

# otwork

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## Manufacturer learns participatory ergonomics worth the investment

An Ontario textile plant saved over a quarter-of-a-million dollars as a result of implementing a participatory ergonomics program, according to an economic evaluation performed by the Institute for Work & Health.

A participatory ergonomics (PE) program has proven to be beneficial to the bottom line of an Ontario manufacturing firm, according to a new study by the Institute for Work & Health (IWH).

Taking a business perspective, the study analyzed a PE program at a clothing manufacturer in southwestern Ontario that employed up to 295 workers. Over a four-year period, the company realized a net benefit of almost \$295,000. The study is included in the May 2013 issue of *Applied Ergonomics*, which is already available online (vol. 44, no. 3, pp. 480-487, doi:10.1016/j.apergo.2012.10.019).

IWH researchers conducted a similar evaluation in a car manufacturing plant. In that case, too, the PE program proved to be cost-effective (see Summer 2009 issue of *At Work*).

Clearly, PE was worth the investment for both firms. "This seems to be the case, even though the ergonomics interventions were



Dr. Emile Tompa

typically low-cost and low-tech," says IWH Scientist Dr. Emile Tompa, who led the study. "Most of the costs were for 'people time,' rather than tools and workstation changes."

Despite the large number of studies that describe PE best practices, few investigate the costs and benefits of PE programs. Yet the demand for this kind of information is big, according to Tompa. "Resources are limited, so organizations want to know which health and safety alternatives provide the best value for their money," he explains.

PE programs involve workers, supervisors and other workplace parties jointly identifying and addressing work-related risks that can

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## Two IWH senior scientists awarded medal

Two senior scientists at the Institute for Work & Health (IWH), **Dr. Claire Bombardier** and **Dr. Monique Gignac**, have been awarded the Queen Elizabeth II Diamond Jubilee Medal. Bestowed by The Arthritis Society, the medal acknowledges their commitment to advancing the state of arthritis diagnosis, care and prevention. The letter to the IWH scientists recognizes that their hard work “gives us hope that we will one day see a future without arthritis.”

## Syme Fellowship opportunity now open

IWH is now accepting applications for the S. Leonard Syme Training Fellowships in Work and Health. Two fellowships are available: one for \$15,000 and the other for \$5,000. These fellowships are for young researchers at the master's or doctoral level intending to study work and health. All documents must be received by IWH by May 31, 2013. For information, go to: [www.iwh.on.ca/syme](http://www.iwh.on.ca/syme).

## Disability handbook features IWH authors

IWH scientists figure prominently in the just-released *Handbook of Work Disability*, published this year by Springer. Five IWH scientists wrote or co-wrote book chapters:

- **Dr. Emile Tompa** wrote the chapter “Measuring the burden of work disability”;
- **Dr. Sheilah Hogg-Johnson** and **Dr. Ellen MacEachen** co-authored the chapter “Methodological issues in work disability prevention research”;
- **Dr. Vicki Kristman** contributed to the chapter “Workplace issues”;
- **MacEachen** wrote the chapter “Understanding work disability systems and intervening upstream”;
- **Dr. Ivan Steenstra** and **Hogg-Johnson** co-wrote, along with former IWH Scientist **Dr. Jason Busse**, “Predicting return to work for workers with low-back pain.”

For information, go to: <http://link.springer.com/book/10.1007/978-1-4614-6214-9/page/1>.

## IWH welcomes new SAC members

Three new members have joined the Institute's Scientific Advisory Committee (SAC). They include:

- **Dr. Andrew Hale**, professor emeritus of safety science at the Delft University of Technology in Delft, The Netherlands;
- **Dr. Maurits Van Tulder**, a professor of health technology assessment in the Department of Health Sciences at VU University Medical Center in Amsterdam, The Netherlands; and
- **Dr. Thomas Wickizer**, the Stephen F. Loeb professor in the School of Health Management and Policy at Ohio State University in Columbus, Ohio, U.S.A.

For the full list of SAC members, go to: [www.iwh.on.ca/scientific-advisory-committee](http://www.iwh.on.ca/scientific-advisory-committee).

WHAT RESEARCHERS MEAN BY...

# Case Control Study

**Case control studies start with an outcome (such as a disease) and work backwards to find exposures that may be linked to it.**

Let's say your mother was recently diagnosed with breast cancer and so, too, was her best friend. The two worked together for 30 years at the town's food canning plant. You wonder if something in the workplace was the cause of their cancer.

Researchers can help find answers to this type of question using a **case control study**. This study design helps determine if a previous exposure is linked to a current condition, such as having a disease.

A case control study compares people who already have a condition or disease (these are the **cases**) with people who do not have the condition or disease but are otherwise similar (these are the **controls**). It then looks back to see if an exposure to something in particular (e.g. at work, in the environment, lifestyle) was more likely in the group with the condition than in the group without.

Not all studies with cases and controls are case control studies. Some studies start with a group of people with a known exposure and a comparison group (the control group) without the exposure and follow them forward to see what happens. This is the case with some cohort studies.

Case control studies are always **retrospective**; they always look back. The outcomes are always known—the cases *do* have the condition and the controls *do not*—and the researchers trace backwards to identify possible exposures or factors that may have contributed to the condition.

## Case control study in action

Let's take our example of breast cancer and work to show how a case control study might provide some answers. The researchers begin by turning to the regional cancer treatment centre to find women within the town and the surrounding area who developed a new case of breast cancer during a six-year period and are willing to participate in the study. The researchers identify 1,000 women, the cases.

The researchers then select controls. With computer-generated phone numbers, homes are randomly called to find women in the region without breast cancer of about the same age who are willing to take part in the study. They find 1,150 women, the controls.

Both cases and controls are asked about their personal, lifestyle and reproductive pasts, including information about factors known to be associated with breast cancer (e.g. body mass index, drinking, smoking, menstrual and menopause history, use of hormone replacement therapy, birth control, family history). They are also asked about the jobs they've had over the years and for how long. The researchers take this job information to code occupation, industry and exposure, allowing them to figure out likely exposures to cancer-causing materials and endocrine disruptors (i.e. chemicals that interfere with the hormone system).

By comparing the two groups, the researchers find that, taking the other risk factors into account, the women with breast cancer are more likely to have worked in certain occupations, including food canning. Although the study cannot say that your mother and her best friend's breast cancer was caused by work—case control studies cannot show causation—it does indicate that their breast cancer may be linked to their work.

Case control studies have a number of drawbacks. They cannot show causation, as mentioned; nor can they provide information on incidence (e.g. what percentage of people have a condition). As well, the information collected can be faulty or incomplete because it depends on people accurately and truthfully recalling their past.

Nonetheless, case control studies are relatively quick, inexpensive and easy. Thus, they are often used to conduct preliminary investigations of suspected risk factors. If a link is found, a more costly study that starts with a group of people and follows them forward may be justified.

**Note:** The example used here is based on a real study published in the November 2012 issue of *Environmental Health* (vol. 11, no. 87, doi:10.1186/1476-069X-11-87). This case control study found an association between breast cancer among women and working in jobs with potentially high exposures to carcinogens and chemicals that interfere with the hormone system, including jobs in agriculture, automotive plastics manufacturing, food canning, metalworking, and bars and casinos.



# Female nurses working nights weigh [slightly] more than those working days

Body mass index scores are slightly higher among female nurses working night shifts (or a mix of day, evening and night shifts) than among those working regular day shifts, according to a recent study from the Institute for Work & Health. But we don't yet know if this difference is important.

Female nurses working night shifts or mixed shifts (i.e. days, evenings and nights) weighed just slightly more, based on body mass index (BMI) scores, than those working regular daytime schedules. This is according to a new study from the Institute for Work & Health (IWH) that looked at a 2005 “snapshot” of over 8,500 Canadian nurses.

Published in the February 2013 issue of *Applied Nursing Research* (vol. 26, no 1, pp. 24-31, doi:10.1016/j.apnr.2012.10.001), the study explored the relationship between shift work and BMI scores (a measure of

body fat based on height and weight). From a public health perspective, this is a vital area of research, according to IWH Scientist Dr. Peter Smith, who led the study.

“Some studies have reported that shift work is

associated with higher rates of obesity, and obesity may be one of the pathways linking shift work to the increased risk of cancer and cardiovascular disease that we are seeing in the research recently,” he says. However, not a lot is known about the relationship between shift work and obesity, and this is the area Smith set out to explore.

## Survey included over 8,500 nurses

Smith and his research team turned to the National Survey on the Work and Health of Nurses (NSWHN), a 2005 Statistics Canada survey of almost 19,000 registered nurses from all 10 Canadian provinces and three territories. From among this sample, the researchers looked at 8,665 direct-care nurses who were working in hospitals or long-term care facilities and who were not working other jobs at the time.

The researchers calculated the BMI scores of these nurses (based on their

self-reported height and weight) and compared them to their reported usual shift schedule: regular days, regular evenings, regular nights or mixed. They also looked at information available in the survey about working conditions (e.g. job strain and amount of respect and support at work), health behaviours (e.g. smoking and drinking alcohol) and employer-provided services (e.g. access to on- or off-site gym facilities and places to buy healthy food).

## Small differences in BMI scores found

Smith and his team made these key findings:

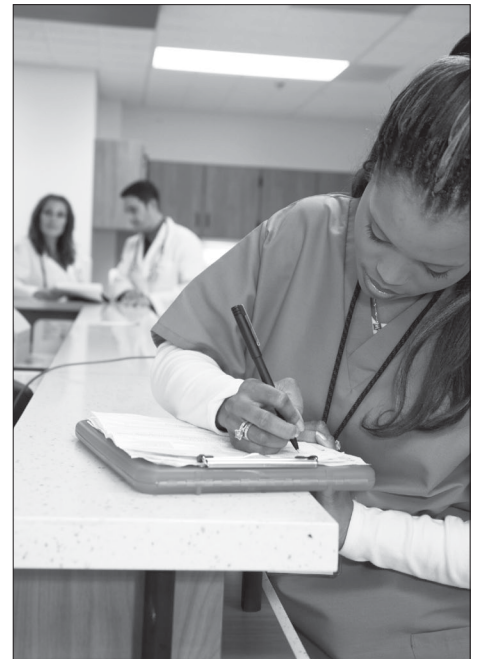
- After taking factors such as age, marital status, pain restrictions, mental health and more into account, shift schedules were associated with some slight differences in BMI scores. Namely, night and mixed shift schedules were associated with a small increase in BMI scores among female nurses. That is, female nurses working night shifts had BMI scores that were 0.67 points higher—and those working mixed shifts had BMI scores that were 0.44 points higher—than those working regular daytime schedules. According to the researchers' calculations, this represented increased average weights of 1.66 kg (or 3.65 lb) and 1.11 kg (or 2.44 lb), respectively.
- The relationship between shift work schedules and higher BMI scores was not affected by differing working conditions, employer-supported facilities or health behaviours—all of which are traditionally associated with BMI scores. In other words, if shift work schedules affected BMI scores, it did not appear that these factors made a difference.
- Finally, no difference was found in the relationship between shift work and BMI scores for nurses who had access to fitness facilities or healthy eating options through work. That is, female nurses working night and mixed shift schedules

who had access to employer-supported fitness and healthy eating services still had slightly higher BMI scores than their counterparts working regular daytime schedules.

Smith would like to see more research in this area. “We first need to know if the difference in BMI scores among nurses working night shifts and mixed shifts is an important difference,” he says. “That is, does a difference of three-and-a-half pounds have potentially important health or social consequences?”



Dr. Peter Smith



As well, because this was a cross-sectional study—a snapshot of nurses at one point in time—the study did not provide information on how long nurses were working their reported usual work schedule. “We don't know the effect on BMI scores of working a particular type of shift over time,” says Smith. “Nor does the study allow us to explore the effect of different shift schedule patterns, such as rotating shifts, on BMI. Perhaps certain shift schedules lead to weight gain while others do not.” ■

# Permanent work injury lowers women's chances of marriage

Women experiencing a permanent impairment following a work injury are less likely than uninjured women to marry, says new research from the Institute for Work & Health.

Women who are permanently injured in a work accident are less likely to marry than their uninjured counterparts, according to a new study from the Institute for Work & Health (IWH). The same, however, does not appear to hold true for men.

According to the study, published in the January 2013 issue of *Disability and Health* (vol. 6, no 1, pp. 43-51, doi:10.1016/j.dhjo.2012.10.001), permanently disabled men were also at a disadvantage in the marriage market, but this was largely driven by their tendency to earn less.

"Once we took earnings into account, the effect of the work disability on the likelihood of men getting married disappeared," says IWH Associate Scientist Dr. Heather Scott-Marshall, the lead researcher on this study. "By contrast, women with a permanent disability were less likely to get married no matter how much they earned."

## Study explores effects on personal life

Scott-Marshall decided to look at the impact of permanent work injuries on marriage because she was struck by the lack of research in this area. "Workplace injury resulting in a permanent impairment can alter the course of a person's life," she says. "Yet most studies in this area neglect the impact of injury on milestones like marriage."

Scott-Marshall drew on research that shows that social support and intimate partnerships are key to effective rehabilitation post-injury. She figured that, if a permanent work disability reduces the likelihood of getting married, this could lead to isolation and reduced self-worth, making recovery and return to work (RTW) more difficult.

In this study, Scott-Marshall and her team linked information from two sources. Work injury information (e.g. date of accident, degree of impairment) from the Ontario Workplace Safety and Insurance Board (WSIB) was linked to personal information



Dr. Heather Scott-Marshall

were permanently impaired as a result of a work accident in 1990 to 1994. Each of these men and women was matched with up to 10 others in the LAD who, except for the work injury, were similar in all other respects (e.g. age, gender, income, number of children, rural-versus-urban residence, etc.). The comparison group included 2,137 men and 1,071 women. The researchers

(e.g. marriage status, income) from Revenue Canada's Longitudinal Administrative Databank (LAD).

In the WSIB data, the researchers found 348 men and 189 women of prime marrying age (25 to 40 years) who

then looked at time to marriage (including common-law unions) in the injured and uninjured groups for a period of 10 years post-accident.

## Different outcomes for women and men

The researchers found that women with a permanent work injury were 17 per cent less likely to marry than their counterparts in the comparison group. And women with higher levels of physical impairment (i.e. greater than 10 per cent loss in bodily function, according to guidelines of the American Medical Association) were even less likely to marry: 22 per cent less likely than the comparison group.

On the other hand, men with a permanent work impairment were just as likely to marry as their uninjured counterparts, as long as they earned about the same amount of money.



# Mental health suffers among workers permanently impaired by job injury

Depression and related symptoms are more common among workers with permanent impairments following a work-related injury than in the general population, according to a new study from Trent University and the Research Action Alliance on the Consequences of Work Injury.

These findings are consistent with other research showing that men and women value different things when choosing a mate, says Scott-Marshall. “Women tend to put a premium on education, social status and earnings potential when selecting a partner, whereas men assign greater importance to qualities such as youth, physical attractiveness and health,” she explains.

## Findings of interest to rehab providers

For Scott-Marshall, the findings point to the need for occupational rehabilitation service providers to be aware of all the potential barriers to re-engaging in the working world, including personal and social barriers. “Our study draws attention to the potential for stigma and social isolation of injured workers, which we believe could have implications for recovery,” she says.

Specifically, the lack of marriage prospects for permanently injured workers could be psychologically challenging and affect their ability to resume productive social roles. “It is possible that one reason permanently impaired workers experience difficulty returning to work is that they have problems with adjustment and coping that derive, ultimately, from a lack of supportive relationships,” says Scott-Marshall. “This is something occupational rehabilitation providers may need to address.”

Scott-Marshall’s study is part of a growing body of work looking at the consequences of permanent work injuries. Another study looking at mental health among permanently impaired workers is profiled in the box at right. Both studies were conducted under the umbrella of the Research Action Alliance on the Consequences of Work Injury, a community/academic alliance that included a number of researchers from the Institute for Work & Health (for information, see the Spring 2012 issue of *At Work*). ■

Workers who suffer a permanent impairment following a work injury are at greater risk of depression, sleep problems and medication abuse than the general population, according to new research from Trent University and the Research Action Alliance on the Consequences of Work Injury (RAACWI).

“Our study paints a troubling picture of the mental health of injured workers with permanent impairments, who are struggling both physically and psychologically,” says Dr. Fergal O’Hagan, assistant professor in Trent’s Psychology Department and lead author of the study. “These workers may require mental health services and supports outside of the scope usually provided by the workers’ compensation system.” The study was published in the July/August 2012 issue of the *Canadian Journal of Public Health* (vol. 103, no. 4, pp. 303-308).

The consequences of work injury are a major public health issue. Each year in Ontario, about 15,000 workers sustain a permanent physical impairment as the result of a workplace injury, according to the Workplace Safety and Insurance Board (WSIB). These impairments are characterized by ongoing pain, physical limitations and the inability to participate in some activities—all factors that make people susceptible to mental health problems

## Survey determines onset of problems

O’Hagan and his team used survey data collected by RAACWI to conduct the study. RAACWI was a six-year community/academic alliance, and Institute for Work & Health Scientist Dr. Emile Tompa was its academic lead.

The RAACWI survey included information from 494 injured workers in Ontario. These workers were English-speaking people aged 25 to 55 who filed first-time claims with the WSIB between 2002 and 2007, and then went on to be certified as permanently impaired between 2005 and 2007. O’Hagan sought to understand how many of these

injured workers with permanent impairments were experiencing mental health problems, and when these problems first appeared—before or after the injury.

## Depression elevated in injured workers

The key findings connected the dots between permanent work injuries and mental health problems:

- Mental health problems were elevated in the injured workers compared to the general population. For example, the study found greater rates of diagnosed depression (38 versus 12 per cent), sleep problems (75 versus 48 per cent), medication abuse (12 versus two per cent), and problems concentrating (42 versus 10 per cent).
- Among those reporting mental health problems, most arose after the injury. Post-injury onset was reported by 81 per cent of those diagnosed with depression, 92 per cent of those with sleep problems, 96 per cent of those abusing medications and 88 per cent of those having problems concentrating.

O’Hagan was surprised by the findings.

“What got me the most were the extent and range of problems,” he says. “Injured workers’ depressive symptoms were high years after the injury, in men and women, in those in high and low income brackets, with high and not-so-high levels of education. It was across the board.” He also saw an unsettling number of people who described their use of prescription or over-the-counter medications as “abusive.”

O’Hagan hopes that workers’ compensation boards will pay more attention to the mental health of workers with permanent injuries. He suggests that services need to better integrate psychological care with physical rehabilitation. He also proposes a long-term tracking system of injured workers to check physical and psychological recovery.

This study is available online at <http://journal.cpha.ca/index.php/cjph/article/view/3036>.



# Do workplace disability management programs promote return to work?

The effectiveness of workplace-based disability management programs in promoting return to work is unclear, according to a review by the Campbell Collaboration that nevertheless provides important insights into the components of these programs.

It's proving difficult to determine if employer-provided workplace disability management programs promote injured workers' return to work (RTW). This was confirmed in a Campbell Systematic Review published last November.

"Because we found so few studies that met our criteria, we cannot draw firm conclusions on the effectiveness of these

directed at workplaces that may have been initiated and/or delivered by outside parties, such as community, health-care and workers' compensation vocational and clinical service providers.

This review wanted to look exclusively at the effectiveness of disability practices included in employer-provided programs. It set out to compare the effectiveness of workplace programs promoting return to work with no treatment, treatment as usual or an alternative program, and to determine which parts of workplace programs in particular bring about the best results.

Gensby and his team searched 12 databases for studies published between 1948 to July 2010 on workplace programs provided by employers to employees who were re-entering their workplaces with work- or non-work-related injuries or illnesses. In the end, 13 studies met the criteria needed to be included in the review.

Because too little high quality information was available in these studies, the researchers were unable to determine the effectiveness of workplace disability management programs

on RTW, or find out which specific program components most effectively promoted RTW.

## Program characteristics identified

However, by closely examining the workplace programs described in the research (all based in companies in Canada and the U.S.), the reviewers did learn a number of important things about program components, procedures and the human resources involved. For example, the programs:

- focused largely on the off-work and pre-return phases of RTW, with little focus on

the post-return phase and no focus on the sustainability of work;

- offered a suite of policies and practices, with 15 program elements being most common (see the table on this page, with the elements listed from most to least common);
- were developed to manage mainly musculoskeletal disorders, with only two developed to manage common mental health problems such as stress and depression;
- involved a multidisciplinary team with people from several corporate departments, such as occupational physicians, physiotherapists, occupational therapists, ergonomists, RTW coordinators/case managers, union representatives, supervisors and managerial human resources staff;
- were administered internally by the medical, benefits, health and safety, or human resources department, and were supported by senior management and a joint labour-management committee; and
- used outcome measures primarily related to costs savings, time lost from work and time until RTW, with limited or no focus on work-role functioning, job satisfaction, well-being and job retention.

Based on these findings and what the research already tells us about workplace disability management programs, the researchers suggest current programs are potentially lacking in a number of key areas. These include the education and training of key personnel in RTW and job accommodation, the active involvement of employees in RTW procedures and practices, the early contact with workers when they go off work, the post-return and stay-at-work phases of RTW, and the use of health and job-retention measures to determine program outcomes.

For more information, go to: <http://campbellcollaboration.org/lib/project/136/>. ➤

## COMPONENTS OF WORKPLACE DISABILITY MANAGEMENT PROGRAMS

The systematic review identified these components of employer-provided disability management programs, listed here in order of most common to least common:

- Organizational return-to-work (RTW) policy
- Offer of suitable work accommodation
- Onsite physical rehabilitation services
- Tailored job modifications
- Workplace assessment with job analysis
- Corporate-located RTW coordinators or disability case managers
- Internal disability claim information system
- Early contact and intervention
- Joint labour/management commitment
- Active employee participation
- Transitional work opportunities
- Education of workplace staff or case managers
- Access to alternative placements
- Preventive strategies to avoid disability occurrence
- Revision of workplace roles

programs or on the program components that drive effectiveness," says Ulrik Gensby, a PhD fellow at Denmark's Roskilde University and lead author of the review. The review team included two researchers from the Institute for Work & Health: Emma Irvin, director of research operations, and Dr. Ben Amick, associate scientific director.

Previous research has indicated that workplace-based RTW interventions can reduce work disability absences, their duration and their associated costs. But this previous research included programs

# Work environment may up risk of hypertension in men

Low job control is associated with an increased risk of hypertension among men, says a study from the Institute for Work & Health and Institute for Clinical Evaluative Sciences.

Low job control is linked to an increased risk of hypertension (high blood pressure) among men, but not women. This was the key finding of a study by researchers at the Institute for Work & Health (IWH) and the Institute for Clinical Evaluative Sciences (ICES), published in the January/February issue of the *Canadian Journal of Public Health* (vol. 104, no. 1).

Job control refers to the ability to make decisions about the way work is done or skills are used in the job. The study found that, among men reporting low job control, 27 per cent were diagnosed with hypertension during a nine-year period. This compared to 18 per cent among men reporting high job control.

The study also found the proportion of cases of hypertension among men that could be attributed to low job control was 12 per cent—higher than the proportion of cases attributed to poor health behaviours, such as smoking and not getting enough exercise. Low job control was second only to obesity, to which 26 per cent of cases of hypertension among men could be attributed.

“Primary prevention programs to reduce hypertension are largely aimed at changing unhealthy behaviours,” says IWH Scientist Dr. Peter Smith, who led the research. “But this study suggests that prevention strategies might also assess the potential for modifying work environments as a hypertension control intervention.”

What those strategies should be remains unclear. As IWH President and Senior Scientist Cam Mustard points out, we don’t have solid evidence on how best to increase job control. “Furthermore,” adds Mustard, a member

of the study team, “we don’t yet have research to show interventions to increase job control would, indeed, lower the incidence of hypertension among men.”

Hypertension is a risk factor for strokes and heart attacks, among other health ailments. Its prevention is a public health concern in Canada and other developed countries. In Ontario, the incidence of hypertension increased by 60 per cent from 1995 to 2005: from 153 to 244 cases per 1,000 Ontarians.

For details about the study, go to: [www.iwh.on.ca/media/2013-feb-27](http://www.iwh.on.ca/media/2013-feb-27). An earlier article by the same team found low job control is associated with an increased risk of diabetes among women, but not men. For more information on that study, see the Fall 2012 issue of *At Work*. ■



## What's new at [www.iwh.on.ca](http://www.iwh.on.ca)

Weekly and monthly Research Alerts help you stay abreast of current scientific literature—from the Institute for Work & Health (IWH) and beyond—in the areas of occupational health and safety, return to work, workers’ compensation and more: [www.iwh.on.ca/research-alerts](http://www.iwh.on.ca/research-alerts)

Topic links are now available from the IWH Research page—bringing together IWH information on current issues such as newcomers, shift work and temporary agency work: [www.iwh.on.ca/research](http://www.iwh.on.ca/research)

Register now for IWH’s next systematic review workshop, set for June 5 to 7, 2013: [www.iwh.on.ca/systematic-review-workshops](http://www.iwh.on.ca/systematic-review-workshops)

IWH is accepting applications for its 12-month S. Leonard Syme Training Fellowships, designed for young researchers at the master’s or doctoral level intending to study work and health: [www.iwh.on.ca/syme](http://www.iwh.on.ca/syme)

Missed an IWH plenary that you really wanted to attend? Slidecasts of most IWH plenaries from 2012 onwards are now available in the archives: [www.iwh.on.ca/plenaries](http://www.iwh.on.ca/plenaries)

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The Institute for Work & Health conducts and shares research that protects and improves the health of working people and is valued by policy-makers, workers and workplaces, clinicians, and health & safety professionals.

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Participatory ergonomics...  
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lead to musculoskeletal disorders. In 2001, the shirt manufacturer involved in this most recent study implemented a PE program using the process outlined in the how-to guide *Participative Ergonomic Blueprint*, developed by the University of Waterloo (available at [www.iwh.on.ca/pe-blueprint](http://www.iwh.on.ca/pe-blueprint)).

A worksite ergonomics change team was set up, which included management and union representatives from the plant, as well as two expert ergonomists external to the company. Team members were trained to use PE principles to identify jobs for improvement, assess the ergonomic risk factors of the identified jobs and come up with solutions.

In the end, the team identified and implemented ergonomics changes for 97 workers in 27 different types of jobs. The changes ranged from equipment and workstation adjustments to process changes. Almost all were low-cost and low-tech changes that were made by the plant's mechanics and maintenance staff (e.g. adjusting workstation heights).

## IWH team conducts economic evaluation

Tompa and his team then came in to calculate the outcomes of the PE program in dollars and cents over the four-year period from January 2000 to February 2004. This period included three distinct phases: before (72 weeks), during (100 weeks) and after (44 weeks) the implementation of the program.

The PE program cost \$65,787. That included the time and material costs for 700 hours of ergonomics team training, over 700 hours of ergonomics expertise and about 20 hours of production down-time.

As for savings, the researchers calculated the money saved by comparing before-and-after numbers for health measures (i.e. workers' compensation claims, first-aid only incidents, modified-duty cases and durations, casual absence days, and long-term sickness claims and durations) and productivity measures (i.e. percentage of shirts manufactured correctly the first time and percentage of target output produced). Complex statistical methods were used to ensure, as much as possible, that any changes identified were due to the PE program

and not other changes at the firm taking place at the same time.

## PE program decreases absenteeism

The study team found many improvements. Its calculations suggested that the PE program:

- reduced the number of first-aid only cases by 65 per cent, saving \$7,675;
- cut the number of modified-duty cases by half, saving \$58,230;
- brought down the number of casual absenteeism days by 23 per cent, saving \$10,045; and
- dropped the number of long-term sickness absences by 75 per cent and reduced their length by 93 per cent, saving \$266,645.

Interestingly, workers' compensation claims were not affected by the PE program. As for productivity, both the percentage of shirts manufactured right the first time and the percentage of target output produced improved, resulting in about 135 more shirts being produced right the first time each week. This resulted in savings of just over \$18,000.

Subtracting the PE program costs from the savings, the company was ahead \$294,825 over a four-year period. That represented a benefit-to-cost ratio of 5.5: for every \$1 spent on the program, the company saved \$5.50. "PE programs can be effective and cost beneficial from a company perspective," Tompa concludes. "And companies may need to look at more than workers' compensation costs to measure these benefits."

Tompa adds that PE interventions do not have to be expensive to achieve health and productivity benefits. "Small-scale things—i.e. minor workstation modifications—can yield big returns," he says. "For example, it came to light in the shirt manufacturer that some of the textile racks were too high for workers to reach comfortably. So the racks were lowered and needless strain was avoided. Many simple changes like this seemed to add up to make a big difference."

For those interested in introducing a PE program at their own workplace, see the IWH's lay-friendly guide outlining the six key steps that have been shown to contribute to the success of a PE program: [www.iwh.on.ca/pe-guide](http://www.iwh.on.ca/pe-guide). ■