Chapter 15
Workplace Interventions Aiming to Improve Psychosocial Work Factors and Related Health

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15.1 Introduction

Cardiovascular diseases are the main cause of death in men and women worldwide. According to the World Health Organization (WHO), 17.5 million people died from CVD in 2012 which represents 31 % of all deaths (WHO 2011). Hypertension is the leading CVD risk factor (Kearney et al. 2005; Ezzati et al. 2002). Globally, approximately 54 % of strokes and 47 % of coronary heart diseases are attributable to high blood pressure (Lawes et al. 2008). For their part, mental health problems account for close to a third of the disease burden associated with non-communicable diseases in high income countries (WHO 2008). Depression and anxiety altogether represent the second leading reason for visiting a general practitioner in Canada (IMS Health Canada 2010). Mental health problems also are the first or second cause of sickness absence from work (Henderson et al. 2005) and represent the leading cause of disability for ages 15–44 (WHO 2002). Certified sickness absences from work for mental health problems usually have a long duration and a high risk of recurrence, thus leading to a considerable social burden and loss of productivity (Koopmans et al. 2011; Henderson et al. 2005).

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As presented in Chaps. 5, 6, and 7, prospective evidence has been accumulating on the deleterious effects of adverse psychosocial work factors, on the development of CVD (Gilbert-Ouimet et al. 2013; Babu et al. 2014; Kivimaki et al. 2012; Nyberg et al. 2013; Landsbergis and Schnall 2013) and mental health problems (Ndjaboue et al. 2012; Bonde 2008; Stansfeld and Candy 2006; Netterstrom et al. 2008). Two well-defined and internationally recognized theoretical models are generally used to measure psychosocial work factors: the effort-reward imbalance (ERI) (Siegrist 1996) and demand-control (Karasek 1979) models. The ERI model proposes that efforts (e.g. pressure to work overtime, increasingly demanding work, constant time pressure, repeated interruptions) should be rewarded in various ways: income, respect, esteem, and occupational status control (job security, promotion prospects, unforced job changes) (Siegrist 1996). Workers are in a state of detrimental imbalance when high efforts are accompanied by low reward, and thus more susceptible to health problems (Siegrist 1996; Siegrist et al. 2004). For its part, the demand-control model suggests that workers simultaneously experiencing high psychological demands and low job control (job strain) are more likely to develop stress related health problems (Karasek 1979). In prospective studies conducted in industrialized countries, about 20 % of workers are exposed to these adverse psychosocial work factors (Brisson et al. 2011). In the current globalized economy, organizations are facing ever-stiffer competition and workers are consequently being increasingly exposed to adverse psychosocial work factors, mainly increased workload and precariousness (Algava et al. 2014; Quinlan et al. 2001; Eurofound 2015).

Workplace interventions aiming to improve work environment characteristics, including psychosocial work factors, have been recommended two decades ago by the World Health Organization (1995) and reaffirmed in 2001 by the International Labour Office (2001) and in 2004 by the London department of health (Department of health 2004). If preventive interventions are successful in reducing adverse psychosocial work factors (intermediate effects) they could also lead to the reduction of work-related health problems, such as high blood pressure, CVD, and mental health problems (final effects).

This chapter will first present a brief overview of evidences regarding the effects of preventive intervention aiming to reduce adverse psychosocial work factors and related health problems. This overview will be followed by a discussion of important quality criteria required to conduct solid research in this area. In the third part, three psychosocial workplace intervention studies meeting most of these quality criteria will be presented in depth. Finally, public health policies aiming to help reducing adverse psychosocial work factors will be discussed.

15.2 Overview of Psychosocial Workplace Interventions Studies and Health

A number of systematic reviews have been conducted to evaluate the effects of workplace interventions aiming to improve work characteristics and related health outcomes (Ruotsalainen et al. 2015; Richardson and Rothstein 2008; Corbiere et al.

2009; Egan et al. 2007; Montano et al. 2014). The systematic review conducted by Egan et al. (2007) is the only one systematic review which included specifically studies in which the intervention aimed at improving adverse psychosocial work factors which can be related to the ERI or the demand-control models. This review included 18 intervention studies published between 1981 and 2006. The study was restricted to interventions aiming *to increase employee's opportunities to make decisions or participate in decision making process at work* (Egan et al. 2007). The studies included had to evaluate health effects, but no restrictions were made regarding the type of health outcomes (ex. mental health, physical health, absenteeism and physical measures). Twelve studies out of 18 were prospective with a control group. Altogether the results were mixed. Indeed, in 8 studies out of 18 there were improvements of psychosocial work factors and in 11 studies out of 18 there were improvements in workers' health. However, a more consistent result was observed in the subgroup of studies where psychosocial work factors had improved. Indeed, in this sub-group improvements in workers' health were observed in the large majority of studies i.e. seven out of the eight studies. One of these studies targeted the ERI model directly (Bourbonnais et al. 2006a). This study will be presented in depth in Sect. 15.4 of this chapter.

Three other systematic reviews were restricted to (Montano et al. 2014) or made separate analysis for (Ruotsalainen et al. 2015; Richardson and Rothstein 2008) organizational-level intervention studies. Organizational-level interventions refer here to interventions aiming to improve workplace characteristics as opposed to interventions aiming to act at the individual level by enhancing the capacity of individuals to cope with adverse psychosocial work factors. However, unlike in the review by Egan et al. presented previously, the interventions evaluated in these reviews combined organisational-level interventions on adverse psychosocial work factors with other organizational-level interventions such as physical conditions, exposure to noise or chemical agent, working time, schedule, etc. In the systematic review by Montano et al. (2014), the interventions were classified according to three categories of targets: (1) material conditions, (2) work time-related conditions and (3) work organization conditions including psychosocial work factors of the effort-reward and the demand-control models. Thirty-two studies published between 1993 and 2011 included at least one intervention in the work organization category. Compared to interventions on only one of these three categories of targets, interventions addressing targets in more than one category were more likely to report a significant health improvement. Indeed, significant health improvements were reported for 6 of the 16 studies when only work organization conditions were targeted, one of three studies when work organization were combined with time conditions, six out of ten studies when work organization conditions were combined with material conditions and three out of three studies when all three conditions were targeted. In the systematic review and meta-analysis by Ruotsalainen et al. (2015), 21 organizational-level intervention studies conducted in health care workers between 1993 and 2013 were reviewed. In these studies, the intervention aimed at improving work schedule, work conditions, support, care, and communication skills. The outcomes evaluated included a number of scales such as the Maslach Burnout Inventory (MBI) scale, the Nurse Stress Scale, the Perceived Stress Scale and the General Health Questionnaire. Note that psychosocial work factors were

considered as stress outcomes. This meta-analysis showed that improving the work schedule was significantly associated with a reduction in workers' stress level (Standardized mean difference (SMD) = −0.55 (95 % CI −0.84 to −0.25), two trials, 180 participants). No clear benefit of any other organizational-level interventions was observed. In the systematic review and meta-analysis by Richardson et al. (Richardson and Rothstein 2008) five organizational-level studies conducted between 1983 and 2000 were included. The intervention aimed at improving social support, participatory action, promotion program and problem-focused coping. The health outcomes included general mental health, general physical health, anxiety, depression, emotional exhaustion (MBI) and absenteeism. The effect size, defined by the mean differences between intervention and control group, was non-significant (SMD = 0.144 (95 % CI −0.123 to 0.411), five studies, n = 221 participants).

Finally, in the systematic review by Corbières et al., organizational-level intervention studies were not evaluated separately but in combination with interventions at the individual level, such as cognitive-behavioral interventions, relaxation technics and physical exercises (Corbiere et al. 2009). The authors mentioned that interventions aiming to improve adverse psychosocial work factors, including ERI, combined with a participatory approach, observed significant improvements of workers' mental health (Corbiere et al. 2009). This last observation was based on three studies, one of which will be presented in depth in Sect. 15.4 (Bourbonnais et al. 2006a).

The systematic reviews presented above show that workplace intervention studies have led to inconsistent findings (Ruotsalainen et al. 2015; Richardson and Rothstein 2008; Corbiere et al. 2009; Egan et al. 2007; Montano et al. 2014). Indeed, approximately half of the studies observed improvements of psychosocial work factors or improvement in workers' health (Ruotsalainen et al. 2015; Richardson and Rothstein 2008; Corbiere et al. 2009; Egan et al. 2007; Montano et al. 2014). These inconsistencies could be explained by a number of methodological limitations. In addition, workplace intervention take place in complex social structures and often include multiple components (Goldenhar et al. 2001). A better understanding of the content and context of the intervention may also contribute to explain their varying effectiveness. In order to advance our knowledge in this area a number of important issues have to be taken into account (Nielsen and Randall 2013). The next section of this chapter will discuss these issues through the presentation of criteria required to conduct high quality workplace intervention studies.

15.3 Criteria for High Quality Psychosocial Workplace Intervention Studies

The framework elaborated by Goldenhar and colleagues (2001) suggests three phases for a rigorous intervention research process (Goldenhar et al. 2001), namely: (1) the development phase, (2) the implementation phase and (3) the effectiveness

phase. The development phase aims at identifying changes needed to improve health and the best ways to bring about these changes. The implementation phase aims at systematically documenting how an intervention is carried out. The effectiveness phase evaluates whether the intervention was successful in reducing adverse work factors (intermediate effects) and related health problems (final effects). Figure 15.1 presents an adaptation of Goldenhar's framework. The figure describes the questions that need to be answered at each phase as well as suggestions for the corresponding quantitative and qualitative methods that can be used to answer them. The quality criteria presented below cover all three phases of the intervention research process.

One of the first steps of a workplace intervention is to obtain a *strong commitment from head and line managers* of the participating organization(s) (Nielsen 2013). The implication and support from the managers favor the development and implementation of organizational changes required to reduce adverse work factors. Managers commitment could include communicating (or allowing researchers to communicate) relevant information to employees and promoting their involvement in the intervention process. The use of a participative approach where employees are involved in the planning and implementation of interventions may help determining how and why interventions work (Nielsen and Randall 2013). Such participative approach stimulates the synergy between the actors responsible for interventions implementation (managers, employees and-or researchers) (Corbiere et al. 2009; Montano et al. 2014). The lack of commitment from managers and/or employees is one of the main reasons pointed out in recent literature reviews to explain the mixed results of organizational-level interventions (Montano et al. 2014; Corbiere et al. 2009; Egan et al. 2007). Since this commitment might influence the success of each intervention phase, it needs to be reaffirmed throughout the whole process of the intervention.

The development phase of the intervention should include *an* a priori *risk evaluation* to identify which groups are most at risk within the study population (Goldenhar et al. 2001). An a priori quantitative assessment of adverse psychosocial work factors and health outcomes will help identifying these groups. However, the risk assessment of adverse psychosocial work factors faces unique challenges. 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. However, such thresholds are not readily available for adverse psychosocial work factors. A useful approach is to compare the prevalence of psychosocial work factors and health indicators in a study organization with reference populations, thus providing a "barometer" of the importance of psychosocial exposures and health outcomes within the study organization. Adverse psychosocial work factors whose prevalence is found to be greater than that of the reference populations can then be deemed "in excess" and identified as targets for intervention. Since the reference populations and the intervention population may differ regarding potential confounders, such as age, socioeconomic characteristics, and gender, a statistical adjustment for these factors or other methods to take these factors into account are recommended to provide a valid risk assessment.

PHASES	1.Development	2. Implementation	3. Effectiveness
	• What theories apply? • What changes are needed? • What are the best ways to bring about changes?	• Type of changes? • How many workers are affected by changes? • Actual degree of transformation achieved?	To what extent does the intervention reduce: 1. Adverse work organization factors? (intermediate effects) 2. Health problems? (final effects)
EXAMPLES OF CORRESPONDING METHODS			
• Quantitative	• *A priori* risk assessment		Quasi-experimental studies with pre-and post-intervention measurements and a control group
• Qualitative	• Focus groups with employees • Meetings and follow-ups with managers and union representatives or intervention teams	• Intervention log books • Focus groups with employees • Meetings and follow-ups with managers and union representatives or intervention teams	

Fig. 15.1 Three-phase intervention study design with corresponding questions to answer and examples of quantitative and qualitative methods (Adapted from Goldenhar et al. (2001) and Brisson et al. (2006))

The a priori risk assessment of psychosocial work factors and health outcomes and the evaluation of effects require the use of *validated instruments*. Validated instruments to measure exposures to adverse psychosocial factors have to be theoretically and empirically supported (Bambra et al. 2007; Nielsen et al. 2006; Corbiere et al. 2009). Such instruments do exist for psychosocial factors defined by the ERI model (Siegrist 1996) and the demand-control model (Karasek 1979). A number of self-reported validated scales are likewise available to measure mental health outcomes (Muntaner et al. 1998; Kessler et al. 2002; Ilfeld 1976). Objective measures of health should also be used when possible. Objective health indicators are not subjected to self-report bias (Rothman et al. 2008) and therefore provide important support for the validity and impact of the results. Ambulatory blood pressure measurement is a well suited objective cardiovascular health indicator which has several important advantages over the more classical clinic blood pressure measurement. Ambulatory BP also offers better precision and validity, by capturing the BP fluctuations related to daily life (O'Brien 2003). Ambulatory BP measurement is also known to avoid three sources of bias: the observer error, the "white-coat effect" and masked hypertension (Bobrie et al. 2008; Cloutier et al. 2015; O'Brien 2003). Prospective studies showed that ambulatory blood pressure measurement is a much stronger predictor of cardiovascular morbidity and mortality than clinic blood pressure measurement (Grossman 2013; O'Brien 2003).

The development phase also aims at identifying organizational changes needed to eliminate or reduce adverse psychosocial work factors identified as intervention targets and determining how these changes can be optimally implemented. Qualitative tools such as *focus groups and follow-up meetings with employees and managers* could be used to develop well-adapted interventions. These complementary tools also stimulate the continuous implication of both employees and managers in the development and implementation processes.

The implementation phase also requires ***a systematic documentation of how an intervention is carried out***. This comprises a thorough description of the changes implemented in order to: (1) understand how intervention priorities established at the start of the process may be translated by workplace actors into organizational changes and (2) enlighten an intervention success or failure at improving intermediate and final outcomes (Robson et al. 2001; Goldenhar et al. 2001). Documenting the changes implemented will help determining whether the intervention was ineffective or whether it may have been effective but was not properly implemented (Kristensen 2005). As pointed out in a recent literature review of workplace interventions studies (Egan et al. 2009), many studies referred to implementation, but reporting was generally poor and anecdotal in form.

There is often no "one size fits all" solution to improve the psychosocial work environment. Interventions often have to be tailored to an organization and to its local priorities and context. Since adverse psychosocial work factors can take a variety of forms, improving them often requires the use of *multiple components* solutions. Indeed, even though single target interventions may be successful in addressing one specific problem, more comprehensive interventions addressing several organizational-level targets tend to have a higher chance of improving workers' health (Montano et al. 2014; Corbiere et al. 2009).

There is no standardized way to record the changes implemented in psychosocial workplace interventions. A qualitative report of the changes is particularly important in contexts of: multiple components interventions, when changes implemented are specific to work departments, and when intervention priorities are translated into organizational changes by managers, instead of researchers (Bourbonnais et al. 2006a). Detailed logbooks (Gilbert-Ouimet et al. 2015) or updated action plans can be used as qualitative tools to record the changes implemented (Nielsen et al. 2006).

The effectiveness phase aims to evaluate whether an intervention was successful in reducing the prevalence of adverse psychosocial work factors (intermediate effects) and health problems (final effects). A number of quality criteria should also be considered at this stage to provide a valid evaluation of the intervention effectiveness.

First, a prospective design with pre and post intervention measurements and *a control group* are essential to provide a valid measure of intervention effects. A control group in which no intervention takes place is needed to compare workers exposed to the intervention to workers not exposed to the intervention over the same time period. The control group allows to distinguish the changes resulting from the intervention from the changes that would have naturally occurred over the same time period. It is crucial to discriminate the effect of these naturally occurring changes from the effect of the intervention per se (Kristensen 2005). The control group should be comparable to the intervention group in terms of socioeconomic, demographics and general occupational characteristics.

Second, an *appropriate follow-up time* has to be defined. This requires that sufficient time has elapsed between the implementation of interventions and the evaluation of effects (Smith et al. 2011). While a meaningful reduction of the prevalence of adverse work factors could occurs over some months, related improvements in health outcomes may take longer (Gilbert-Ouimet et al. 2011). Longer follow-up durations including more than one post-intervention measure will also make it possible to evaluate whether short-term improvements are sustained over time. It is noteworthy that the use of an inappropriate follow-up time will generally lead to an underestimation of the true effects (Rothman et al. 2008).

Third, a *good participation proportion* reduces the risk of introducing a selection bias due to difference between workers who participate in a study and those who do not (Rothman et al. 2008). Such a selection bias could lead to an under- or overestimation of the true effects. Participation rates should always be reported, at each measurement time. Differences between those who participated and those who did not should be carefully examined and reported. Statistical techniques, such as inverse probability weighting were also identified as appropriate analytical tools to mitigate the potential selection bias induced by loss to follow-up and could be used in workplace intervention studies facing high dropout rates (Howe et al. 2015).

Fourth, the *sample size* has to be sufficiently large to provide the statistical power needed to detect the expected effects of the intervention. One should bear in mind that changes in health outcomes following a workplace intervention can be of small magnitude and nonetheless have important public health implications. An appropri-

ate sample size is necessary to detect such changes. Larger sample size also allows comparing the intervention effects in groups having different risks of illnesses, for example according to socioeconomic status and gender (Egan et al.).

Fifth, an appropriate *control for confounding factors* should also be performed. Confounding factors, such as lifestyle related and behavioral factors are likely to change over time. These factors should ideally be measured before and after the intervention. The use of single baseline measurements could result in residual confounding, leading to potential under or over-estimation of effects.

Sixth, the demonstration of a beneficial effect of an intervention should exclude the possibility for this effect to be attributable to a regression to the mean (RTM). This statistical phenomenon occurs when more extreme measurements tend to be followed by measurements that are closer to the mean (Barnett et al. 2005). In non-randomized workplace interventions, baseline levels of a given illness-related outcome might be higher in one of the compared groups. This discrepancy is sometimes even expected given the fact that the intervention is a priori designed to target groups with worse psychosocial and health profiles (Kristensen 2005). One solution often proposed to eliminate the RTM effect is to adjust for the baseline value of the health outcome. However, baseline adjusted analyses may be biased in the presence of RTM (Glymour et al. 2005). Although not feasible in all settings, a design with several (>1) pre-intervention time points have been recommended to mitigate the RTM effect in non-randomized interventions (Linden 2013).

Finally, cluster analysis should always be considered when the intervention is administered at the departmental level, i.e., when departments act as the unit in which the intervention is implemented (cluster). One consequence of clustering is that measurements on units within a cluster tend to be more similar (Fitzmaurice et al. 2004). Ignoring this correlation among individuals in the same cluster might lead to artificially low standard errors, increasing the risk of Type 1 error (i.e. conclude that a supposed effect exists when it doesn't). One should thus carefully examine the impact of within-department correlation on their study findings.

15.4 Description of Three Psychosocial Workplace Intervention Studies

This section will provide an overview of three psychosocial workplace intervention studies (Bourbonnais et al. 2005b, 2006a, 2011; Gilbert-Ouimet et al. 2011; Brisson et al. 2006) meeting most quality criteria discussed in Sect. 15.3. These three studies aimed to reduce adverse psychosocial work factors and improve mental health. In addition, in one study, the intervention effects on ambulatory blood pressure and hypertension prevalence were also assessed. Studies designs, examples of implemented organizational changes, main results, and contextual elements of these studies will be presented.

15.4.1 Common Grounds of the Three Studies

The three intervention studies used a quasi-experimental before-after design. Pre- and post-intervention measurements were taken between 2000 and 2010. Post-intervention measurements were collected 6–36 months after the implementation of interventions. The three intervention studies included a control group composed of workers having comparable socioeconomic and work characteristics to those of workers of the intervention group. Participation proportions were very good in intervention groups and control groups, with most proportions ranging between 73 % and 86 % (Table 15.1).

The three intervention studies were supported by strong commitments from head managers of the participating organizations. These studies followed the three-phase framework of Goldenhar (Goldenhar et al. 2001) (Fig. 15.1): (1) During the development phase, the a priori risk evaluation consisted in a quantitative assessment of adverse psychosocial work factors and psychological distress. The adverse factors evaluated were high psychological demands, low job control, lack of social support from supervisors and colleagues, and low reward and their combination in the effort-reward imbalance model and the demand-control model. Validated questionnaires were used to measure these psychosocial factors (Karasek et al. 1998; Brisson et al. 1998; Larocque et al. 1998; Niedhammer et al. 2000) and psychological distress (Ilfeld 1976; Perreault 1987; Bellerose et al. 1995; Préville et al. 1992). This initial portrait allowed the identification of intervention priorities. (2) During the implementation phase, the interventions were implemented and systematically documented with a number of tools using mainly qualitative methods but also, to some extent, quantitative ones (Brisson et al. 2006; Bourbonnais et al. 2006b). The intervention was defined as all organizational changes that were implemented with the explicit goal (or the clear consequence) of improving one or more adverse psychosocial work factors of the effort-reward imbalance model or the demand-control model. Decisions regarding the implementation of these changes were made by managers (Bourbonnais et al. 2006a; Brisson et al. 2006) or by an intervention team composed of employees and managers representatives (Bourbonnais et al. 2005b). (3) During the effectiveness phase, the intervention effects were evaluated using quantitative assessment(s) of psychosocial work factors and health outcomes.

15.4.2 Populations and Specificities of the Three Studies

Table 15.1 presents the populations and designs of the three intervention studies. Here is a brief description of each study.

The long-term care centers study (Bourbonnais et al. 2005b) was conducted among health care providers in 12 long-term care centers in Quebec City. The intervention group was composed of 195 workers from four centers. The control group was composed of 298 workers from eight other centers. A multidisciplinary work team of

Table 15.1 Population at baseline and design of intervention studies on effort-reward imbalance and demand-control models and mental and cardiovascular health outcomes

Author Year	Population type, N (% women)	Intervention group (% participation)	Control group	Post-intervention follow-up(s)	Intervention	Outcome
Bourbonnais et al. (2005b)	Health care providers in 12 long-term care centers, N = 872 (78 % women)	195 health care providers of 4 centers (pre- and post-intervention: 81 % and 79 % participation)	298 health care providers of 8 centers (pre- and post-intervention: 82 % and 86 % participation)	12-month	A Priori assessment of psychosocial work factors and psychological distress. Identification of work constraints and development of action plans by intervention teams. Implementation of the plans by teams with support of direction. Documentation of the interventions	Psychological distress
Bourbonnais et al. (2006a, 2011)	Health care providers in 2 general hospitals N = 1110 (80 % women)	492 health care providers of 1 hospital (pre- and 12- and 36-month post-intervention: 73 %, 77 %, 60 % participation)	618 health care providers of the other hospital (pre- and 12- and 36-month post-intervention: 69 %, 62 %, 60 % participation)	12- and 36-month	A Priori assessment of psychosocial work factors and psychological distress	Psychological distress
					Observation of care units (direct and interviews with key informants)	Burnout
					Identification of priorities by the intervention team (2 researchers and 12 employees). Implementation of interventions by managers. Documentation of the interventions	

(continued)

Table 15.1 (continued)

Author Year	Population type, N (% women)	Intervention group (% participation)	Control group	Post-intervention follow-up(s)	Intervention	Outcome
Brisson et al. (2006, 2016), (Gilbert-Ouimet et al. (2011), and Trudel et al. (2011)	White-collar workers of 3 insurance organizations, N = 2167 (60 % women)	1093 workers of 1 organization (pre- and 6- and 36-month post-intervention: 81 %, 86.3 %, 85.2 % participation)	1074 workers of 2 other organizations (pre- and 6- and 36-month post-intervention: 80.7 %, 86.3 %, 85.4 % participation)	6- and 36-month	A Priori assessment of psychosocial work factors and psychological distress. Identification of priorities through a focus group with workers. Implementation of interventions by managers. Documentation of the interventions	Psychological distress Blood pressure level Hypertension

10–15 workers was put in place in each of the four intervention centers. The team was composed of employees and managers representatives. Action plans were developed separately in the four centers to address their specific priorities, which were identified through the quantitative a priori risk assessment. Examples of action plans were: (i) stabilization of work teams and improving the quality of care (psychological demands); (ii) clarification of roles, tasks, and functions of the members of the caregiver team (reward and job control); (iii) staff training, development of leadership skills, team consolidation and sense of belonging (social support); and (iv) developing a support group and a reward program (social support and reward). These action plans were presented to the managers by the researchers. After this presentation, the intervention team received the management's approval and support to implement the actions.

The acute care hospitals study (Bourbonnais et al. 2006a, 2011) was conducted among health care providers working in two acute care hospitals in Quebec City. Both hospitals offer general and specialised short-term care. The study population included all care providers in direct contact with patients (nurses, orderlies, and auxiliary nurses), who occupied permanent full time, part time or temporary positions, or who were on call. There were 492 care providers in the intervention group and 618 in the control group. Intervention priorities were identified by an intervention team. This team was created according to the following criteria (Beermann et al. 1999): operate in small groups, group members of various hierarchical levels, regularly scheduled work meetings, preferably eight to ten meetings, meetings led by an external moderator, and expertise of team members used as input to identify solutions to reduce adverse psychosocial work factors. The team included two researchers, one research assistant, three head nurses, three registered staff nurses (one from each targeted care unit), one beneficiary attendant, one reception clerk, one representative from human resources and one from nursing, as well as two local union representatives (nurses and beneficiary attendant unions).

During eight 3-h meetings held over a 4-month period, two researchers accompanied the intervention team in identifying problems related to adverse psychosocial work factors and their solutions. The intervention team identified a number of problems which were listed, described in detail, and finally synthesised under 56 intervention targets (Bourbonnais et al. 2006b). These targets were then classified according to six problem categories (team work and team spirit, staffing, work organization, training, communication, and ergonomics) and according to the four adverse psychosocial work factors (each problem could be linked to more than one psychosocial factor). Of the 56 intervention targets, 43 % aimed at improving psychological demands, 24 % reward, 20 % decision latitude, and 13 % social support at work. A total of 63 solutions were suggested to address the targets. A number of solutions suggested by the intervention team were implemented (Bourbonnais et al. 2006b). They mainly included conditions that could be resolved and managed by the units. Examples of implemented solutions were as follows: transmission of information on the evening and night shifts (social support), management of replacements at the unit level rather than at the hospital level to improve stability of the personnel (psychological demands), regular work team meetings (job control and

social support), and special training to cover specific needs such as palliative care (job control). Other solutions requiring the approval and support of management could only be implemented on a mid- or long-term basis. These solutions included better training for new nurses during the probation period (job control), enrichment of tasks for beneficiary attendants (job control), new system of medication distribution (psychological demands), and revision of the information and communication system through the hospital, between units, and between shifts (psychological demands and social support). These solutions were consistent with the adverse psychosocial work factors identified as intervention targets (Bourbonnais et al. 2006b).

The white-collar insurance services study (Brisson et al. 2006; Gilbert-Ouimet et al. 2011) was conducted among three semi-public organizations. The intervention group was composed of 1093 workers of a first organization. Their jobs covered the full range of white-collar positions, including senior and middle managers (5 %), professionals (38 %), and technicians and office workers (57 %). The organization was composed of 12 departments of which nine were targeted by the intervention based on a priori risk assessment (described below). All workers currently employed in these nine departments were invited to participate in pre- and post-intervention measures. The control group was composed of 1074 workers, who were either employed in two other semi-public insurance organizations or evolving in the three departments of the first organization for which no intervention was implemented.

An a priori risk assessment was performed separately for each department. Figure 15.2 provides, as an example, the risk assessment conducted in a major department. This department (department A) was composed of 146 office employees (28 men and 118 women) whose work consisted of following up clients and answering clients' requests in accordance with pre-established rules. As shown in Fig. 15.2, in this department, the prevalence of the four adverse psychosocial work factors were significantly higher than in the reference populations (Brisson et al. 2006). All four adverse psychosocial work factors were thus identified as intervention targets. The methods and results of these a priori risk assessments and the related intervention targets were presented in written reports and during an oral presentation to the managers of each department. A second part of the development phase was to conduct focus groups with workers. The aim of these focus groups was to identify, from the worker's point of view, organizational changes that would contribute to reduce the adverse psychosocial work factors that were previously identified as targets for intervention (Brisson et al. 2006; Trudel et al. 2009). These changes were then presented to the managers in written reports and during an oral presentation, as suggestions for implementation.

The organizational changes implemented were systematically documented (Gilbert-Ouimet et al. 2015). Key informants kept a logbook providing a detailed record of every change implemented in the workplace to improve the four adverse psychosocial work factors. A separate logbook was kept for each department. A member of the research team met with each key informant to provide detailed explanations on how to keep the logbook and to emphasize the importance of the task. The following information was recorded in the logbooks for each change implemented: (1) a description of the activity, (2) the goal (or the current problem or situ-

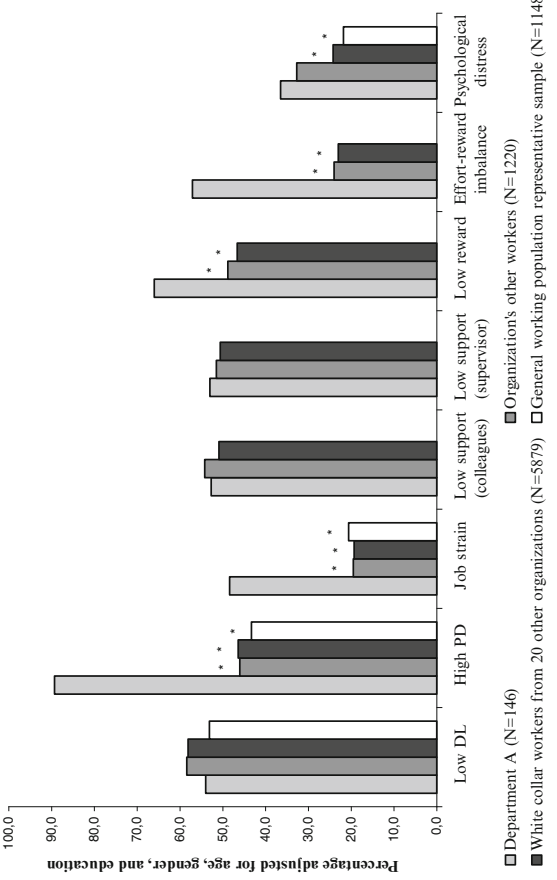

Fig. 15.2 Prevalence of adverse psychosocial work factors and psychological distress in department A compared to reference populations (a priori risk assessment) (From Brisson et al. (2006). *p < .05, *DL* decision latitude, *PD* Psychological demands (Note: The number of men in Department A was insufficient to perform separate analyses by gender)

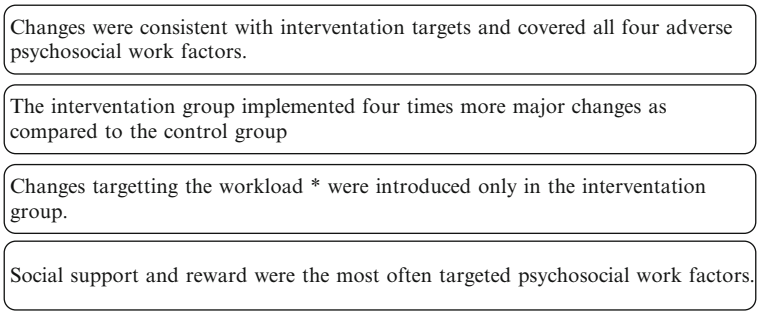

Fig. 15.3 Summary of the implemented organizational changes. *Workload is a component of the psychological demands scale (Adapted from Gilbert-Ouimet et al. (2015))

ation to be solved or improved), (3) the administrative unit involved, (4) the date or period of the activity, (5) the number of employees involved, (6) the adverse psychosocial work factor(s) targeted, and (7) the degree of improvement expected from the activity (weak, medium or strong). A qualitative analysis of the reported changes was performed. Changes were classified into 29 categories providing a description of the intervention content. The "one main" psychosocial work factor potentially improved was assigned to each of these 29 categories (Gilbert-Ouimet et al. 2015).

Changes implemented were consistent with intervention priorities identified a priori and covered all four adverse psychosocial work factors (Gilbert-Ouimet et al. 2015) (Fig. 15.3). Reward and social support were the most acted upon psychosocial work factors. In addition, the intervention group implemented changes to reduce the workload; this psychosocial factor was not acted upon in the control group. The intervention group also implemented four times more major changes than the control group. These major changes were defined as those which: (1) reached a large percentage of employees in the department, and (2) brought about a genuine transformation in the work environment from the viewpoint of the key informants of the organization. Examples of major changes were: slower implementation of a large project to prevent increased workload (psychological demands), increased workforce and replacement of long-term leaves (psychological demands), and grouping teams together to facilitate the use of expertise and to promote synergy (psychological demands and social support) (Table 15.2). The psychosocial work factors potentially improved were identified by the key informants.

15.4.3 Intervention Effectiveness

Table 15.3 presents the effectiveness of the three intervention studies in reducing adverse psychosocial work factors. In the intervention groups, all three studies showed significant improvements in two (Bourbonnais et al. 2005b, 2006a) or three (Brisson et al. 2006; Gilbert-Ouimet et al. 2011) adverse psychosocial work factors (Table 15.3).

Table 15.2 Examples of major changes and targeted adverse psychosocial work factors

Major changes	Targeted adverse psychosocial work factors
Slower implementation of a large project to prevent increased workload	Psychological demands
Increased workforce and replacement of long-term leaves	Psychological demands
Grouping teams to facilitate the use of expertise and to promote synergy	Psychological demands and social support
Career and skills development with conferences and training activities	Decision latitude
Improvement of management practices: consult, orient, and coach	Psychological demands, decision latitude, and social support

Adapted from Gilbert Ouimet et al. (2015)

In the long-term care centers study, the prevalence of job strain decreased from 46.5 % to 38.5 % and the prevalence of low job control decreased from 82.9 % to 76.7 % ($p < 0.05$). Although non-significant, there were also improvements of effort-reward imbalance (48.9–46.3 %), high psychological demands (59.4–57.8 %), low social support from colleagues (33.2–27.4 %) and from supervisors (30.5–26.8 %). In the acute care hospitals study, two psychosocial work factors significantly improved at 12- and 36-month after the intervention: effort-reward imbalance (means of scores decreasing from 1.1 to 1.08 to 1.00) and high psychological demands (from 12.5 to 11.8 to 11.6). Finally, in the white-collar insurance services study, low reward, as shown by the sub-scale "lack of respect and esteem", decreased from 36.1 % to 29.8 %, high psychological demands decreased from 50.1 % to 47.8 %, and low co-worker social support decreased from 53.9 % to 50 % (p-values < 0.05) (Table 15.3). No improvements (Bourbonnais et al. 2005b) or a single improvement (Gilbert-Ouimet et al. 2011; Bourbonnais et al. 2011) were observed in the control groups of the three studies.

Table 15.4 presents the comparison of health outcomes before and after the intervention in the intervention and control groups, respectively. All three studies showed a reduction in the prevalence of high psychological distress in the intervention group (Table 15.4). This reduction was however only significant in the white-collar insurance services study (32.9–29.2 %). In the acute care hospitals study, work-related burnouts and client-related burnouts also reduced between pre-intervention and 12- and 36-month post-intervention evaluations. Mean scores reduced from 48.2 to 46.3 to 43.2 ($p < 0.05$) and from 34.9 to 36.2 to 33.0 ($p < 0.10$), respectively. In the control groups, there was no improvement in any mental health indicators. In the long-term care centers, the control group rather experienced a rise in the prevalence of psychological distress from 43.6 % to 46.0 % (non-significant) (Table 15.4). In the white-collar insurance services study, a significant reduction in systolic (−2.3 mmHg, $p < 0.05$) and diastolic (−1.3 mmHg, $p < 0.05$) BP means was observed (Brisson et al. 2016; Trudel et al. 2011). The prevalence of hypertension was also reduced from 28.2 % to 23.6 % ($p < 0.05$).

Table 15.3 Comparison of psychosocial work factors before and after the intervention period in intervention and control groups

Author Year	Psychosocial work factors	Intervention group			Control group		
	Prevalence (%)	Before	12-month		Before	12-month	
Bourbonnais et al. (2005a, b)	Low reward:	41.3	44.4		57.5	53.0	
	ERI:	48.9	46.3		51.2	48.8	
	High psy. demands:	59.4	57.8		56.5	53.4	
	Job strain:	46.5	38.5*		47.6	44.8	
	Low job control:	82.9	76.7*		87.1	85.4	
	Low SS from coll.:	33.2	27.4		31.6	32.6	
	Low SS from sup.:	30.5	26.8		37.7	33.9	
	Mean scores	Before	12-month	36-month	Before	12-month	36-month
Bourbonnais et al. (2006a, 2011)	Reward:	30.8	31.11	31.3	30.2	30.0	30.2
	ERI:	1.10	1.08*	1.00*	1.2	1.16	1.2
	Psy. demands:	12.5	11.8*	11.6*	13.3	12.9	12.8
	Job control:	69.9	68.7*	70.2	69.4	68.0*	68.6
	SS from coll.:	12.5	12.5	12.5	12.5	12.2*	12.04
	SS from sup.:	11.5	10.8*	11.3	11.1	10.4	10.5*
	Prevalence (%)	Before	6-month		Before	6-month	
Brisson et al. (2006, 2016), Gilbert-Ouimet et al. (2011), and Trudel et al. (2011)	Low reward:	50.5	51.0		58.2	54.8*	
	Low respect and esteem	36.1	29.8*		NM	NM	
	ERI:	29.8	29.2		21.4	20.6	
	High psy. demands:	50.1	47.8*		35.9	37.2	
	Low job control:	56.2	56.7		59.9	59.5	
	Low SS from coll.:	53.9	50*		52.4	49.5	
	Low SS from sup.:	52.1	52.2		54.6	53.8	

* $p < 0.05$ for intra-group comparison between pre-intervention post-intervention measures

Changes in health outcome occurring in the intervention group must be statistically compared to those occurring in the control group to accurately assess the intervention effect per se. These complementary analyses of the intervention effects were performed in the acute care hospitals study and in the white-collar insurance services study. In the acute care hospitals study, the mean scores for client-related and work-

Table 15.4 Comparison of mental and cardiovascular outcomes before and after the intervention in intervention and control groups

Author Year	Psychosocial work factors	Intervention group			Control group		
	Prevalence (%)	Before	12-month		Before	12-month	
Bourbonnais et al. (2005a, b)	Psychological distress	44.9	42.3		43.6	46.0	
	Mean scores	Before	12-month	36-month	Before	12-month	36-month
Bourbonnais et al. (2006a, 2011)	Psychological distress	21.9	21.1	20.6	22.6	22.5	22.4
	Client-related burnout	34.9	36.2	33.0†	36.3	38.5*	37.8
	Work-related burnout	48.2	46.3*	43.2*	48.1	49.4	48.3
		Before	6-month		Before	6-month	
Brisson et al. (2016), Gilbert-Ouimet et al. (2011), Trudel et al. (2011)	Prevalence (%)						
	Psychological distress	32.9	29.2*		30.1	30.9	
	Means						
	Systolic BP	126.6	124.3*				
	Diastolic BP	80.0	79.8*				
	Prevalence (%)						
	Hypertension:	28.2	23.6*				

*$p<0.05$ for intra-group comparison between pre-intervention post-intervention measures
† Borderline significant: $p<0.10$

related burnout were significantly lower ($p<0.05$) as a measure of the intervention effect, 36 months after the intervention. The difference in mean score for psychological distress was of borderline significance. In the white-collar study, the change in the prevalence of psychological distress (reduction) was significantly different from the change (increase) observed in the control group ($p=0.03$). The effectiveness of the intervention in reducing blood pressure was also demonstrated using the control group (not shown).

15.4.4 Discussion

Interpretation The three intervention studies showed improvements in adverse psychosocial work factors. There were also improvements in psychological distress, burnout prevalence and blood pressure level. This section will highlight contextual elements of particular importance for understanding these findings.

In the long-term care centers study, the main contextual elements mentioned as having favoured the improvements observed were the active support of high managers and the fact that the intervention team was representative of all care providers for each work shift (e.g., members of the management, head nurses, union representatives, nurses, assistant nurses, and support staff) (Bourbonnais et al. 2011). However, it was pointed out that the 12-month intervention period was insufficient to adjust and implement some of the action plans (Bourbonnais et al. 2011). Qualitative interviews revealed that workers had great expectations toward the interventions. The only-partial implementation of the action plans generated frustration. This might help to explain the rise in the prevalence of low reward observed from pre-intervention to the 12-month post-intervention evaluation (41.3–44.4 %, Table 15.3). A longer intervention period might have led to a more thorough implementation of the actions plans. A longer follow-up might also have revealed that the non-significant improvement observed for psychological distress was in fact the start of a larger beneficial effect. This underlines the need to evaluate both the short- and long-term effects of interventions aimed to improve mental health indicators.

There was a significant reduction in the prevalence of psychological demands in two out of the three studies (Gilbert-Ouimet et al. 2011; Bourbonnais et al. 2011); the acute care hospitals study and the white-collar insurance services study. In these studies, decreasing the workload was identified as an intervention priority. More precisely, work overload and worker shortages were initially reported in the acute care hospitals study (Bourbonnais et al. 2011), while the workload was identified as an intervention priority in six out of nine departments in the white-collar insurance services study (Gilbert-Ouimet et al. 2011). Acting upon this factor implies improving components of the workload (e.g., increasing staff or replacing workers on sick leave), which can be hard considering the context of strong competition of the current globalized economy. However, findings of these two studies support the fact that it is possible to improve the workload.

In the study conducted in acute care hospitals, a large majority of the solutions proposed by the intervention team were implemented (80 %) (Bourbonnais et al. 2011). One of the main targets of the intervention was to improve social support by stimulating "team work and team spirit". However, contextual difficulties were suggested as having prevented the improvement of social support. These difficulties involved the conflicting needs and priorities of management and employees and communication problems between workers from different work shifts and care units. Nevertheless, in the intervention group, the level of social support (i.e., mean score) remained stable, while in the control group, social support from supervisors deteriorated.

Compared to the two intervention studies conducted among long-term care centers or acute care hospitals, the beneficial effects observed in the white-collar insurance services study were facilitated by the facts that: (1) the study took place among white-collar workers benefiting from regular daytime schedules (8 h00 to 16 h00). Considerable evidence has demonstrated that shift work and night work have deleterious health effects (Ulhoa et al. 2015). These schedules could potentially contribute to dilute the beneficial effects of the interventions among health care providers.

(2) The interventions were mainly implemented at the department-level, which meant that they were specific to each department's priorities. This was not the case in the hospital interventions. Members of a hospital intervention team reported that "means of communication were deficient, which made it difficult to share information between people working different shifts and with other care units in the hospital" (Bourbonnais et al. 2006b). (3) The intervention group of the white-collar insurance services study was involved in a reward promoting program at the time of the study. This program could help to explain the management's interest in acting to improve reward.

The results of the 36-month follow-up of the white-collar insurance services study were not presented here. Preliminary results showed that the beneficial effects observed in the intervention group were maintained, after 36 months, which supports the long-term effectiveness of such psychosocial workplace interventions in reducing blood pressure and improving mental health.

Strengths and Limitations The three intervention studies had some substantial strengths. Among them was the fact that they respected most quality criteria presented in this chapter. First, the participative process of these studies relied, from the start, on both manager commitment and employee involvement, which are recognized conditions for successful preventive interventions (Goldenhar et al. 2001; Mikkelsen et al. 2000). Second, the studies used a quantitative a priori risk evaluation that allowed intervention targets to be identified. This evaluation also included interviews that gathered crucial background information allowing characterising the initial problems and their setting. Third, the multiple component interventions made it possible to target several components of the psychosocial work exposures identified as priorities (Karsh et al. 2001; Denis et al. 2001). Fourth, the studies relied on a sound theoretical background favouring a choice of targets and solutions based on four well-defined psychosocial work factors, whose deleterious effects on CVD (Kivimaki et al. 2012; Aboa-Eboule et al. 2007), high BP (Babu et al. 2014; Landsbergis et al. 2013; Nyberg et al. 2013; Gilbert-Ouimet et al. 2013), and mental health problems (Ndjaboue et al. 2012; Bonde 2008; Stansfeld and Candy 2006; Netterstrom et al. 2008) have been observed in various work settings. Relying on well-defined psychosocial work factors also had the advantage of allowing researchers to translate what managers and staff considered "irritants" into higher order theoretical concepts, thereby increasing their level of understanding of the adverse impact of these work exposures on health. Finally, the three-phase theoretical framework used (development, implementation and effectiveness) is exportable to other workplaces.

The three intervention studies presented in this chapter provide evidence that it is possible to conduct high quality intervention studies without using a RCT design. It is noteworthy that a RCT design is not feasible or even desirable in a number of real life situations (Kristensen 2005; Nielsen and Randall 2013). Findings observed in these studies support the effectiveness of rigorous quasi-experimental workplace intervention studies, given that significant improvements were observed in the intervention groups while almost none were observed in the control groups. To be rigor-

ous however, workplace intervention studies have to rely on the previously suggested quality criteria (Sect. 15.3). Respecting these quality criteria may foster intervention success or, at least, provide a better understanding of intervention failures.

Gender differences have been observed in the effects of adverse psychosocial work factors on cardiovascular and mental health outcomes (Stansfeld and Candy 2006; Netterstrom et al. 2008; Bonde 2008; Backe et al. 2012; Hemingway and Marmot 1999; Eller et al. 2009; Landsbergis et al. 2013; Kivimäki et al. 2006; Belkic et al. 2004). In the white-collar insurance services study, beneficial effects on psychological distress and blood pressure were observed in both men and women, which support the consistency of the intervention effects across both genders. This finding adds important new knowledge to the field of psychosocial workplace intervention. Indeed, Bambra et al.'s systematic review (Bambra et al. 2007; Egan et al. 2007) pointed out that the available studies provide very little insight into the differing effects of such workplace interventions by gender (Bambra et al. 2007; Egan et al. 2007). Most studies performed statistical adjustment for gender, preventing to observe potential differences between women and men.

Strong evidence shows that the incidence of cardiovascular diseases and mental problems tends to be higher among people with lower socioeconomic positions. However, workplace intervention studies have predominantly been conducted in middle class samples (Kristensen 2005). As suggested by Kristensen, these interventions should also be implemented among workers of lower occupational classes, immigrants, young workers, obese workers, workers in small- and medium-size enterprises and temporary workers.

Impact on Managerial Practice The probing results of the white-collar insurance services study led to a guide of organizational practices beneficial to health (Gilbert-Ouimet et al. 2009). This guide was intended to promote the implementation of practices having the potential to improve psychosocial work factors of the effort-reward imbalance and demand-control models (low reward, high psychological demands, low decision latitude, and low social support). The guide comprises 18 practices. These practices were chosen because: (1) they were implemented in administrative units where at least one psychosocial work factor significantly improved and (2) they were coherent with available empirical evidence and researchers' expertise. The organizational practices were classified according to five organizational dimensions, namely: (i) participative management, (ii) interpersonal aspects and support, (iii) work organization, (iv) career and skills development, and (v) mission, culture, and leadership. These dimensions were selected from theoretical models of organization performance and change (Burke 2002; Peters and Waterman 1982). Table 15.5 presents the 18 practices according to the psychosocial work factor that they are likely to improve.

A recent research project identified factors facilitating or preventing the implementation of the practices suggested in this guide and in other tools designed to improve psychosocial work factors. Over 100 managers of four organizations participated in the project. To identify factors influencing implementation of the organizational prac-

Table 15.5 Organizational practices aiming to reduce psychosocial work factors and improve health, according to five organizational dimensions

Organizational practice	Psychosocial work factor(s)
Participative management	
1. Creating committees, workshops, team meetings (participation to decision making)	Social support and decision latitude
2. Having individual meetings with managers (adjustment of the tasks and workload and talk about difficulties)	Psychological demands, decision latitude, and social support
Interpersonal aspects and social support	
3. Holding reward activities (for the work done)	Reward
4. Highlighting the employees successes	
5. Holding interpersonal activities	Social support
Work organization	
6. Revising processes	Psychological demands, decision latitude, social support, and reward
7. Introducing work tools facilitating work task(s)	Psychological demands
8. Implementing organizational changes progressively	
9. Increasing staff (temporarily or permanently)	
10. Replacing employees on sick leave	
11. Introducing flexible scheduling	Psychological demands and decision latitude
12. Enriching tasks	Decision latitude
Career and skills development	
13. Revising tasks complexity	Reward
14. Coaching/mentoring	Psychological demands
15. Encouraging participation to formation activities	Decision latitude
Mission, culture, leadership	
16. Communicating objectives, mandates, issues	Social support
17. Defining and diffusing politics and action plans to employees	Psychological demands, decision latitude, social support, and reward
18. Managing the planning of the workforce	Psychological demands and decision latitude

tices, self-reported questionnaires were administered at baseline and 3 months later (N = 144 at baseline; N = 157 at 3-month follow-up). The results showed that managers were more likely to implement practices beneficial to health when: (1) their organization gives high priority to mental health; (2) they have more decision latitude; (3) they have better relationships with their subordinates, and (4) they have less psychological distress. Also, men and older managers were the most likely to adopt organizational practices promoting employees' health (Biron et al. 2015). It is worth noting that manager's workload was not identified as a factor influencing the implementation of these practices suggesting that adopting good management practices doesn't increase the workload of managers (Biron et al. 2015).

15.5 Public Health Policies

Enterprises can be supported by public health policies in order to achieve primary prevention of organizational or psychosocial work factors. We have in this matter, few interesting initiatives from many countries. UK for example, put in place, a few years ago, the Health and Safety Executive project aiming to support enterprises by proposing managerial standards to reduce or control psychosocial risks factors (Health and Safety Executive 2007). Six factors were targeted; workload, control, support, interpersonal relationships, roles and transformation (organizational changes). The proposed process relies on a three steps approach, namely: risk evaluation, discussion of the results by stake holders and joint discussion for improving working conditions.

In Canada, there are also two voluntary standards aiming to promote healthy organizational practices and prevent related health problems: *Psychological Health and Safety in the Workplace* (CAN/CSA-Z1003-13/BNQ 9700-803/2013) and *Prevention, promotion and organizational practices contributing to health in the workplace* (BNQ9700-800/2008).

The first standard states in its introduction that the strategic pillars of psychological health and safety rely on human needs which, when unmet or thwarted, can become risk factors for psychological distress, whereas, when satisfied, can lead to psychological and organizational health (Standards Council of Canada 2013). These human needs include security and physiological safety, belonging, social justice, self-worth, self-esteem, self-efficacy, accomplishment, and autonomy. These human needs are well covered by or part of the ERI and demand-control models. The standard was launched in January 2013 (Standards Council of Canada 2013). A group of Canadian researchers from Simon-Fraser University in British Columbia, with whom our group collaborates, are currently conducting case studies in organizations to *document success and failures in implementing this standard.* Regarding acceptability of this standard for stake holders, a recent study showed that *the standard was positively described as a resource that could provide direction, tools, and guidance to address psychosocial elements in the workplace and that a broad range of potential benefits for employees, employers, and workplaces were identified for implementing the standard* (Kunyk et al. 2016).

The second standard applies only to the province of Quebec (Canada) and is composed of four areas of activities. One of these areas specifically targets management practices in order to reduce adverse psychosocial works factors. The three other areas of this standard relate to lifestyle habits, physical work environment, and work-life balance. This standard was put in place in 2008 (Bureau de Normalisation du Québec (BNQ) 2008). The standard is currently being evaluated by our research group in ten workplaces in terms of its implementation, effects on physical and mental health of employees, and economic impact for employers (Sultan-Taïb et al. 2014–2016).

Some countries like Denmark have gone further by training their labour inspectors in the use of tools and sectorial guides to evaluate psychosocial risk factors.

They have also established an intervention monitoring system based on discussion with social partners (Rasmussen et al. 2011). These preventive strategies can also take the form, at a national level, of social and labour policies to protect the least privileged segments of the labour market. These national policies are promising. In fact, recent research has shown that the average level of stress at work (as measured by the ERI and the demand-control models) was significantly lower in countries with well-developed social and working policies. Furthermore, the effect of effort-reward imbalance on depression was also less pronounced in these countries (Lunau et al. 2013).

15.6 Conclusions

Available evidence shows that primary prevention through workplace interventions has the potential to reduce exposure to adverse psychosocial work factors such as those of the effort-reward imbalance model. Moreover, these interventions could lead to significant improvements of mental and cardiovascular health outcomes. Findings from the three psychosocial workplace intervention studies presented in this chapter showed improvements of psychosocial work factors, psychological distress (Bourbonnais et al. 2005b; Gilbert-Ouimet et al. 2011), and burnout prevalence (Bourbonnais et al. 2006a, 2011). Also, one of these intervention study showed that reducing exposure to ERI, high psychological demands, and low social support led to significant reductions in workers' blood pressure level and hypertension prevalence, in both men and women (Brisson et al. 2016; Trudel et al. 2011). At the population level, reduction of blood pressure in the range of those observed in that study may prevent large numbers of premature deaths and disabling strokes. Indeed, a 2 mmHg lower systolic blood pressure mean would involve about 10 % lower stroke mortality and 7 % lower mortality from ischemic heart diseases (IHD) or other vascular causes in middle age (Lewington et al. 2002).

Cardiovascular diseases and mental health problems result in important economic and social costs. Population-wide strategies, targeting whole populations are crucial preventive measures, found to be effective in reducing the burden of these health problems (Whelton et al. 2002; Whelton 2015; WHO 2004). In the particular case of high BP, there is a clear need for additional population-level initiatives and multifactorial interventions (Perkovic and Rodgers 2015). In this context, determining whether or not workplace interventions are effective in improving cardiovascular and mental health is of major public health significance. As supported by the presented evidence, workplace interventions targeting adverse psychosocial work characteristics appear to be promising approaches and could lead to significant benefits on disease prevention. The underlying causal pathway would involve the implementation of theory-based multi-components workplace interventions leading to reductions of adverse psychosocial work factors and subsequent improvements of mental health and blood pressure. Lowering the burden associated with

work-related health problems could lead to reductions of the use of health services, compensation for permanent disabilities, and sickness absenteeism. These consequences require going beyond the traditional approach limited only to compensable occupational morbidity. In order to advance our knowledge, innovative research and preventive interventions have to open on the wider field of all morbidity due to work, using validated models to identify specific dimensions of work organization that are pathogenic. The effort-reward imbalance model provides a strong contribution to local, national and international efforts developed toward this goal.

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