervention.

An important strength of the overall study is its rigorous design for evaluating effectiveness. This final phase will use a pre/post-test design with a control group to evaluate the short- (18 months) and medium-term (36 months) effects for both work organization factors and health indicators. The use both of objective health-indicator measures (blood pressure and certified sick leave) and self-reported measures (psychological distress and musculoskeletal symptoms) will reinforce the scientific contribution and credibility of the results. High participation rates both in the experimental and control groups make a selection bias unlikely.

Finally, the current study also meets two necessary conditions for a successful intervention study: the involvement of top and middle management, and the use of employee knowledge and participation (Kompier, Geurts, Gründemann, Vink, & Smulders, 1998).

Nevertheless, the overall study design also has a number of limitations. First, the intervention was not controlled by the researchers. To minimize the impact of this limitation, a careful analysis of the intervention was done in each department, assessing, among others, which adverse work organization factors were targeted, what types of activities were implemented, and what the major changes were in terms of actual transformation and employee coverage. Comparisons of different departments according to these variables will help to interpret the results of the effectiveness phase of the study. Attention was also paid by the researchers to documenting factors that may have had a negative impact on the work environment. Follow-up with managers and union representatives, as well as information from focus group participants, helped researchers to understand and document such contextual circumstances.

Another important potential limitation related to intervention studies is the extent to which the results can be generalized (Rose, 1992). However, the fact that the intervention targeted four well-defined, theory-based adverse work organization factors, whose deleterious health effects have been found in various work settings, favours generalization. Although solutions to adverse work organization factors may be specific to each workplace, the process of problem identification and resolution as well as a rigorous evaluation of the effects of preventive intervention are exportable.

The qualitative approach made it possible to include the participants' experiences and their views concerning the work organization and related changes. However, the negative side is that it also provides a somewhat biased perspective, representative of only those individuals who volunteered to participate. Nevertheless, the reliance on both qualitative and quantitative approaches provides different perspectives on the research and intervention, and helps to compensate for the limitations of any particular methodology.

Intervention in Department A

The results from Department A were used to illustrate the development and implementation phases of the intervention. In this department, the prior risk evaluation showed that high PD, low reward, job

strain, and effort-reward imbalance were in excess when compared with reference populations. Focus groups with workers resulted in the identification of five priorities for action. Provided with this information, managers were responsible for implementing changes to improve the work environment. Those changes were brought about by a new head manager who took measures to decrease demands placed upon employees, and who infused a new management philosophy based on communication and employee recognition. High PD and low reward, which were in excess in the prior risk evaluation, were actually tackled: high PD was targeted by 35% of the activities implemented, and low reward by 54% of the activities. Convergent information from the intervention logbook and focus group reveals that priorities for action identified by the focus group were addressed: the workforce was actually increased, and support staff were provided. Moreover, the logbook reports the slowing down of a major project, which is consistent with the employees' request to temporarily level-off on work organization changes. Low reward was addressed with the implementation of new recognition practices mentioned in both the logbook and in the focus group. Finally, increased communications between managers and employees reported in the logbook may have improved employee consultation about work organization changes, which was also a priority for action identified by the focus group.

This analysis thus establishes that there actually was an intervention in Department A, that this intervention targeted the main problems identified through the prior risk evaluation, and that it brought about solutions consistent with the priorities for action prescribed by the focus group. Papers presenting an in-depth analysis of the focus group and logbook approaches are in preparation, and papers on the effectiveness of the intervention will be prepared after data collection is completed in the control group.

CONCLUSION

This article has presented the overall research design and preliminary results of an intervention study on work organization and health. At baseline, significant associations were found between adverse work organization factors and psychological distress. The intervention development phase in one major department of a public organization revealed an excess of PD, job strain, low reward, effort-reward imbalance, and psychological distress compared to reference populations. This department was thus targeted for intervention. The development phase allowed workers to identify five priorities for action. The implementation phase showed that the changes that were put into effect were consistent with those priorities. The upcoming effectiveness phase will allow researchers to determine whether the changes made actually resulted in improvements to adverse work organization factors. Positive effects on health are expected if those adverse work organization factors are actually improved upon. The effectiveness phase will specifically establish the impact of the intervention on employee mental health.

RÉSUMÉ

Cet article présente le devis général et les résultats préliminaires d'une étude-intervention sur l'organisation du travail et la santé intégrant les 3 phases d'une étude-intervention: développement,

implantation et évaluation. Les modèles de demande-latitude-support et déséquilibre efforts-reconnaissance ont été utilisés pour évaluer les facteurs de l'organisation du travail. La détresse psychologique a été mesurée à l'aide du Psychiatric Symptoms Index. La phase de développement dans un important département d'un organisme publique a révélé des excès dans la prévalence d'une demande psychologique élevée, d'une faible reconnaissance, de tension psychologique et du déséquilibre efforts-reconnaissance et a permis d'identifier 5 priorités d'action. Durant la phase d'implantation, des changements correspondant à ces priorités d'action ont été mis en œuvre.

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