



Job Demand and Control Interventions: A Stakeholder-Centered Best-Evidence Synthesis of Systematic Reviews on Workplace Disability

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Abstract

Background: Physical and psychological job demands in combination with the degree of control a worker has over task completion, play an important role in reducing stress. Occupational stress is an important, modifiable factor affecting work disability. However, the effectiveness of reducing job demands or increasing job control remains unclear, particularly for outcomes of interest to employers, such as absenteeism or productivity.

Objective: This systematic review reports on job demand and control interventions that impact absenteeism, productivity and financial outcomes.

Methods: A stakeholder-centered best-evidence synthesis was conducted with researcher and stakeholder collaboration throughout. Databases and grey literature were searched for systematic reviews between 2000 and 2012: Medline, EMBASE, the Cochrane Database of Systematic Reviews, DARE, CINAHL, PsycINFO, TRIP, health-evidence.ca, Rehab+, National Rehabilitation Information Center (NARIC), and Institute for Work and Health. Articles were assessed independently by two researchers for inclusion criteria and methodological quality. Differences were resolved through consensus.

Results: The search resulted in 3363 unique titles. After review of abstracts, 115 articles were retained for full-text review. 11 articles finally met the inclusion criteria and are summarized in this synthesis. The best level of evidence we found indicates that multimodal job demand reductions for either at-work or off-work workers will reduce disability-related absenteeism.

Conclusion: In general, the impacts of interventions that aim to reduce job demands or increase job control can be positive for the organization in terms of reducing absenteeism, increasing productivity and cost-effectiveness. However, more high quality research is needed to further assess the relationships and quantify effect sizes for the interventions and outcomes reviewed in this study.

Keywords: Job demands; Job control; Workplace; Efficiency, organizational

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Introduction

A substantial body of research indicates that the physical and psychological demands of a job can contribute to higher rates of disability,^{1,2} higher levels of sickness absence,^{3,4} and poorer return-to-work outcomes. The risks of physical and psychological demands appear to exist across different job categories as well as illness types, including mental health conditions,^{3,4} rheumatoid arthritis,^{1,2} low back pain,⁵⁻⁷ and cancer⁸. In a recent synthesis and critical evaluation of systematic reviews, White, *et al*,⁹ concluded that there is strong evidence that increased physical and psychological job demands are risk factors for disability and work absence.

A second body of research suggests that reduced decision latitude or job control may also affect disability and work absence. For example, O'Neill, *et al*,¹⁰ found reduced rates of return to work after myocardial infarction when decision latitude is low. Similar systematic reviews have concluded that decision latitude predicts short-term absence and/or disability for workers with mild injuries or illnesses,¹¹ low back pain,^{6,12} or mental health conditions^{3,4}. White, *et al*,⁹ suggest that the evidence is strong that job control should be considered a “limited” risk factor of work disability.

The possibility that the combination of high job demands and low job control could have a particularly negative impact on worker health was first hypothesized by Karasek¹³ and has since been tested in a broad range of studies.¹⁴⁻¹⁶ Karasek¹³ proposed that physical and psychological job demands such as the pace, amount and difficulty of work interact with the degree of decision latitude (discretion) to produce job strain. In 1992, Karasek and Theorell¹⁷ revised the original model in order to include social support as a third component. The Job-Demand-Control-Social Support

Model¹⁷ suggests that the greatest negative impact on health will occur when job demands are high, control is low and social support is also low. Other researchers have expanded the model beyond the original psychosocial model to include evaluation of physical job demands.¹⁸ Although tests of Karasek's model have been somewhat mixed,¹⁹ the demand-control relationship is largely supported in the academic literature.²⁰

While the literature pointing towards a relationship among high job demands, low job control and disability is relatively convincing, it is less clear whether interventions aimed at reducing these risk factors are effective. Research has been conducted on demand-control interventions, such as job modification,²¹ task reorganization,²² environmental modification,²³ the use of ergonomic equipment,²⁴ and quality circles (a participative management technique intended to increase employee involvement in decision-making)²⁵. The difficulty determining which interventions are most effective arises in part because the range of potential interventions is very broad, while the work context and participant groups may be quite specific. Interventions can be temporary or permanent; they can include a single activity or they can be complex/multimodal treatments; they can involve all workers, only those in certain occupations, or only those returning to work after a disabling incident. Understanding which interventions work and which do not is further complicated because “effectiveness” can be defined in different ways. Researchers may use different measures of effectiveness including disability incidence, disability duration, recurrence of disability, general employee health, absenteeism, productivity, or other outcome variables.

Without a clear understanding of the state of current research, stakeholders often embark upon a variety of activities

intended to address demand and control concerns. They may develop costly programs that are intended to reduce risk, but find that the results do not meet expectations. One reason for the separation between research and practice is that studies assessing the effectiveness of demand-control interventions tend to be published in academic journals that are inaccessible to employee, employer, and government stakeholders who could utilize the research to inform workplace practice and public policy. Discussions with stakeholders indicate that they are motivated to learn from the academic literature, but find that in addition to access, they need assistance from experts in order to evaluate the scientific merit of the research.⁹ Employers and other stakeholders are particularly interested in understanding the impact of interventions on the employee in terms of return to work, performance, and absenteeism. They also want to ensure that the programs developed to manage demand/control risks are cost-effective and a responsible use of financial resources.

The purpose of this study was therefore 1) to describe existing research that assessed the effect of job demand or control interventions on a) return to work for employees with disabilities, b) worker absenteeism, c) employee performance or productivity, and d) financial outcomes including cost/benefit analyses; 2) to evaluate the quality and quantity of that research; and 3) to involve scientific and practitioner stakeholders in the research process to facilitate knowledge exchange including translation of the results into information that can be utilized in the workplace.

Materials and Methods

This paper reports on workplace-based job demands and control interventions that address worker absenteeism rates,

productivity and economic outcomes that have been derived from a broader best-evidence synthesis of systematic reviews²⁶ investigating interventions that address modifiable risk factors of work absence across different health conditions.^{9,27} As such, the methods described below are similar to those described in other papers resulting from this study.²⁶

This synthesis was conducted by an academic-community partnership (ACP) consisting of academic researchers and stakeholders. The ACP team collaborated in developing the purpose of the review, search terms, inclusion and exclusion criteria, refinement and categories used for data abstraction, and manuscript preparation. Consultation occurred through meetings, in person or by video conference, as well as review and reflection via e-mail. The ACP team also pilot-tested a collaboration process integrated within the Health and Work Productivity Portal (www.healthandworkproductivity.org), a Web site designed to facilitate knowledge translation among disability prevention academics and practitioners. The ACP approach was intended to ensure that the project results were relevant to all stakeholders and had practical value for non-academic partners.

The PRISMA²⁸ statement for best-evidence synthesis and reporting of systematic reviews and the Institute of Medicine's Standards for Systematic Reviews²⁹ guided the research process. This process included 1) developing a search strategy in consultation with two librarians associated with the project and reviewed by an external librarian; 2) pilot-testing the search strategy for relevance and refinement of search terms by members of the ACP team; 3) two or more researchers independently assessing titles for relevance (any conflicts were moved to the abstract review); 4) two or more independent researchers assessing abstracts for relevance (any conflicts were moved to full text review); 5) retriev-

For more information on PRISMA statement see <http://www.prisma-statement.org/>



ing full-text articles for in-depth review; 6) assessing relevance of full-text articles by two independent reviewers; 7) pilot-testing abstraction of data for relevance and comprehensiveness with participating stakeholders; 8) reviewing methodological quality of all included articles by two independent reviewers, with disagreements resolved by consensus; and 9) participation of stakeholders in creating the final report to ensure relevance to their organizational contexts.

Search Strategy

The search strategy was initially developed by the ACP team and subsequently validated by a library information specialist and peer-reviewed by a second information specialist. The MeSH terms utilized were also reviewed by external librarians

to ensure the sensitivity and specificity of the search. Databases searched included Medline, EMBASE, the Cochrane Database of Systematic Reviews, DARE, CINAHL, PsycINFO, and TRIP. Grey literature database searches included health-evidence.ca, Rehab+, National Rehabilitation Information Center (NARIC), and the Institute for Work and Health (IWH). The reference lists of included articles were hand-searched for additional articles. Experts, identified through the reference lists, were then contacted and asked to suggest other relevant reviews for this study.

Inclusion/Exclusion Criteria

To be included in the current synthesis, articles were required to a) be a systematic review of the impacts of interventions that occurred at the workplace or were managed by the workplace; b) be focused on an adult population (15+ years) either at work or trying to return to work; c) be published between January 1, 2000, and September 30, 2012; d) be a quantitative or qualitative review, with or without meta-analysis of results; e) report on one or more of the following outcomes: work absence, productivity, or economic outcomes; and f) discuss risk or protective factors for disability-related work absence.

Reviews that focused on severe or rare physical or mental conditions, or specific populations that would be difficult to generalize to other occupations (*eg*, firefighters), were excluded. Two reviewers independently assessed the full-text of articles against these criteria.

Quality Assessment

Quality assessment forms for included articles were developed using a modified version of the Health-evidence.ca quality assessment tool, as well as the EBM Glasgow Checklist³⁰ for Systematic Reviews and AMSTAR methodological quality guidelines.³¹ ACP members participated in de-

TAKE-HOME MESSAGE

- Occupational stress is an important, modifiable factor affecting work disability.
- The physical and psychological demands of a job can contribute to higher rates of disability, higher levels of sickness absence, and poorer return-to-work outcomes.
- Increased physical and psychological job demands are risk factors for disability and work absence. Also reduced decision latitude or job control may affect disability and work absence.
- Decision latitude predicts short-term absence and/or disability for workers with mild injuries or illnesses, low back pain, or mental health conditions.
- The greatest negative impact on health will occur when job demands are high, control is low and social support is also low.
- The research assessing the effect of job demand reductions on important stakeholder outcomes such as absenteeism and productivity, is at a more advanced stage than similar research on job control.

veloping the quality assessment forms, including any changes made in questions or scoring. Questions added to the quality assessment form included the relevance to small employers, strengths and weaknesses of research design, implementation recommendations from authors and from the reviewers, and whether or not the systematic review met the inclusion/exclusion criteria for this study.

The quality assessment form included 18 questions, and quality scores were created based on the 10 numeric questions, which were translated into a percent of the total possible score. Methodological quality was considered high if the review scored 85% or over, medium if it scored 75%–84%, and low if it scored 50%–74%. Studies achieving a score of less than 50% were removed from our synthesis. Appendix A shows the methodological quality questions and weighting system.

Data Abstraction

Data abstraction forms were developed and reviewed by researchers in collaboration with stakeholders. These forms were then pilot-tested using a selection of 10 systematic reviews. The ACP team reviewed the sample abstraction to ensure content they felt was relevant was captured. The refined abstraction tables categorized articles by the previously determined risk factors for work absence. Article placement was decided upon by consensus among ACP team members. Data abstracted included method, sample, intervention, results, and author conclusions.

The results were organized by the outcome of interest: work absence/return to work, productivity, or other financial outcomes. The overall level of evidence was assessed by our team based on the consistency of effect, conclusions of the review authors, number and quality of the systematic reviews. The overall level of evidence was considered “strong” if the effect

was found positive in 70% or more of the included reviews, there were at least three reviews where the authors concluded the evidence was strong, or two reviews that concluded the evidence was strong and two that concluded the evidence was moderate. It was considered “moderate” if the effect was positive for 60%–69% of the included reviews, and at least one review characterized the results as strong and one concluded there was a moderate level of evidence, or three reviews stated there was a moderate level of evidence. The level of evidence was considered “limited” if the effect was positive in 50%–59% of the reviews, and there was at least one review that concluded there was moderate evidence and one review stating weak/limited evidence, or three reviews finding weak/limited evidence. It was considered “inconsistent” if the effect was positive in fewer than 50% of the reviews; and “insufficient” if the effect was not inconsistent, but did not meet the criteria for limited evidence.

Results

Our initial search resulted in 3363 titles after duplicates were removed. These were uploaded into RefWorks® for review. Titles were examined for relevance to the review, and 115 articles were selected for full-text review. Further exclusions were as follows: 48 articles did not have work-related outcomes, 35 did not involve job control or demand components in their intervention, eight were not systematic reviews, and 13 were excluded for other reasons (Appendix B). Eleven systematic reviews were identified that assessed interventions related to the predictive factors of job demand and control.

Job Demand Interventions

Ten systematic reviews assessed job demand interventions. Interventions are described in Appendix C, and included

Table 1: Level of evidence for the effect of job demand modifications on return to work, absence or sick leave among at-work workers

Review	Intervention type	Review quality	Applicable studies	Effect	Author assessment of evidence quality
Simple					
Bond, <i>et al</i> ²²	Work reorganization	Medium	7+	+/-	Inconsistent
Maher ²¹	Work modification	High	1	0	Insufficient
Linton, <i>et al</i> ³²	Lumbar support	Medium	3	+/-	Insufficient
Complex					
Aas, <i>et al</i> ²³	Multimodal including physical environment modification	High	1	+	Moderate
Bos, <i>et al</i> ²⁴	Multimodal including ergonomic equipment	High	2	+/-	Inconsistent
LaMontagne, <i>et al</i> ³⁶	Multimodal job stress (physical or psychological) reduction	High	18	+	Strong

work modifications that were intended to reduce either physical or psychological job demands. Examples include work redesign, ergonomic adjustments, and changes to the social or physical environment. Study interventions were simple (one or two components) in four reviews^{21,22,32,33} and complex (two or more components) in five reviews^{23,24,34-36}. A review by Franche, *et al*,³⁷ included studies with both simple and complex interventions. The study populations in six of the systematic reviews were at work at baseline (with or without pain or musculoskeletal disorders).^{21-24,32,36} Four reviews assessed workers on sick leave or disabled at baseline.^{33-35,37} Eight of the 10 reviews met the standard for high-quality reviews (a score of 85% or higher) and two^{22,32} met the standard for moderate quality (a score of 75%–84%). Appendix C includes the quality score totals for each review.

Job demand interventions and return to work/absenteeism/sick leave

Table 1 summarizes the six reviews that assessed the effect of job demand modifications on return to work, work absence or sick leave among at-work workers. Approximately 32 studies were included in the reviews. Some overlap is possible due to the different approaches to reporting included studies and review results. The intervention effects were mixed in four reviews,^{22,24,32,36} positive in the review by Aas, *et al*,²³ (only one study in this review assessed the effect on absence), and Maher, *et al*,²¹ suggested there was no effect. Notably, LaMontagne, *et al*,³⁶ conducted the most thorough, high-quality examination of this particular outcome for at-work workers. The authors identified 90 evaluations of job stress interventions. Eighteen of these studies included interventions affecting job demands, 15 of which showed positive effects for multimodal interven-

Table 2: Level of evidence for the effect of job demand modifications on return to work, absence or sick leave among off-work workers

Review	Intervention type	Review quality	Applicable studies	Effect	Author assessment of evidence quality
Simple					
Franché, <i>et al</i> ³⁷	Work accommodation	High	2	+	Strong
Palmer, <i>et al</i> ³³	Environmental modification	High	15	+	Limited
Complex					
van Oostrom, <i>et al</i> ³⁵	Multimodal	High	6	+	Moderate
Franché, <i>et al</i> ³⁷	Multimodal	High	7	+	Strong
Carroll, <i>et al</i> ³⁴	Multimodal	High	4	+	Moderate

tions that target both the individual and the organization. The authors concluded that individually focused interventions are effective for individual outcomes, but organizationally focused approaches garner benefits at both the individual and organizational level.

Overall, the evidence that simple work modifications have an influence on absenteeism or sick leave in at-work workers can be considered insufficient. Effects are mixed in two reviews, there is no effect in one review, and the authors in all three studies indicate either inconsistent or insufficient evidence. However, the level of evidence that complex, multimodal interventions for at-work workers can reduce absence is moderate. The three reviews assessing this outcome for at-work workers show relatively consistent positive effects, with one author concluding the evidence is strong and one concluding the evidence is moderate.

There were four high-quality reviews

that assessed the effect of job demand modifications on absence among workers who were on sick leave at baseline.^{33-35,37} Study participants were work disabled due to pain and/or musculoskeletal disorders. All four reviews (including approximately 34 studies) showed positive effects on the outcome variables of interest. The overall level of evidence is limited for simple interventions and moderate for complex interventions (Table 2).

Palmer, *et al*,³³ suggested that research evidence supporting simple interventions is limited because the studies included in their review were typically small (with a mean sample of 107), and limited in quality. The median reduction in sick absence was 1.11 days/month, but the effect sizes were smaller in the larger studies, suggesting a possible publication bias.

In comparison, Franché, *et al*,³⁷ identified a total of ten high to very high quality studies that had assessed return to work interventions with some combination of

Table 3: Level of evidence for the effect of job demand modifications on financial outcome among at-work and off-work workers

Worker status	Review	Intervention type	Review quality	Applicable studies	Effect	Author assessment of evidence quality
At-work	Maher ²¹	Simple	High	2	–	Insufficient
At-work	LaMontagne, <i>et al</i> ³⁶	Multimodal	High	5	+	Moderate
Off-work	Franche, <i>et al</i> ³⁷	Multimodal	High	4	+	Moderate
Off-work	Carroll, <i>et al</i> ³⁴	Multimodal	High	4	+	Moderate

the following components: a) early contact with the worker by the workplace, b) work accommodation offers, c) contact between the health care provider and the workplace, d) ergonomic worksite visits, e) supernumerary replacements, and f) return to work coordination. The interventions were multimodal in most studies, so assessing the unique contribution of individual elements is not possible. However, the review does suggest that disability duration is decreased when employers use interventions that reduce job demands through work accommodation (strong evidence) and ergonomic worksite adjustments (moderate evidence). The evidence supporting the use of supernumerary replacements was insufficient.

Job demand interventions and work productivity/performance

Only one high-quality review³⁶ and one medium-quality review²² assessed the effect of job demands on performance or productivity. Eight studies were included in the high-quality review. All eight used complex, multimodal interventions. Six studies with simple interventions were included in the medium-quality review. Both reviews assessed modifications that reduced demands for at-work workers, and both indicated that the interventions

had a positive impact on productivity or performance. However, when we distinguish between simple and complex interventions, the evidence must be considered insufficient in each category. As noted by Bond, *et al*,²² the results “from laboratory (or analogue)-based research are very consistent in showing the detrimental impact of demands on performance.” However, their applicability to organizations is limited by research, which has been largely conducted in laboratory settings, without longitudinal analysis, and without considering the potential confounding effects of job control.

Job demand interventions and financial outcomes

Table 3 summarizes the four high-quality reviews assessing the effect of job demand modifications on financial outcomes.^{21,34,36,37} Two reviews considered the effect on at-work workers.^{21,36} Seven studies were included in these two reviews. The studies assessed financial gains resulting from increased productivity, reduced absenteeism, or based on a cost-benefit analysis of the study interventions. In Maher's review,²¹ the two studies that assessed financial outcomes were rated of moderate quality, but the simple interventions were found to have no positive financial

Table 4: Level of evidence for the effect of job control interventions on at-work workers

Outcome	Review	Intervention type	Review quality	Applicable studies	Effect	Author assessment of evidence quality
Return to work/sick leave	Bond, <i>et al</i> ²²	Simple	Medium	4	+	Moderate
	LaMontagne, <i>et al</i> ³⁶	Multimodal	Strong	15	+	Strong
Productivity	Pereira and Osburn ²⁵	Simple	Medium	14	+	Moderate
	Bond, <i>et al</i> ²²	Simple	Medium	11	+	Moderate
Financial outcomes	LaMontagne, <i>et al</i> ³⁶	Multimodal	High	6	+	Moderate
	Bond, <i>et al</i> ²²	Simple	Medium	4	+	Moderate
	LaMontagne, <i>et al</i> ³⁶	Complex	High	3	+	Insufficient

benefit. The review from Lamontagne, *et al*,³⁶ found financial benefits for complex interventions. The authors of that review concluded that organizationally focused systems approaches to reduce job stress have favorable impacts at both the individual and organizational level. Although there is more evidence to support complex interventions, the overall level of evidence for the financial benefit of simple or complex interventions to reduce job demands is insufficient.

The other two reviews assessed the effect of job demand interventions on off-work workers. In the first of these reviews, Franche, *et al*,³⁷ highlight why cost-benefit analyses are not commonly included in outcomes. They note that claims cost data distributions are highly skewed because a small number of individuals typically incur the largest costs. Skewed distributions may result in non-significant results, even though very small differences in costs can translate into large net savings at the population level. Franche, *et al*,³⁷ located two high-quality and two very high-quality studies and suggested there is moderate evidence that work accommodations and

ergonomic interventions reduce costs associated with work disability.

In a more recent review, Carroll, *et al*,³⁴ also found four studies of good or moderate quality that evaluated the cost-effectiveness of job demand interventions. They conclude that although the study results are difficult to compare because of design differences, it is still possible to infer that multidisciplinary interventions that include some form of workplace involvement are likely to result in a net cost saving or a low cost-effectiveness ratio.

Overall, the level of evidence assessing the effect of job demand modifications for off-work workers on financial outcomes is positive, and limited to moderate.

Job Control Interventions

There were three reviews that addressed the effects of increased control or job participation on at-work workers (Table 4).^{22,25,36} Two medium-quality reviews^{22,25} assessed simple (1-2 components) interventions for at-work workers. One high-quality synthesis³⁶ assessed complex, multimodal interventions for at-work workers, which may have included changes to job

demands in addition to increased employee participation.

Job control and return to work/sick leave/absenteeism

Bond, *et al*,²² and LaMontagne, *et al*,³⁶ assessed the effects of increased job control or employee participation on absenteeism, among at-work workers. Bond, *et al*, conducted meta-analyses of four longitudinal studies and found a small but statistically significant effect on absence rates. The authors note that their meta-analysis is further supported by several large scale prospective cohort studies that suggest employees who report low levels of job control have between 20% and 50% higher rates of sick absence compared to those who report high levels of job control.³⁸⁻⁴⁰ LaMontagne, *et al*'s high-quality review included 15 studies that assessed absenteeism as an outcome of complex interventions, all of which included a job control or participation element.³⁶ The intervention designs make it difficult to parcel out the effect of the job control element alone. However, 12 of the 15 studies did find positive effects on absenteeism. The authors also suggest that sickness absence is favorably associated with more participatory interventions and interventions targeting psychosocial work environments.³⁶ Based on our evaluation system, the overall level of evidence that increased job control reduces sick leave and absenteeism among at-work workers might be considered moderate. However, it should be noted that if the evidence for complex and simple interventions is considered separately, the level is limited for each, indicating that more research is needed.

Job control and productivity/performance

All three of the job control reviews assessed the impacts of control interventions on productivity or performance.^{22,25,36} Pereira and Osburn²⁵ conducted a meta-analysis

of the participative technique of quality circles. Quality circles are a management technique used to involve employees in solving organizational or job-related problems. They found eight studies using self-appraisal as the performance measure, and six studies using supervisor appraisal. Effects on productivity and performance were positive in 13 of the 14 studies. The authors note that the effect sizes were quite small in the first year of implementation, but grew over time, indicating that organizations should use longitudinal designs when implementing and evaluating quality circles. Similarly, Bond, *et al*,²² conducted a meta-analysis of 11 longitudinal studies and found small to medium statistically significant results. The studies assessing "objective" performance measures in Bond, *et al*'s meta-analysis included both laboratory experiments (five studies) and field research (three studies). Considering all three studies together (both simple and complex interventions), the overall level of evidence regarding the effects of increased job control on work performance is moderate and positive. Considering simple or multimodal interventions separately, the level of evidence for each is limited.

Job control and financial outcomes

Two reviews (assessing seven studies in total) considered the effects of job control on financial outcomes.^{22,36} The effects were positive in both reviews. Bond, *et al*,²² considered the evidence as moderate. However, it should be noted that they did not conduct meta-analyses on financial outcomes. Rather, they reported the estimated cost savings associated with reduced absenteeism or turnover in four studies. The authors suggest that "even small to medium statistical effects can translate into meaningful financial savings."²² They conclude that the financial impacts of increased job control have been "convincingly demonstrated in four rigorously designed inter-

Table 5: Evidence level summary

Simple Intervention × Outcome	Overall level of evidence	
	At-work	Off-work
Demand × absence	Insufficient +	Limited +
Demand × productivity	Insufficient +	No reviews
Demand × financial outcome	Insufficient +	No reviews
Control × absence	Insufficient +	No reviews
Control × productivity	Limited +	No reviews
Control × financial outcome	Insufficient +	No reviews
Multimodal intervention × Outcome		
Demand × absence	Moderate +	Moderate +
Demand × productivity	Insufficient +	No reviews
Demand × financial	Insufficient +	Limited +
Control × absence	Insufficient +	No reviews
Control × productivity	Insufficient +	No reviews
Control × financial outcome	Insufficient +	No reviews

+ indicates a predominantly positive effect in existing studies

ventions studies.”²² LaMontagne, *et al*,³⁶ are more conservative, suggesting the evidence is insufficient to draw strong conclusions. Based on our system for categorizing the level of evidence, research supporting the financial impact of job control interventions is currently insufficient.

Discussion

The main purpose of this study was to evaluate the quality and quantity of research assessing the effect of job demand or control interventions on absenteeism, productivity and financial outcomes for employers. A second purpose was to involve both scientific and practitioner stakeholders in the research process in order to facilitate translation of the results for use in the workplace.

We found that there are more systemat-

ic reviews assessing the impact of changes to job demands on the outcomes of interest (ten reviews) than job control (three reviews). This observation indicates that the research assessing the effect of job demand reductions on important stakeholder outcomes such as absenteeism and productivity, is at a more advanced stage than similar research on job control. Six of the systematic reviews included complex/multimodal interventions with elements that may impact multiple disability risk factors. This research design makes it difficult to distinguish the effectiveness of the interventions independently. Table 5 provides a summary of evidence levels by intervention type and worker status at baseline.

In general, it can be said that the effects of interventions that reduce job demands or increase job control are usually positive

for the organization in terms of absenteeism, financial benefit and productivity or performance. More high quality research is needed to further assess the relationships and quantify effect sizes for the interventions and outcomes reviewed in this study.

The best level of evidence we found indicates that multimodal job demand reductions for either at-work or off-work workers will reduce disability-related absenteeism. The effects of simple job demand reductions are limited, but trending in a positive direction. The evidence that job demand reductions improve productivity or result in financial benefits currently also suggests a positive impact, but the quantity and quality of research on these outcomes are insufficient at this time. There were only three systematic reviews assessing the effects of increased job control for general workers and none for workers with disabilities.^{22,25,36}

This best-evidence synthesis indicates that there is a need for more, high-quality randomized controlled trials, longitudinal cohort field studies, and replication studies that assess the impact of job demand/control interventions on outcomes of interest to employers and other stakeholders. Since the outcomes of interest for this research were focused on organizational outcomes, a similar best-evidence synthesis assessing individual health outcomes should also be conducted. The fact that the majority of studies included in the systematic reviews report positive impacts on the outcomes we investigated is reason for caution, suggesting there may be publication biases at play and journals should publish disconfirming evidence in addition to positive results. Studies assessing the effect of demand/control interventions for workers with known disabilities are particularly lacking (Table 5).

As mentioned earlier, Karasek and Theorell's Job-Demand-Control-Social

Support Model¹⁷ suggests that the greatest negative impact on health will occur when job demands are high, control is low and social support is also low. This best-evidence synthesis indicates that a good deal of research has been done across a range of industries showing the benefits of reducing job demands accrue to the organization, as well as the individual, in terms of disability absence and associated costs. We encourage the development of studies designed to evaluate the organizational impacts of job demands, control and social support together, and including analysis of the differential impact of each intervention.

A better understanding of multimodal interventions and the impacts of their components and component combinations would provide more insight into what actually contributes to the observed outcomes. Similarly, future studies should include analysis of the broader intervention context, including the organizational structure in which demand-control-support interaction occurs. Last but not least, adding yet another layer of complexity to already complex interaction, inclusion of relevant psychosocial characteristics of involved workers, would help explain how systemic/organizational factors interact with individual factors to produce outcomes of research, social and economic interest.

Potential limitations of our study include the fact that we considered only reviews published in English and available on primarily English language databases. Although we have reported only high- or moderate-quality reviews, as a best-evidence synthesis our conclusions depend on the quality of the systematic reviews and their primary studies. This synthesis was concerned with absence, productivity and financial outcomes, and should not be generalized to include the effectiveness of the interventions on overall employee health or other important disability outcomes. Fi-

nally, the nature of a higher order synthesis means that important details, including description of specific interventions and outcome measures is lost to some extent. In particular, the specific types of job modifications in the studies may have included elements of both reduced demands and increased control (*eg*, fewer hours of work in addition to deciding when to take rest breaks). This lack of specificity in both the individual studies and systematic reviews highlights the need for research that measures demand and control interventions concurrently, but independently.

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Appendix

Appendix A: Methodological quality review (questions and weighting)

Common criteria for both qualitative and quantitative methodological review

Question	Answer choice	Score
Did the authors have a clearly focused question?	Yes	1
	No	0
Were inclusion/exclusion criteria used?	Yes	1
	No	0
	Not specified	0
Did the authors describe a search strategy that was comprehensive and reproducible?	Yes	1
	No	0
	Not specified	0
Please click the search strategies used	(selected/unselected)	a. Five or more databases: 2 b. Two to four databases: 1 c. One database: 0
Did search strategy cover an adequate number of years? (10+ years)	Yes	1
	No	0
Does the data support the author's interpretation?	Yes, mostly	1
	No	0
Are there any concerns related to Conflicts of Interest?	Yes	0
	No	1

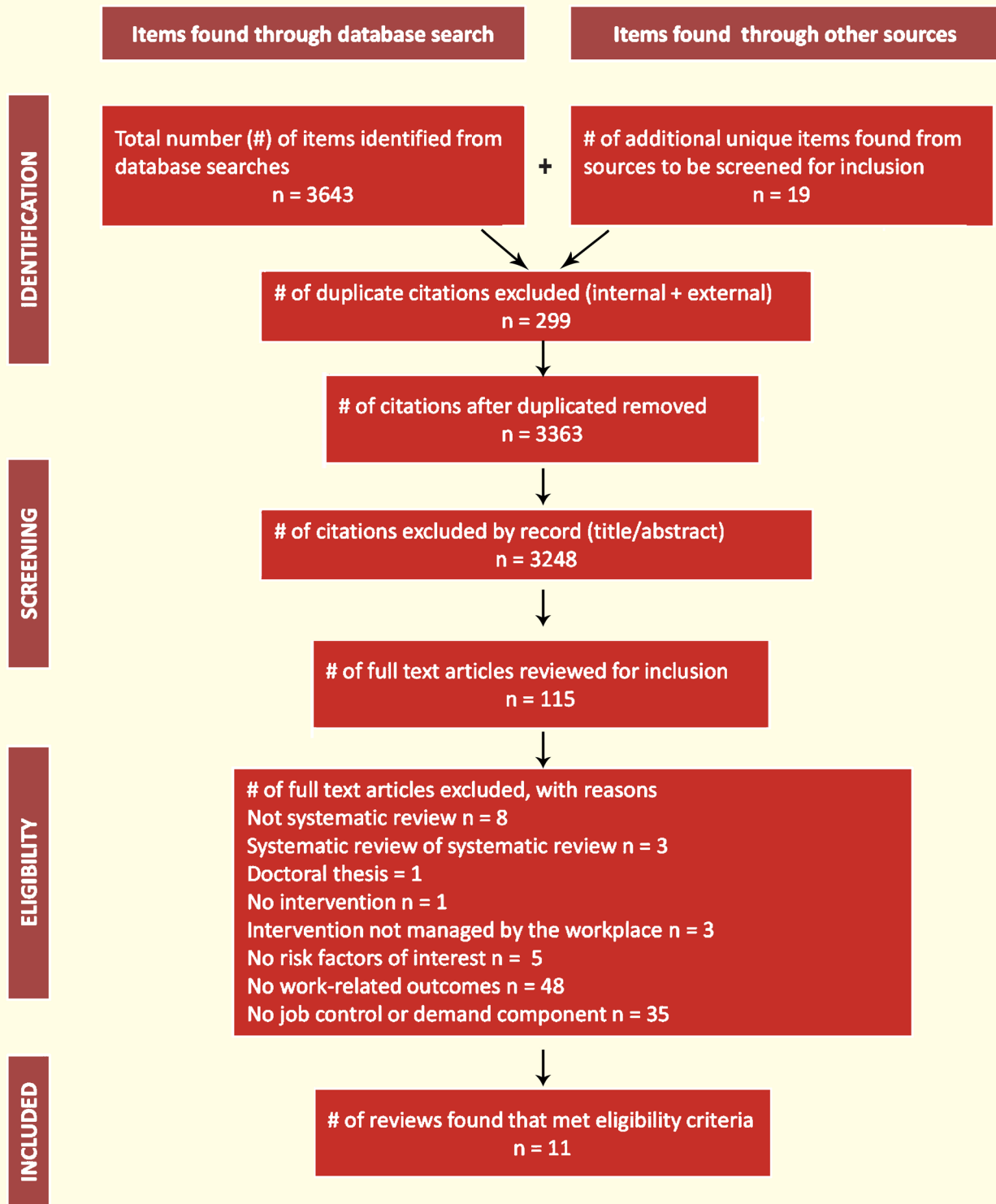
Specific criteria for quantitative methodological quality

Question	Answer choice	Score
Did the review assess the methodological quality of the primary studies?	Yes	1
	No	0
What methods did the authors use to combine or compare results across studies?	Meta-analyses	2
	Descriptive + quality weight	2
	Descriptive no weight	1
	Other	0
How strong was the level of evidence supporting the strongest conclusions of the study?	Level 1 (RCT*)	2
	Level 2 (non-random)	1
	Level 3 (uncontrolled)	0
	Unclear	0

Total score possible: 13

*RCT: Randomized clinical trial

Appendix B: PRISMA Diagram



Appendix C: Summary of included studies

Citation	Quality score	Total number of studies	Population	Outcomes assessed	Intervention description
Aas, <i>et al</i> , 2011 ²³	92%	10	At-work	Absence	Multimodal—Finnish Participatory Ergonomic model. Components include 1) mental health education; 2) physical health education, relaxation and breaks; 3) activity modifications; and 4) physical environmental modifications.
Bond, <i>et al</i> , 2006 ²²	77%	—	At-work	Absence, productivity, cost	Simple—One of: work reorganization, participative work reorganization, participative job control improvement; facilitation of two-way communication between management and employees.
Bos, <i>et al</i> , 2006 ²⁴	100%	13	At-work	Absence	Multimodal—Theoretical and practical training about physical load, risk factors, ergonomic rules and patient transfers. Training time ranged from 1 hour to 6 days. Seven studies combined education and training with ergonomic interventions (<i>eg</i> , mechanical equipment to assist in patient transfers, physical exercise and fitness, and organizational interventions (<i>eg</i> , commitment and cooperation of the manager).
Carroll, <i>et al</i> , 2010 ³⁴	92%	13	Off-work with disability	Absence, cost	Multimodal—More than one of the following: meetings with occupational health personnel, employee and employer; agreed-upon work modifications; exercise therapy; and cognitive-behavioral therapy. The workplace element of the intervention could not consist only of education or advice concerning ergonomics or the workplace, without either a worksite visit or contact with the workplace or employer.
Franche, <i>et al</i> , 2005 ³⁷	85%	10	Off-work with disability	Absence, cost	Simple and Multimodal—One or more of: early contact with worker by workplace, work accommodation offer, health care provider contact with workplace, return to work coordination, worksite ergonomic visit, supernumerary replacement and occasional other (unnamed) components.
LaMontagne, <i>et al</i> , 2007 ³⁶	85%	94	At-work	Absence, productivity, cost	Multimodal—Primary interventions: job redesign, workload reduction, improved communication, conflict management skills. Secondary interventions: cognitive behavioral therapy, coping, and anger management. Tertiary interventions: return to work programs, occupational therapy, medical interventions.

Continued

Appendix C: Summary of included studies

Citation	Quality score	Total number of studies	Population	Outcomes assessed	Intervention description
Linton and van Tulder, 2001 ³²	77%	27	At-work	Absence	Simple—Four types (no study included a combination of interventions): lumbar support, back-school and education, information, and physical exercises.
Maher, 2000 ²¹	92%	13	At-work	Absence, cost	Simple—Back school, education, exercise, braces, or workplace modification.
Palmer, <i>et al</i> , 2012 ³³	92%	42	Off-work with disability	Absence	Simple—Exercise therapy (including physical therapy), behavioral intervention, workplace adaptation, provision of additional services.
Pereira and Osburn, 2001 ²⁵	77%	36	At-work	Productivity	Simple—Quality circles (participative technique involving problem-solving meetings of groups of co-workers in similar jobs; solutions are recommended to management).
van Oostrom, <i>et al</i> , 2009 ³⁵	92%	6	Off-work with disability	Absence	Multimodal—Changes to workplace or equipment, work design/organization, working conditions/environment, and occupational (case) management with active stakeholder involvement of (at least) the worker and the employer. Changes in the workplace and equipment included changes to furniture or materials needed to perform the work. Changes in work design and organization included changes in schedules or tasks, training in task performance, and altered working relationships with supervisors and co-workers. Changes in working conditions referred to financial and contractual arrangements; changes in work environment concern noise, lighting, vibration, <i>etc.</i>