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Acknowledgements

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One third of the articles newly brought into this compendium represent research done outside of the United States. This global emphasis in current health and wellness literature reflects a growing world-wide interest of private industry and governments to contain healthcare cost and improve work productivity. Perhaps this trend also relates to the growing interest regulatory bodies such as the UK Health and Safety Executive and the European Agency for Safety and Health at Work have put on issues such as stress in the workplace.

These past two years have seen changes in how health and well-being are viewed as business issues. Health and wellness programs are no longer “nice to have” items for competitive organizations, they have become “must have” strategies reflecting sound investment in human capital. Recent peer-reviewed research has repeatedly shown significant value return when health and wellness initiatives are successfully implemented. Thus, we’ve included in this compendium meta-analyses of studies looking at what sort of financial return to expect with well planned initiatives.

Yet even the best designed health and wellness programs fail if nobody uses them. Quite a bit of recent research has examined what factors contribute to having people actively participate in health and wellness programs. And it’s not enough to simply have someone begin a wellness program. The end-game goal needs to be achievement of long-lasting behavior changes resulting in better health. With this in mind, we’ve decided to allocate one third of new articles in this compendium to research related to program engagement strategies. While we’ve learned much over the past two years, there are still many questions for researchers to answer regarding program design and implementation. As programs are started within large organizations and across the globe, the need to understand more about how to effectively work with diversity grows in importance. For example, how do we best apply a combination of financial and non-financial incentives to engage the greatest number of people in sustained healthy behaviors? Also, what sorts of combinations of ways to deliver health and wellness programs (e.g. telephonic, smart phone application, web-based, etc) will have the greatest impact across a widening range of socio-demographic groups?

It stands to reason a one-size-fits-all solution will not be best for most organizations, and we want to know more about how to tailor health and work performance solutions to individuals and large groups. If the very impressive growth of solid research in health and work performance over the past several years is any indication of what future research might yield, we’ve plenty reason to be optimistic that we’ll be closer to answering these questions by the time we release our next compendium.

Jeff Kang
Chief Medical Officer
CIGNA HealthCare
Trends in global health: knowing the risks and taking the opportunities

The global cost of healthcare continues to rise, driven by increasing life expectancy and the demand for high quality facilities and the latest medication. At 16% of the Gross Domestic Product, the US has highest expenditure on health in the world. Paying an estimated $2 trillion annually on healthcare is arguably a competitive disadvantage for US companies in the international marketplace. We know that 80% of healthcare costs are to treat diseases that are a result of unhealthy behaviours. A staggering statistic, but a situation that presents an opportunity for companies. The only way to contain business healthcare costs is to reduce risk and therefore demand. As the evidence contained in this compendium demonstrates, if the risk is modifiable it is ultimately preventable. Working to change unhealthy behaviours can reduce costs.

For large companies in the US the average cost of healthcare premiums are projected to be $9,821 per employee in 2011. However employees with high health risks are estimated to cost 2.5 times more than low risk employees. Therefore understanding the emerging trends that influence health risks and utilising opportunities to improve employee health should form an integral part of a company’s business strategy.

For example, the current economic climate continues to increase the worldwide financial pressures and have raised the prevalence of stress. A worrying trend considering that health and productivity costs related to worker stress already cost American business an estimated $50-$150 billion annually.

Another global issue is the rise of obesity and its associated costs. This is a particular problem nationally as the US has the unenvied title of the world’s most obese nation. The annual cost attributable to obesity among full-time US employees is estimated to be $73.1 billion.

Despite these daunting trends, awareness of these risks can facilitate the opportunities to improve business performance. We know that employees who actively engage in health advocacy have a six times greater cost reduction. One study by Aldana et al. (p81) found that every $1 invested in an employee wellness programme resulted in $15.6 in saved medical costs and reduced absenteeism. The ever increasing use of the internet to find health information means cost effective online well-being programmes have a wider scope and audience than ever before.

We are proud to present this updated compendium of research which demonstrates how investing in health promotion at work can provide a positive return on investment and improve business prospects. Taking the opportunity to endorse employee health can reduce medical costs and improve performance. It can also develop competitive advantage as employers offering health promotion programs can benefit from enhanced corporate image and good will, increased employee morale, greater employee retention and reduced absenteeism. We hope that the accessible evidence contained in this compendium is useful in supporting your company’s health and well-being strategy.

David Cordani
President
CIGNA HealthCare

3. Dr Raphael Ray Levey, Chairman, Global Medical Forum Foundation 2005
5. University of Michigan – Health Management Research Center
6. Working well! A global survey of health promotion and workplace wellness strategies. Buck Consultants, November 2010
8. Obesity and the Economics of Prevention: Fat not Fat. Organisation for Economic Co-operation and Development. 2010
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The impact of health risks on medical expenses

Excess health risks contribute to employer costs

Aim
To determine the excess medical costs associated with employees having multiple health risk factors.

Looked at
4,226 employees, of whom 49% had completed a health risk appraisal.

How?
Calculated excess costs as the difference in average annual costs between HRA participants with low-risk status, and those with medium or high-risk status.

Risk criteria
- Low risk – 0-2 health risk factors
- Medium risk – 3-4 health risk factors
- High risk – ≥ 5 health risk factors

Results
- 56% of total excess costs (US$1.8 million of $3.2 million) were due to medium and high-risk individuals.
- 44% ($1.4 million) were due to high-risk HRA participants.

What does this mean?
Individuals with excess health risks significantly contribute to excess costs due to absenteeism, medical, and pharmacy claims.

Full reference of the original study - studies included in the compendium are from reputable scientific journals with solid ‘peer review’ systems (i.e. studies are reviewed by experts in the field to ensure that all data, analyses and conclusions are correct.)

The results section provides the raw data e.g. money saved. In most instances, the data provided are ‘significant’, which means it’s very unlikely the findings are due to chance.

Color coded research area tab for easier navigation.

A summary of the key conclusions – often puts the data into a ‘real world’ setting.

The general title is a very brief summary of the study’s conclusions.

The number of people who participated in the study. The ‘sample size’ can indicate how strong a study is. The more people the better.

How the study was conducted e.g. how the researchers ranked health risks in the individual study.

Compendium key
- Research country of origin
- Productivity at work
- Medical care costs
- Health promotion program
- Absence from work
- Mutimodal engagement

The general title is a very brief summary of the study’s conclusions.
The impact of health risks on medical expenses
Diet related health risks increase medical and productivity costs


Aim
To measure the costs associated with employee health risks and to estimate potential cost savings from risk reduction.

Looked at
11,217 employees of a soft drink manufacturing plant that completed a health risk assessment (HRA). The sample consisted of mainly male ‘blue-collar’ workers.

How?
The employees’ medical care, compensation and short term disability costs were evaluated against 10 modifiable health risks outlined in the employee’s HRA. The health risks were overweight/obesity, high blood pressure, high blood glucose, high total cholesterol, physical inactivity, poor diet, stress, depression, tobacco use, and alcohol consumption.

Results
- High risk for weight, blood pressure, glucose, and cholesterol had the greatest impact on total costs.
- A 1% reduction in weight risk would save $50.95 per worker each year.
- A 1% annual reduction in ten modifiable health risks would save between $83.02-$103.39 per worker each year.
- Even a small 0.01% reduction in risks would save between $8.38-$10.45 per worker per year.

What does this mean?
Modifiable health risks in employees cause organizational expenditure through greater medical and compensation claims and short term disability costs. Even a small reduction in risk factors can bring substantial savings.

Diabetes, hypertension and cholesterol impact costs


Aim
To examine the effect of type 2 diabetes, high blood pressure, and high cholesterol levels on work productivity, the use of medical resources and the quality of life of individuals who are overweight or obese.

Looked at
19,759 individuals who completed the 2006 National Health and Wellness and the Work Productivity and Activity Impairment Surveys, who were classified as being overweight or obese (i.e. body mass index >27 kg/m²).

How?
The presence of type 2 diabetes, high blood pressure and high cholesterol levels were compared with absence from work due to illness, reduced on-the-job productivity, work productivity loss, activity impairment, resource utilization, and quality of life measures.

Results
- All three separate conditions had a considerable impact on work productivity loss and activity impairment, with diabetes having the strongest association at 26% overall work impairment vs 20% for obesity or overweight.
- Hospital stays were generally longest and frequency of emergency room visits highest in individuals with all three conditions when compared with those who weren’t obese or overweight.
- Further, the occurrence of all three conditions had the strongest negative impact on physical and mental well-being.

What does this mean?
Interventions such as lifestyle management programs are urgently needed to both manage and stem the increase in the frequency of these conditions and obesity.
Costs rise with increasing BMI


Aim
To examine the direct and indirect economic impact of obesity in a working population.

Looked at
88,984 employees from nine large US employers who completed a health risk appraisal between 2003 and 2005.

How?
HRA data were used to classify individuals according to body mass index (BMI), and in turn BMI was compared with usage of medical resources, associated medical costs, lost work time and associated indirect costs.

Results
- Of the study population, less than 1% were underweight (BMI <18.5 kg/m²), 34% were normal weight (18.5–25 kg/m²), 38% were overweight (25–30 kg/m²), 17% were obese (30–35 kg/m²), and 10% were severely obese (≥35 kg/m²).
- In terms of direct costs (i.e. medical claims costs and use of medical resources), the incremental cost associated with being underweight was US$409.35, for being overweight, obese and severely obese these figures were $147.11, $712.34 and $1,977.43, respectively.
- The incremental indirect costs (i.e. those associated with paid absence from work), for being overweight, obese, and severely obese were $1,403.81, $1,511.24 and $1,414.09, respectively.

What does this mean?
Obesity is associated with a considerable economic burden and reductions in the prevalence of obesity and its associated conditions (high blood pressure and type 2 diabetes) could prove beneficial to employers.

Cost of medical care for COPD is high


Aim
To determine the healthcare costs and medical resource usage associated with chronic obstructive pulmonary disease (COPD; a preventable disease largely caused by smoking, in which the airflow to the lungs is restricted).

Looked at
6,445 US-based employees and their dependents (also covered by company medical insurance) who were diagnosed with COPD between January 2001 and December 2002, and two ‘control’ groups of individuals without COPD.

How?
Healthcare costs and medical resource usage for the group with COPD were compared with those of the control groups.

Control group one – individuals with no evidence of COPD, including those with and without healthcare costs.

Control group two – individuals with no evidence of COPD who incurred no healthcare costs.

Results
- Individuals with COPD tended to use medical resources much more frequently than those without COPD; the number of outpatient, emergency room, and hospital visits was significantly higher in the COPD group.
- Further, those with COPD incurred much higher pharmacy, medical, and total healthcare costs than both control groups.
- Healthcare costs for those with COPD totalled US$15,875 per year, compared with $3,634 and $5,148 for control groups one and two, respectively.

What does this mean?
The economic burden of COPD is high in young, working-age individuals. Effective management of COPD could lower the costs associated with this condition.
Insomnia, a huge economic burden


Aim
To examine the direct and indirect costs of untreated insomnia.

Looked at
138,820 US-based employees between 18 and 64 years old who developed insomnia, and another group of 75,558 elderly patients with insomnia.

How?
Medical claims data (direct costs) and records of absenteeism and short-term disability (indirect costs) between 1999 and 2003 were collected for the insomnia groups and compared with corresponding data from age-matched and sex-matched control groups.

Results
- The average six-month direct medical costs for working-age individuals with insomnia were US$924 higher than those matched individuals without the sleeping disorder ($4,755 vs $3,821).
- In terms of absenteeism-related costs, insomnia was associated with a $405 increase for a six-month period.
- For the elderly patient group, the medical costs rose by $1,143 if insomnia was present.
- At-work productivity, psychosocial functioning and accident rates were not included in the study calculations, but it is likely they would add further costs.

What does this mean?
Insomnia is associated with a considerable financial burden in the working-age population. Considering at-work productivity, psychosocial functioning and accident rates could further increase the insomnia burden.

Excess health risks contribute to employer costs


Aim
To determine the excess medical costs associated with employees having multiple health risk factors.

Looked at
4,226 employees, of whom 49% had completed a health risk appraisal.

How?
Calculated excess costs as the difference in average annual costs between HRA participants with low-risk status, and those with medium or high-risk status.

Risk criteria
i) Low risk – 0-2 health risk factors
ii) Medium risk – 3-4 health risk factors
iii) High risk – 5 ≥ health risk factors

Results
- 56% of total excess costs (US$1.8 million of $3.2 million) were due to medium and high-risk individuals.
- 44% ($1.4 million) were due to high-risk HRA participants.

What does this mean?
Individuals with excess health risks significantly contribute to excess costs due to absenteeism, medical, and pharmacy claims.
Rheumatoid arthritis associated with high employer’s health costs


Aim
To estimate medical expenditure and costs related to absenteeism and short-term disability (STD) for employees with rheumatoid arthritis (RA).

Looked at
8,502 people with RA employed by US-based companies.

How?
- Medical claims data from the participants were used to estimate direct (inpatient, outpatient and pharmacy expenditures) and indirect (absenteeism and STD) costs for RA for the study population, and were then compared with a similar control population without RA.
- Average medical costs and expenditures for absence and STD for 10 other medical conditions were also estimated for comparison.

Results
- Medical costs were higher for employees with RA than for those without this condition (US$7,337 vs $3,250).
- Average annual absenteeism costs and STD expenditure were $27 and $129 higher for employees with RA than for those without.
- The direct and indirect costs for RA ($11,120) were significantly higher than those for the other 10 conditions (total costs for heart disease were $4,653), with the exception of kidney failure (total costs $18,296).

What does this mean?
RA is an expensive disorder relative to other conditions and interventions should be considered to improve workers’ health and productivity.

Medical claims costs rise with increasing BMI


Aim
To quantify the increased healthcare costs associated with body mass index (BMI).

Looked at
A population of 35,932 employees who had completed a one-year health risk appraisal.

How?
The medical and pharmacy costs were analyzed in relation to BMI, and the impact of diabetes and heart disease (two obesity-related health conditions) on cost, was examined.

Risk criteria
Participants were classified as having a normal BMI, being overweight or obese.

Results
- Annual medical costs increased by US$119.70 in people classified as overweight and obese.
- Drug costs increased by $82.60 per BMI point increase.
- Diabetes and heart disease were more common among employees with higher BMIs, and they also had higher medical costs related to these diseases.

What does this mean?
In general, medical claim costs escalate with increasing BMI, and costs increase relative to BMI in the presence of diabetes and/or heart disease. Further, the risk for diabetes and heart disease increases with BMI.
### Strong ROI for weight management programs

**Aim**
To work out approximate costs for lifestyle health risks, emphasizing obesity-related costs.

**Looked at**
Some 24.5 million full-time employees from 61 major US companies over four years.

**How?**
Estimated costs for the following lifestyle risks: accidents/injuries, alcohol/substance abuse, high cholesterol, high blood pressure, obesity, poor prenatal care, lack of exercise, smoking, stress, and poor dental hygiene.

**Results**
- 14.2% of male and 25.1% female lifestyle health risk claims related to obesity.
- The highest obesity costs were found for employees in the healthcare and retail/mixed sectors, aged 65 to 74 years of age, at US$17.29 and $16.49 per month, respectively.
- People at greatest risk for high obesity-related costs were women aged between 55 and 64 years from finance/consulting, manufacturing or civic/utility sectors, and women aged 65 to 74 from healthcare or retail/mixed sectors.

**What does this mean?**
Addressing lifestyle health risks can help avoid migration to disease. Therefore, employers interested in wellness initiatives should first engage in weight management programs, as the potential return on investment is estimated to be substantial.

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### Painful medical conditions raise the cost of employees’ medical claims

**Aim**
To examine the average annual direct and indirect healthcare costs for employees who have painful medical conditions (cancer, arthritis, back/neck disorders or neuropathic pain).

**Looked at**
68,491 insured people employed by seven large US-based companies.

**How?**
Records between 1998 and 2000 were analyzed, and direct costs (including hospital inpatient costs, hospital outpatient costs, emergency room costs, doctors’ office costs, and total drug costs) and indirect costs (including absence and disability claims) from employees with painful medical conditions were compared with total costs from a control population.

**Results**
- Employees with one or more of the four categories of painful conditions incurred higher costs and made more medical claims than those of average employees.
- On average, employees with cancer incurred 3.5 times greater costs than those of average employees.
- Employees with painful conditions had 1.6 to 2.8 times as many healthcare claims than the average employee.

**What does this mean?**
There is a significant relationship between painful conditions and employees’ costs due to medical claims and absenteeism.
Health risks identified and linked to higher medical care costs


Aim
To investigate the relationship between health risk factors and medical care costs.

Looked at
6,543 employees from a Japanese electronics company who were enrolled in a health insurance plan and had undergone a physical check up in 1999 and 2000 and completed a health risk appraisal (HRA).

How?
Medical care costs were recorded in 2000 and compared with data collected during check-ups and the HRA.

Results
- The most common risk factors were lack of exercise (52.9%), current smoking (35.0%), stress (33.0%) and poor nutritional habits (23.6%).
- Accounting for other risk factors, employees who had recently quit smoking incurred 78.0% higher medical care costs (US$289); and those with high blood pressure incurred 22.6% higher costs (US$340) than those without these risk factors.
- Individuals with multiple cardiovascular disease risk factors had up to 128% higher costs ($1,204) than individuals without these risk factors.
- Strangely, smoking, poor nutrition and alcohol intake were associated with reduced medical care costs; but this could be because the HRA was not tailored to a Japanese population and to the length of the study.

What does this mean?
The authors suggest that such data could help health promotion efforts in Japan and direct future investigations of health risks and medical costs. However, some risk factors are likely cultural-specific and population-specific.

Obesity increases medical and absenteeism costs


Aim
To estimate the annual medical and absenteeism costs related to obesity across the US.

Looked at
Two nationally representative datasets: the National Health Interview Survey (NHIS) with 25,427 participants and the Medical Expenditure Interview Survey (MEPS) with 20,329 participants.

How?
Analyzed NHIS data to look at absenteeism and MEPS data to look at medical costs.

Risk criteria
Body mass index was categorized into five groups, normal, overweight, grade I obesity, grade II obesity, and grade III obesity.

Results
- Obesity resulted in a significant increase in absenteeism for women, but a not so significant increase for men.
- Combined absenteeism and medical costs for overweight or grade I, II or III obese individuals was significantly greater than that for normal weight men and women.
- Obesity in a firm with 1,000 employees would cost US$285,000 per year, approximately 30% of this resulting from increased absenteeism.

What does this mean?
Obesity resulted in significant increases in medical costs for full-time employees. Obesity-related costs were significantly higher for women than men.
Medical claims proportional to employee health risks


Aim
To determine the relationship between health risk status and medical claims costs across multiple organizations.

Looked at
165,770 employees from six corporations (manufacturing, insurance and financial services sectors), of whom 21,124 had taken a health risk appraisal (HRA).

How?
- Two years’ worth of medical claims data were merged with HRA data.
- The health risk level of each individual was determined by the number of the following health risk factors they had: stress, perception of physical health, life satisfaction, job satisfaction, tobacco use, alcohol use, seat belt use, drug/medication use, physical activity level, illness absence days, blood pressure, cholesterol, body mass index, serious medical problems, and health-age index.

Results
- Costs of medical claims increased as the risk level increased from low (0-2 risk factors) to high (≥5 risk factors) across all corporations and types of business.
- Excess medical costs for medium-risk and high-risk employees ranged from 15.0% to 30.8%; excess costs related to raised risk level accounted for a large portion of the medical costs of each company.

What does this mean?
Economic benefit could be gained from the use of schemes to reduce the health risk level of employees.

Medical charges increase with increasing BMI


Aim
To quantify the impact of health risks and body mass index (BMI) on medical expenses.

Looked at
38,841 US-based employees of General Motors Corporation who were enrolled in a medical plan.

How?
- Data from health risk appraisals were collected and merged with medical claims records from 1996 to 2000.
- Individuals were classified according to their BMI and how many of the following 12 risk factors they had: physical activity, stress, life satisfaction, perception of health, blood pressure, cholesterol levels, high-density cholesterol levels, smoking, alcohol use, seat belt use, personal illness days, and medical conditions.

Results

<table>
<thead>
<tr>
<th>BMI (kg/m²)</th>
<th>0 additional risk factors claims ($)</th>
<th>4 or more additional risk factors claims ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;18.5</td>
<td>2,689</td>
<td>7,579</td>
</tr>
<tr>
<td>18.5-24.9</td>
<td>2,655</td>
<td>6,555</td>
</tr>
<tr>
<td>25-29.9</td>
<td>3,239</td>
<td>7,118</td>
</tr>
<tr>
<td>30-34.9</td>
<td>3,579</td>
<td>7,758</td>
</tr>
<tr>
<td>≥35</td>
<td>4,151</td>
<td>8,075</td>
</tr>
</tbody>
</table>

What does this mean?
With or without other risks factors, medical charges increased significantly with incremental BMI. Reducing health risks within any BMI category could likely lead to medical cost savings.
Medical costs drop as activity increases, regardless of BMI


Aim
To determine whether physical activity levels have an impact on healthcare costs, taking into account body mass index (BMI).

Looked at
23,490 employees from General Motors Corporation and members of an international union (United Automobile, Aerospace and Agricultural Implement Workers of America), who were enrolled in a medical insurance plan from 1996 to 1997 and who had completed a health risk appraisal.

How?
Data from health risk appraisals were collected and compared with annual healthcare costs (medical and pharmaceutical) between 1996 and 1997.

Results
- Average annual healthcare costs were US$285 less for employees who were at least moderately active than for those who were sedentary.
- Although total costs for obese individuals were higher than those for individuals with lower BMIs, active individuals who were obese incurred up to $499 less charges than sedentary people who were obese.
- Healthcare cost savings were estimated at 1.5% of total healthcare costs if all obese and sedentary employees became moderately active.

What does this mean?
Health promotion programs aimed at improving the physical activity levels of obese employees would be cost-efficient, regardless of weight reduction initiatives.

Medical claims costs predicted using health risk appraisal data


Aim
To test whether a wellness score, derived from the University of Michigan’s health risk appraisal (HRA), can be used to predict future short-term medical claims costs.

Looked at
19,861 employees of General Motors Corporation and members of an international union (United Automobile, Aerospace and Agricultural Implement Workers of America), who were enrolled in medical insurance plans from 1996 to 1998 and who had completed an HRA in 1996.

How?
A wellness score for each individual was generated from the HRA results and comprised three components: behavioral health risks, mortality risks, and preventative services usage.

Results
- A clear relationship existed between short-term medical claims costs and wellness scores, with median costs ranging from US$867 to $1,599, depending on the score.
- Age, sex and presence of disease were significantly associated with cost.
- When controlling for disease status, age, and sex, each additional point on the wellness score (i.e. improvement in health) resulted in a $52 reduction in health services, a $5 reduction in drug/medication, and a $56 reduction in total annual medical claims costs.
- The contribution of these factors could predict 61% of the variance in future medical claims costs.

What does this mean?
HRA data can be used to predict future short-term medical claims costs for individuals, providing a more accurate estimation of costs than traditional methods using just sex, age, and smoking status. This information may be used to better target wellness and disease prevention initiatives.
High-risk health status associated with raised healthcare costs

Aim
To evaluate the association between health risks and medical care costs in an Australian population.

Looked at
11,568 members of an Australian private medical insurance plan who completed a health risk appraisal (HRA) between 1995 and 1999. A group of 8,244 age-matched and sex-matched non-participants were used as a control group.

How?
HRA data were used to stratify participants as i) high risk (three or more of the following health risk factors: smoking, physical activity, alcohol use, blood pressure, cholesterol level, weight, medical problems and absence due to illness), ii) medium risk (two risk factors) and iii) low risk (none or one risk factor), and average healthcare costs between 1995 and 1999 were compared for each risk group.

Results
- Low-risk participants had the lowest total healthcare costs between 1995 and 1999 (total cost AU$377).
- Medium-risk ($484) and high-risk participants ($661) had the highest total healthcare costs during the study.
- Low-risk participants had lower total healthcare costs than the control group ($377 vs $438).
- In total, 13.5% of total healthcare costs were associated with excess risk (high-risk and medium-risk).

What does this mean?
The more risk factors an individual has, the most costly their healthcare. Health risk levels may have underestimated the impact of excess risks in this population as the HRA assessed only eight health risks.

Pharmaceutical costs linked to number and type of health risks

Aim
To quantify the impact of different health risk factors on pharmaceutical expenditure.

Looked at
3,554 employees of the US-based company Bank One, who participated in a pharmacy benefit plan and who had completed a health risk appraisal (HRA).

How?
HRA data were compared with pharmaceutical costs in 2000.

Results
- Age and sex had a significant effect on pharmaceutical costs, and being an ex-smoker, having high blood pressure, high cholesterol levels, a high body mass index and reporting fair or poor self-perceived health were all significantly associated with raised drug-related costs.
- After controlling for age, sex and the number of self-reported diseases, each additional risk factor was associated with an average annual increase in pharmacy claims costs of US$76 per employee.
- However, lack of physical activity, heavy use of alcohol, failure to use seat belts, dissatisfaction with life or job, and stress were not related to pharmaceutical costs.
- The average pharmaceutical costs were $425 for low-risk employees (0-2 risk factors), $591 for medium-risk employees (3-4 risk factors), and $915 for high-risk employees (≥5 risk factors).

What does this mean?
Programs that target modifiable risk factors might reduce pharmaceutical costs. Of note, the modification of some risk factors could, however, lead to increased costs (e.g. drug therapy for high cholesterol levels).
High medical costs linked to overweight and obesity


Aim
To explore the relationship between body mass index (BMI) and medical costs.

Looked at
177,971 employees, adult dependents and retirees of General Motors Corporation (US) who had enrolled in a health insurance plan between 1996 and 1997 and had completed one health risk appraisal (HRA) during this time.

How?
Participants were categorised by weight into six weight groups (underweight, normal, overweight, and grade I, II and III obesity).

Results
- The normal-weight group (BMI 18.5-24.9 kg/m²) cost the least and medical costs gradually increased with increasing BMI (excluding the underweight group).

<table>
<thead>
<tr>
<th>Weight Group</th>
<th>Annual Median Medical Costs ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal weight (BMI 18.5-24.9 kg/m²)</td>
<td>$2,225</td>
</tr>
<tr>
<td>Overweight (BMI 25-29.9 kg/m²)</td>
<td>$2,388</td>
</tr>
<tr>
<td>Grade I obesity (BMI 30-34.9 kg/m²)</td>
<td>$2,801</td>
</tr>
<tr>
<td>Grade II obesity (BMI 35-39.9 kg/m²)</td>
<td>$3,182</td>
</tr>
<tr>
<td>Grade III obesity (BMI 40+ kg/m²)</td>
<td>$3,753</td>
</tr>
</tbody>
</table>

What does this mean?
Medical costs increase with increases in BMI. Weight management programs could be means of avoiding medical costs associated with being overweight and obese.

Healthcare costs predicted by modifiable risk factors


Aim
To determine whether having modifiable lifestyle factors can predict future medical care costs.

Looked at
78,728 men and 50,414 women at the Korea Medical Insurance Corporation over six years.

Risk criteria
People were assessed for their perceived health status, smoking, body mass index, physical activity, cholesterol levels, blood pressure, and blood glucose levels.

Results
- Excess costs for high-risk individuals stood between 2.4% and 16.0% compared with that for low-risk individuals.
- The presence of multiple risk factors doubled medical costs.
- Health risk factors accounted for 23.1% of medical care costs over the six years.

What does this mean?
Modifiable health risk factors contribute to healthcare costs, and when grouped together can double healthcare costs.
The impact of health risks on absence from work and productivity
Aim
To assess the impact of sleep disturbances on work performance and productivity, and review the associated productivity costs.

Looked at
3,735 adult participants that completed a survey on their sleep patterns during June and July 2006 in the US.

How?
Participants recorded their sleep patterns against productivity, health status and daily functioning. From the results, participants were identified as suffering from excessive sleepiness (ES) defined as “the inability to consistently achieve and sustain levels of wakefulness needed to accomplish the tasks of daily living.” It is a common symptom of obstructive sleep apnea, narcolepsy, multiple sclerosis, depression and shift work. Participants with or without ES were further split in two groups. Those who had obstructive sleep apnea, depression, narcolepsy, multiple sclerosis, or were shift workers (1,758 people); and those without these conditions (1,977 people).

Results
- Individuals with ES were four times more likely to report four or more associated conditions e.g. asthma, cancer, chronic fatigue syndrome, chronic pain, diabetes, heart disease.
- Participants with ES also had a significantly worse quality of life and lower cognition and alertness scores than those without ES.
- Absenteeism and presenteeism were 2.2% and 10.6% higher and self-reported activity impairment was also 11.11% higher in those with ES.
- The level of productivity impairment caused by ES is 32.4%, which is similar to long term conditions such as diabetes (22%) and depression (33%).

What does this mean?
Excessive sleepiness has negative effects on health and general functioning, such as cognition and alertness. It’s also linked to higher absenteeism and presenteeism.

Aim
To assess the impact of sleep disturbances on work performance and productivity, and review the associated productivity costs.

Looked at
4,188 employees at four US companies.

How?
Employees were evaluated for sleep problems and placed into one of four categories: i) insomnia, ii) insufficient sleep syndrome, iii) at-risk, and iv) good sleep. These results were then compared to productivity measurements from the Work Limitations Questionnaire.

Results
- Employees with insomnia had a 6.1% productivity loss compared to 2.5% productivity loss in employees who had good sleep.
- Those with insomnia or insufficient sleep had significantly more negative effects of tiredness on their attention, decision-making, memory and motivation at work.
- Insomnia or insufficient sleep made employees significantly more likely to unintentionally fall asleep at work and nod off while driving, leading to near misses or accidents.
- Fatigue-related productivity losses were estimated to cost the companies $1,967 per employee.

What does this mean?
Poor sleep effects employees’ productivity through impairing memory, decision making and motivation, which results in significant business costs.
Worker productivity and performance is affected by waking up in the night


Aim
To investigate the relationship between nighttime awakenings in employees and how they function in the workplace.

Looked at
4,188 employees at four US companies were randomly selected to describe their sleep patterns and complete the Work Limitations Questionnaire.

How?
Researchers gathered employees’ general demographics, health status and sleep information. Participants were categorized by number of nighttime awakenings (0, 1-2, 3-4 and more than 5 times per night). The survey also included questions on how they performed time management, physical job tasks, mental/interpersonal tasks and output tasks.

Results
- Participants who reported more than 5 awakenings per night had the greatest loss in productivity

<table>
<thead>
<tr>
<th>No of awakenings per night</th>
<th>% of employees</th>
<th>Loss in productivity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>11</td>
<td>2.78</td>
</tr>
<tr>
<td>1 to 2</td>
<td>58</td>
<td>3.64</td>
</tr>
<tr>
<td>3 to 4</td>
<td>24</td>
<td>4.46</td>
</tr>
<tr>
<td>5 or more</td>
<td>7</td>
<td>5.5</td>
</tr>
</tbody>
</table>

- More women than men reported higher number of awakenings
- The greatest impairments were found in the performance areas of energy, motivation and social interaction

What does this mean?
The better quality sleep an employee has, the more productive they are likely to be. Energy, motivation and social interaction are especially affected by poor sleep.

Insomnia predicts future sick leave


Aim
To see how symptoms of insomnia contribute to sick leave.

Looked at
The relationship between insomnia and sick leave over four years in 6,892 participants aged 40-45 years in Norway.

How?
Participants were asked their social and demographic data, lifestyle factors, and BMI. They were also asked to report on their experiences of insomnia, sleep apnea symptoms, anxiety, depression, pain or any other long term health conditions. These data were compared against the number of days sick leave from official registry data.

Results
- People with insomnia, 5.1% of the population, had more than twice the risk (odds ratio of 2.20) of being off work compared with good sleepers.
- The odds increased when the sick leave was long term (defined as more than 90 days over 4 years follow up).
- Insomnia was found to significantly predict sick leave, even when taking into consideration other possible factors, such as suffering from a long term illness.

What does this mean?
People with insomnia are more likely to take sick leave than people who sleep well.
Obesity directly increases absenteeism

The impact of obesity on illness absence and productivity in an industrial population of petrochemical workers. Tsai SP, Ahmed FS, Wendt JK, Bhojani F, Donnelly RP. Ann Epidemiol. 2008; 18: 8-14

Aim
To examine the overall and the economic impact of overweight and obesity on illness-related absence.

Looked at
4,153 employees of Shell Oil Company (US) employed at any time between January 1994 and December 2003.

How?
Data prospectively collected from an employee physical examination (the Shell Health Surveillance System used to monitor employee health) were used to categorize individuals according to body mass index (BMI), which was then compared with illness absence data.

Results
- Overall, as BMI increased so did the frequency of absences; there were 132.8 absences per 1,000 normal-weight employees, 193.5 per 1,000 overweight employees and 239.7 per 1,000 obese employees.
- Further, the average number of lost work days lost rose with increasing BMI.
- Among employees with no additional health risk factors (e.g. smoking, high blood pressure), those who were overweight lost more than 1.5 times more days (4.2 vs 2.6 days) and those who were obese more than 2.5 times as many days (7.2 vs 2.6 days) as normal-weight co-workers. This trend continued among employees grouped by number of additional risk factors.

What does this mean?
Obesity and overweight have a considerable economic impact, with and without additional health risk factors. For this study population the direct costs of obesity-related absence were US$1.9 million. The prevalence of both conditions will continue to rise unless preventative measures are taken.

Fatigue-related lost productive time associated with high financial losses


Aim
To estimate the prevalence of fatigue and its impact on health-related lost productive time (LPT).

Looked at

How?
The survey findings were used to estimate health-related LPT (i.e. self-reported hours per week absent from work due to health reasons and health-related reduced performance while at work).

Results
- 41% of the study population had fatigue and were significantly more likely to report pain, digestive problems, feeling sad/blue, cold/flu, allergies, asthma, chronic breathing problems, cancer, heart disease, and diabetes, than employees without reported fatigue.
- 4.1 hours of productive work were lost each week to fatigue-related LPT, 85.4% of this time related to reduced performance at work.
- Employees with fatigue cost an estimated US$136.4 billion in health-related LPT annually.

<table>
<thead>
<tr>
<th>Status</th>
<th>% of employees reporting ≥ one of nine health conditions</th>
<th>% of employees reporting health-related LPT</th>
<th>Hours lost per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>With fatigue</td>
<td>94.0</td>
<td>65.7</td>
<td>5.6</td>
</tr>
<tr>
<td>No fatigue</td>
<td>59.9</td>
<td>26.4</td>
<td>3.3</td>
</tr>
</tbody>
</table>

What does this mean?
Fatigue is common among this sample of US employees, and it could cost US employees an excess of $101 billion per year in health-related LPT. Targeting wellness interventions to individuals with fatigue may help decrease overall LPT costs.
High cost of diabetic neuropathy to US economy


Aim
To investigate the impact of diabetes and pain caused by diabetic neuropathy on lost productive time (LPT) and employment status.

Looked at
19,075 US-based employees aged between 40 and 65 years who participated in a validated computer-assisted productivity telephone interview between August 2001 and February 2004.

How?
Data from the audit were used to compare health-related LPT between individuals without diabetes (n = 18,042; the ‘control’ group), those with diabetes but no neuropathic symptoms (n = 642), and those with both diabetes and neuropathic pain (n = 391).

Results
- Overall, individuals reporting diabetes with neuropathic symptoms were 18% more likely to have lost at least two hours productive time a week than controls.
- In terms of mean hours of LPT per week, those in the diabetes group with neuropathic symptoms lost significantly more time than those in the diabetes or control group (4.21 hours vs 1.91 and 1.92 hours, respectively).
- Further, regardless of whether pain was reported, the presence of diabetes increased the likelihood of an individual being unemployed by approximately twofold compared with controls.

What does this mean?
Extrapolating these findings to the entire US workforce, those with neuropathic diabetes could cost the economy an estimated US$3.65 billion annually in LPT. Health programs aimed at helping people better control diabetes could considerably improve worker productivity.

Major depression and chronic pain linked to absenteeism


Aim
To examine the effect of chronic pain on illness-related and disability-related absenteeism from work.

Looked at
9,238,154 individuals who completed a national survey on mental health and well-being, and who reported a chronic pain condition (diagnosed by a healthcare professional and present for ≥ six months).

How?
Data from the survey were used to compare the occurrence of chronic pain and depression, with absenteeism.

Results
- Major depression in the presence of chronic pain was the strongest predictor of absenteeism; individuals who reported a major depressive event in the past year were 2.9 times more likely to be absent than the individuals who had not suffered from depression.
- 19% of individuals who reported absenteeism also reported a major depressive episode in the previous 12 months, compared with 7.9% in those who did not report any absenteeism.
- Absenteeism was also strongly linked to high income, being younger, being married and a high level of education.

What does this mean?
Depression is a major source of disability for working individuals, especially in the presence of chronic pain.
Productivity-related costs seriously impact full cost of health conditions


Aim
To determine the magnitude of health-related costs due to lost productive time relative to medical and pharmacy costs.

How?
Data from the productivity questionnaire were compared with medical and pharmacy cost data.

Looked at
15,380 employees from four US-based companies who completed the Health and Work Performance Questionnaire.

Results
- The costs related to lost productivity alone were more than four times higher than medical and pharmacy costs combined.

<table>
<thead>
<tr>
<th>Health conditions driving medical and pharmacy costs</th>
<th>Health conditions driving productivity costs</th>
<th>Health conditions driving combined costs for medical, pharmacy and productivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancer (except skin cancer)</td>
<td>Fatigue</td>
<td>Back/neck pain</td>
</tr>
<tr>
<td>Back/neck pain</td>
<td>Depression</td>
<td>Depression</td>
</tr>
<tr>
<td>Coronary heart disease</td>
<td>Back/neck pain</td>
<td>Fatigue</td>
</tr>
<tr>
<td>Other chronic pain</td>
<td>Sleeping problems</td>
<td>Other chronic pain</td>
</tr>
<tr>
<td>High cholesterol levels (except pain due to arthritis, back/neck problems, headache and migraine)</td>
<td>Sleeping problems</td>
<td></td>
</tr>
</tbody>
</table>

What does this mean?
Measuring only medical, pharmacy or productivity costs neglects a large portion of health-related costs. The full cost impact of health conditions to an organization emerges only when medical, pharmacy, and productivity costs are combined.

Job performance associated with health status of employees


Aim
To explore the impact of health status on job performance, as measured by self-reported presenteeism and absenteeism (due to illness).

How?
The prevalence of 12 health risk factors and eight chronic medical conditions were analyzed in relation to presenteeism and absenteeism.

Looked at
224 employees of an Australian insurance company who completed a health risk appraisal in 2004.

Results
- Individuals classified as high risk for stress and life dissatisfaction had significantly higher presenteeism rates than low-risk individuals.
- Presenteeism and absenteeism were significantly higher for those with one or more medical conditions than those with none.

<table>
<thead>
<tr>
<th>Status</th>
<th>Presenteeism (%)</th>
<th>Absenteeism (hours per month)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low risk</td>
<td>14.5</td>
<td>2.4</td>
</tr>
<tr>
<td>Medium risk</td>
<td>23.7</td>
<td>3.1</td>
</tr>
<tr>
<td>High risk</td>
<td>32.7</td>
<td>5.1</td>
</tr>
</tbody>
</table>

What does this mean?
Presenteeism and absenteeism could both be reduced by improving employee health risk factors.
The impact of health risks on absence from work and productivity

Working conditions strongly influence job performance

Aim
To investigate the impact of work environment factors, health risks and medical conditions on job performance.

How?
Appraisal data were divided into work factors, health risks and medical conditions, and were compared with presenteeism.

Looked at
1,523 employees from various industries in Australia, who completed a health risk appraisal.

Results
- Life dissatisfaction, job dissatisfaction, stress, use of drugs/medication for relaxation and poor perception of health, all predicted presenteeism.
- Of the medical conditions, heart problems, allergies, back pain and asthma were associated with an increased chance of presenteeism.

What does this mean?
Health management programs that include interventions targeting work environments could increase at-work productivity.

BMI linked to short-term disability and lost work days

Aim
To evaluate the impact of body mass index (BMI) on workplace productivity, as measured by the frequency and duration of short-term disability (STD) events in a working population.

Looked at

How?
Health risk appraisal data from the population who had at least one STD event (n = 1,690) were then compared with data from those who had no STD events (n = 15,932).

Results
- Overweight or obese individuals (BMI 25.0-29.9 kg/m\(^2\) and \(\geq 30\) kg/m\(^2\), respectively) were more likely to have an STD event than normal weight or underweight employees (BMI 18.5-24.9 kg/m\(^2\) and <18.5 kg/m\(^2\), respectively); 73% of normal-weight employees took an STD event versus 14.9% of obese employees.
- The average BMI for employees with an STD event was 29.1 kg/m\(^2\); for those without an STD event the figure was 26.6 kg/m\(^2\).
- Underweight workers had the longest average STD duration (51.8 work days over the study period), followed by employees who were obese (48.8 work days).

What does this mean?
Improving employee health to promote a healthful weight could reduce STD events, a major cost to companies.


Health-related productivity costs high for smokers


Aim
To determine health-related productivity losses due to smoking.

Looked at
34,934 employees who participated in a Wellness Inventory between 2002 and 2005, from 147 US-based companies.

How?
Days lost from work and unproductive at-work time were compared for nonsmokers, former, and current smokers.

Results

<table>
<thead>
<tr>
<th></th>
<th>Nonsmokers (n = 21,877)</th>
<th>Former smokers (n = 8,452)</th>
<th>Current smokers (n = 4,605)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Productivity results</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average days missed due</td>
<td>4.4</td>
<td>4.9</td>
<td>6.7</td>
</tr>
<tr>
<td>to health conditions per</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>employee per year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average hours lost per</td>
<td>35.2</td>
<td>39.2</td>
<td>53.6</td>
</tr>
<tr>
<td>year due to absenteeism</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average hours lost per</td>
<td>42.8</td>
<td>56.0</td>
<td>76.5</td>
</tr>
<tr>
<td>year due to presenteeism</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Medical conditions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average days missed due</td>
<td>Females: 1.95</td>
<td>Females: 1.81</td>
<td>Females: 2.52</td>
</tr>
<tr>
<td>to allergic rhinitis/hay fever per year</td>
<td>Males: 1.88</td>
<td>Males: 2.59</td>
<td>Males: 2.82</td>
</tr>
<tr>
<td><strong>Costs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost of lost productivity</td>
<td>2,623</td>
<td>3,246</td>
<td>4,430</td>
</tr>
<tr>
<td>time (US$)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

What does this mean?
The promotion of company-wide smoking cessation strategies could reduce health-related productivity losses.

Obesity leads to lost productive time


Aim
To examine health-related lost productive time (LPT) in overweight and obese workers.

Looked at
National telephone survey between September 2002 and May 2003 of 6,894 employed adults aged between 18 and 65 years.

How?
LPT was calculated as the sum of both self-reported absent time per week for health reasons and self-reported productivity loss per week for health reasons.

Risk criteria
Based on body mass index (BMI) categorized as:

- i) underweight (BMI 18.5 kg/m²),
- ii) normal weight (BMI 18.5-24.9 kg/m²),
- iii) overweight (BMI 25.0-29.9 kg/m²), and
- iv) obese (BMI ≥30.0 kg/m²).

Results

- 2,868 (42%) respondents were of normal weight, 2,490 (36%) were overweight, and 1,536 (22%) were obese.
- Obese workers reported higher LPT than overweight and normal weight workers and had reduced performance while at work.
- The estimated excess annual cost of health-related LPT attributable to obesity for US employers was US$11.7 billion. Absenteeism comprised only a third of the total obesity-related LPT costs.

What does this mean?
Productivity could rise if companies focus on reducing excess weight in the workforce.
The impact of health risks on absence from work and productivity

Aim
To investigate the impact of different health risk factors upon productivity while at work (presenteeism).

Looked at
28,375 employees of Bank One (US) who completed a health risk appraisal (HRA) and a brief version of the Work Limitations Questionnaire between 2002 and 2004.

How?
Data from the HRA and Work Limitations Questionnaire were used to investigate the association between health risks and work limitation.

Risk criteria
i) low risk – 0-2 risk factors
ii) medium risk – 3-4 risk factors
iii) high risk – ≥5 risk factors

Results
- Of the study population, 28.6% reported significant levels of pain.
- Individuals reporting the most severe pain had an average 0.83 absence days more than those without pain over a month.
- People with the most pain had 5-times more health-related suboptimal performance per month while doing their job, compared to their healthy colleagues.
- Those with any form of pain lost over three and a half working days over a month.

What does this mean?
Initiatives to improve pain management could yield considerable returns to employers through reduced absence and greater work performance.


The impact of health risks and productivity linked to sizable loss

Aim
To investigate the impact of on-the-job productivity on productivity.

Looked at
1,039 employees of a US-based Fortune 100 company.

How?
Participants completed a short validated internet-based survey with questions on pain, health status, medical conditions, absence from work, presenteeism, healthcare utilization, and health risk behaviors.

Results
- Individuals reported greater overall work limitation when classified as high risk for smoking, physical activity, seat belt usage, use of medication for relaxation, poor life satisfaction, poor physical health, poor job satisfaction, obesity, high blood pressure, and high stress.
- Each additional risk factor was associated with a productivity loss of 2.4% compared with individuals who had no risk factors.
- Individuals categorized as medium risk had an excess productivity loss of 6.2% and high-risk individuals had an excess productivity loss of 12.2% compared with those at low risk.
- Individuals classified as medium or high risk were estimated to cost their employers between US$1,392 and $2,592 in lost productive time each year.

What does this mean?
The study gives an idea of the scale of financial loss attributable to employee health risk factors. Programs targeting these factors could help reduce these losses.

Absence rates and duration rise with number of risk factors


Aim
To quantify the impact of health risk factors on absenteeism.

Looked at

Results
- Current smokers lost nearly twice as many work days as nonsmokers, and employees who were obese had significantly higher rates of work days lost than those of normal weight.

<table>
<thead>
<tr>
<th>Number of risk factors</th>
<th>Frequency of absences (episodes per 100 employees)</th>
<th>Work days lost per employee per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>11.8</td>
<td>4.1</td>
</tr>
<tr>
<td>1</td>
<td>16.3</td>
<td>6.4</td>
</tr>
<tr>
<td>2</td>
<td>23.0</td>
<td>8.8</td>
</tr>
<tr>
<td>3</td>
<td>27.4</td>
<td>9.3</td>
</tr>
<tr>
<td>≥4</td>
<td>32.3</td>
<td>12.6</td>
</tr>
</tbody>
</table>

What does this mean?
Presenteeism and absenteeism could both be reduced by improving employee health risk factors.

Good health status boosts employee productivity


Aim
To develop and validate a 20-question health risk appraisal (HRA) and to assess the impact of employee health risk status on work productivity.

Looked at
2,224 employees of three UK-based organizations who completed the newly developed HRA, the SF-36 health-related quality of life questionnaire, and the World Health Organisation Health and Work Productivity questionnaire.

How?
HRA data were compared with data obtained from the SF-36 and World Health Organisation questionnaires, and 30 individuals retook the HRA four weeks after the completion date to test the validity of the new HRA.

Results
- The 20-question HRA had excellent validity, both on internal measures and when compared with other questionnaires.
- Individuals in the lower quartile of health had a mean productivity decrement of 33.5% per week; a 23.5% difference in productivity when compared with the upper quartile (i.e. the most healthy individuals).
- Those with low and medium health risk status were almost four times more likely to meet productivity standards than those at high risk.

What does this mean?
Health status is correlated with productivity; the better the health status of an employee the more productive they are.
Bipolar disorder associated with high absence-related costs


Aim
To analyze the impact of bipolar disorder (BPD, often referred to as manic depression) on lost work time (absenteeism) and at-work productivity.

How?
Diagnosis and treatment data, and health-related absence and real productivity information from employees with BPD were compared with those from employees without BPD.

Looked at
230,000 employees from a large US-based insurance claims database.

Results
- Over the period of a year, employees with BPD had significantly lower work productivity than the other groups, a 20-22% productivity decrement.

<table>
<thead>
<tr>
<th>Group</th>
<th>Absenteeism days per employee per year</th>
<th>Total absence-related costs (AUSS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employees with BPD, diagnosed in 2001</td>
<td>18.9</td>
<td>1,995</td>
</tr>
<tr>
<td>Employees without a BPD diagnosis in 2001 or 2002</td>
<td>7.4</td>
<td>885</td>
</tr>
<tr>
<td>Employees with mental health diagnosis in 2001 other than BPD</td>
<td>12.2</td>
<td>1,318</td>
</tr>
<tr>
<td>Employees without BPD or mental health diagnosis in 2001 or 2002</td>
<td>6.1</td>
<td>776</td>
</tr>
</tbody>
</table>

What does this mean?
A diagnosis of BPD is strongly associated with raised costs for absenteeism and resulting loss of productivity.

Economic impact of presenteeism exceeds direct medical care costs


Aim
To estimate the cost associated with absenteeism and on-the-job work impairment (presenteeism) attributable to health risks.

Looked at
7,797 employees of Dow Chemical Company (US) who participated in an online survey between July and September 2002.

How?
Data collected from medical and pharmaceutical claims costs were compared with smoking status, the presence of chronic health conditions and various biometric factors.

Results
- For participants with a chronic condition, average absenteeism during one month varied between 0.9 and 5.9 hours, dependent on the condition.
- On-the-job work impairment for those with a chronic condition varied between a 17.8% and a 36.4% decrement in ability to function. This was also dependent on the condition; 36.4% for depression, 23.8% for breathing disorders, 21.7% for back and/or neck disorders, and 18.2% for allergies.
- The average cost per employee with one or more medical conditions was US$2,278 for medical care, US$661 for absenteeism, and US$6,721 for presenteeism.
- Extrapolated to the whole of the workforce, the total cost of chronic conditions was estimated at 10.7% of total labor costs.

What does this mean?
When assessing the overall costs of common chronic illnesses, the costs associated with presenteeism far exceed direct medical care costs.
Medical conditions impair work performance


Aim
To evaluate the relative contribution of different medical conditions on presenteeism.

Looked at

How?
Data from both the health risk appraisal and the work productivity questionnaire were compared.

Results
- In total, 47% of respondents reported the presence of at least one medical condition, with 22.5% reporting two or more conditions.
- Each additional medical condition was associated with a 4-5% increase in work impairment in the areas of time management, physical work activities, mental/interpersonal activities, and overall work output.
- Of all conditions, depression had the greatest impact on all four of the areas listed above; employees with depression were more than twice as likely to report limitations in work output because of their condition.
- Arthritis, back pain, diabetes, heart disease, heartburn, high blood pressure, irritable bowel syndrome, and the menopause also had an impact on work performance.

What does this mean?
Not only do individuals with medical conditions incur greater healthcare costs, they are also much more likely to have impairments in work performance. Disease management and lifestyle management programs in the workplace could yield benefits for both employee and employer.

Health risk status and on-the-job productivity strongly linked


Aim
To investigate the relationship between employee health risks and both on-the-job productivity and absence from work.

Looked at
2,264 US-based employees who completed a health risk appraisal and the Work Productivity and Activity Questionnaire and who had access to a variety of company wellness programs and services.

How?
Between February and September 2001, data from the health risk appraisal were used to calculate a health risk score for each employee, which was then compared with self-reported on-the-job productivity and absence from work.

Results
- As the total number of health risk factors rose, so did the average percentage of time lost related to presenteeism (lost productivity at work) and absenteeism.
- Individuals with no risk factors reported 1.3% and 0% lost time caused by presenteeism and absenteeism, respectively; whereas these figures rose to 25.9% and 6.3% lost time for those with eight health risk factors.
- The risk factors most strongly associated with absence from work were physical inactivity, high stress levels, and diabetes.
- Those factors most strongly associated with presenteeism were poor diet, body mass index outside the normal range, physical inactivity, high stress levels, and lack of emotional fulfillment.

What does this mean?
The difference in productivity between the most and least healthy employees is large, which underlines the potential importance of corporate health promotion programs.
Poor sleep contributes to declines in productivity


Aim
To estimate the prevalence of sleep-related issues within a working population and examine the impact of poor sleep upon workplace absence.

Looked at
4,868 employees of a telecommunications company in Tokyo.

How?
All employees completed the Pittsburgh Sleep Quality Index.

Results
- Sleep issues were reported by 45% of the respondents.
- Those with poor sleep were 89% more likely to take sick leave and 135% more likely to have difficulties performing than those without sleep problems.
- The most strongly associated factors underlying poor sleep quality were perceived stress and low job satisfaction.

What does this mean?
Poor sleep is significantly associated with higher absenteeism and presenteeism. Health programs targeting insomnia could yield improvements in worker productivity.

Pain leads to drop in productivity and financial losses


Aim
To estimate the amount of productive time lost caused by common painful conditions and approximate the resulting economic costs.

Looked at
28,902 individuals employed in the US who had completed the telephone-based American Productivity Audit between 2001 and 2002.

How?
Data from the audit were used to analyze, time absent from work, reduced performance at work due to overall pain, and that relating to specific painful conditions.

Results
- 53% of respondents reported at least one specific painful condition in the two weeks preceding the survey.
- Lost productive time was most commonly caused by overall pain (13.0%), headache (5.4%), back pain (3.2%), arthritis (2.0%), and musculoskeletal pain (2.0%).
- The majority of lost productive time (77%) was explained by reduced performance at work rather than absence days.
- On average, each week individuals with a painful condition lost approximately 4.6 hours of productive time.
- This loss in productive time was estimated to cost US employers US$61.2 billion per year.

What does this mean?
Strategies to reduce and manage pain in employees could have a positive effect on employee productivity and overall business performance.
## Strong link between health risks and absence costs

*Association of health risks with the cost of time away from work. Wright DW, Beard MJ, Edington DW. J Occup Environ Med. 2002; 44: 1126-1134.*

**Aim**
To assess the full costs associated with absenteeism and to investigate the impact of different health risk factors on time away from work.

**Looked at**
6,220 hourly employees of Steelcase Incorporated (US) who participated in a wellness program and took at least one health risk appraisal between 1998 and 2000.

**How?**
Health risk appraisal data were used to categorize individuals as low (0-2 risk factors), medium (3-4 risk factors) or high (≥5 risk factors) risk, and costs associated with time away from work were compared.

**Results**
- 4,090 employees were absent from work at some point and the associated costs totalled US$14.3 million.

<table>
<thead>
<tr>
<th>Risk category</th>
<th>Proportion of employees who had time away from work (%)</th>
<th>Mean annual costs related to time away from work ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>61.0</td>
<td>1,096</td>
</tr>
<tr>
<td>Medium</td>
<td>73.8</td>
<td>1,224</td>
</tr>
<tr>
<td>High</td>
<td>81.0</td>
<td>1,764</td>
</tr>
</tbody>
</table>

**What does this mean?**
The association between health risk level and costs related to time away from work is strong. If absence costs follow risk reduction, a potential annual savings of $1.7 million could be achieved in this study.

## Four or more health risk factors double risk of absenteeism


**Aim**
To examine the relationship between health risk status and the likelihood of absence from work.

**Looked at**
35,451 employees from 28 private and public sector organizations in the US.

**How?**
- Employees were divided into two categories: i) high absenteeism (two or more days absent in the previous year) and ii) low-absenteeism (one or fewer days absent in the previous year).
- Each employee completed a health risk appraisal, which generated data on 10 risk areas: alcohol use, back care, driving, eating, exercise and activity, mental health, self-care, smoking, stress, and weight.

**Results**
- Higher absenteeism related to high-risk status in eight out of 10 health risk areas.
- The health risks with the greatest impact upon absenteeism were i) mental health (47% greater chance of high absence compared with low risk status), ii) poor back care (40%), iii) stress (24%), and iv) overweight (23%).
- Individuals with four or more health risk factors were nearly twice as likely to be in the high-absenteeism group than those with three or fewer factors.

<table>
<thead>
<tr>
<th>Risk category</th>
<th>Proportion of employees who had time away from work (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
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<td>73.8</td>
</tr>
<tr>
<td>High</td>
<td>81.0</td>
</tr>
</tbody>
</table>

**What does this mean?**
Behavioral health can place employees at high risk for absence from work.
Health risk status influences employee compensation costs


Aim
To investigate the association between employee health risk status and workers’ compensation costs, which in 1999 totalled an estimated US$42.4 billion.

Looked at
3,338 long-term employees of the Xerox Corporation (US), 943 of whom had completed a health risk appraisal, 2,395 did not.

How?
Data from the health risk appraisal were used to categorize individuals as i) low (0-2 risk factors), ii) medium (3-4 risk factors) or iii) high risk (≥5 risk factors), and compensation costs between 1996 and 1999 were compared for each risk group.

Results
- As risk status increased, so did the proportion of employees who had made compensation claims; 4.9% of low-risk, 5.4% of medium-risk, and 8.2% of high-risk employees.
- Compensation costs increased with rising health risk status from an average of $2,178 per person in the low-risk group, to $15,162 per person in the high-risk group.
- Overall, employees who had completed a health risk appraisal had lower total workers’ compensation costs ($6,506) than nonparticipants ($9,482).

What does this mean?
The strategies that have been used to reduce medical care costs could also be used to reduce employee compensation costs.

Lack of exercise linked to raised illness-related absence


Aim
To investigate the relationship between habitual physical activity levels and yearly rates of sickness-related absence from work.

Looked at
79,070 employees in the US who completed a health and lifestyle questionnaire, which included questions on physical activity.

How?
Type, duration and frequency of physical activity were compared with self-reported workdays missed because of illness in the previous 12 months.

Results
- Annual sickness absence was lower for those with higher recorded levels of physical activity than for those who did less exercise.
- The most marked difference was observed between those who did no activity and those who did one day of activity per week; non-exercisers had 46% greater absence rates than those who exercised once a week.
- Further, nonexercisers were 51% more likely to be absent for seven days a year or more than those reporting two days of exercise per week, and 30% more likely than those reporting activity one day a week.

What does this mean?
Strategies to promote physical activity could reduce the rates of absence due to illness, and in turn reduce costs that relate to absenteeism.
The business benefits of health promotion programs
How and why employees use online health programs


Aim
To establish what population groups use online health programs and why they use them.

Looked at
More than 20,000 employees from eight large companies representing a broad cross section of industries.

Results
Who were the users of the online health program?
- The gender split was fairly equal with 52% female, 48% male respondents
- The primary age groups were 45-54 years (38%), then 35-44 (22%) and 55-64 (21%)
- Most users had an education past high school level (84%)
- 19% of users were middle management staff and 3% were senior management, the rest of the users were non-managerial

Why did they use the online health program?
- Employees’ top reasons for starting the health program were: i) to complete a health risk assessment (61%); ii) access health benefit tools (40%); and iii) get a one off reward (34%).
- The top reasons for continuing to use the program were: i) comparing health plan coverage (68%); ii) receiving personalized health information (61%) and; iii) assessing their health status (57%).
- The top actions that individuals had taken as a result of the program were: i) starting an exercise program (43%); ii) changing their diet (40%); or iii) scheduling a screening, e.g.: a breast examination (26%)

What does this mean?
Personalized online programs with assessments and tools can provide cost effective health & well-being support. With the ever increasing application of the internet, their use is likely to rise.

Engagement in a health promotion program brings down medical costs


Aim
To look at how differing levels of engagement in an insurance company’s health promotion program influence inpatient medical claims.

Looked at
948,974 members of a health insurance company, of these, 591,134 (62%) were enrolled in the provider’s health promotion program.

Results
- Participants who were highly engaged in the health promotion program had lower total costs, shorter stays in hospital and fewer admissions compared to other groups (p<.001).
- Hospital admission rates for the highly engaged group were 7.4% lower for cardiovascular disease, 13.2% lower for cancers, and 20.7% lower for endocrine and metabolic diseases (e.g. diabetes) than other groups (p<.01).
- Low or no engagement groups had hospital costs similar to the not registered group.

What does this mean?
Engagement in a health promotion program can lower hospital admission costs, and admissions into hospital for chronic diseases affected by lifestyle factors.
Employee wellness programs provide excellent ROI


Aim
To understand the business case for investing in employee health as well as factors contributing to successful programs.

Looked at
Reviewed existing research and studied 10 organizations across a variety of industries with employee wellness programs.

How?
Site visits were made to each company and over 300 people were interviewed regarding what in the program worked and what didn’t, and the overall impact on the organization.


Results
It was concluded that a successful workplace wellness program involves:

- Wellness leadership at all managerial levels
- Alignment to the company’s identity
- Quality programs that are engaging and comprehensive
- Accessible to employees through convenient location and low or no cost
- Partnerships with internal and external partners
- Good communication

Effective employee wellness programs were found to have the following benefits, which led to a good return on investment.

- Lower costs through reducing health risks and the likelihood of disease, which then leads to less healthcare claims
- Greater productivity and less absence and presenteeism
- Higher morale amongst employees, which generates increases trust and pride and a ‘bond’ between employers and employees

What does this mean?
A successful employee wellness program can not only provide a strong return on investment, but a wider range of benefits for the company, such as improved morale and productivity.

Effective interventions use established behavior change methods


Aim
To identify what program designs and delivery methods make an online health intervention most effective.

Looked at
85 studies of online interventions, with a total sample size of 43,236 participants.

How?
A comprehensive review (meta-analysis) of online interventions designed to change health behavior was conducted to compare techniques and the outcomes achieved by the interventions.

Results
- The average online intervention had a small but significant effect on health-related behavior.
- Interventions that were based on behavior theory were more effective (P = .049). In particular, interventions based on the theory of planned behavior tended to have substantial effects on behavior.
- Interventions that used behavior change techniques also tended to be more effective compared to interventions using fewer techniques.
- Additional methods of communicating with participants, especially the use of short message service (SMS) or text messages increased the effectiveness of online interventions.

What does this mean?
The most effective online health interventions are usually behavior theory-based, incorporate behavior change techniques and use varied modes of delivery.
Workplace wellness programs can generate savings and reduce absence


Aim
To assess if workplace wellness programs are cost effective and provide good ROI.

Looked at
Thirty-six studies of employee wellness programs published in English language peer-reviewed journals.

How?
An in depth and systematic review (meta analysis) of the evidence around the cost savings generated by workplace wellness programs. Research databases, such as MEDLINE were used to review the evidence from the last 30 years. The review focused on studies providing results from two groups of employees, one that participated in the wellness program and a similar (control) group that did not take the program for comparison.

Results
- On average, employee wellness programs costs $144 and generates $358 worth of savings per person through reducing healthcare costs. This generates an average ROI of $3.27 on each $1 spent over 3 years.
- The average ROI for saving costs through reducing absenteeism was $2.73. Over 2 years, the average costs of $132 per employee generated $294 worth of savings. It’s predicted that the cost of running wellness programs would decrease in time, which may then mean a greater ROI.

What does this mean?
Workplace wellness programs can provide a strong return on investment through reducing healthcare costs and absenteeism, even in the first few years. These programs can also bring benefits such as improved employee health and reduced turnover.

Online weight intervention helps maintain long-term weight loss


Aim
To analyze patterns of use of an interactive website for support of long-term weight maintenance and evaluate which web features were most effective.

Looked at
348 participants on a weight loss maintenance program, 37% of which were male. The participants had lost an average 8.6 kilograms and were trained to use an interactive website to maintain the weight loss.

How?
Participants were encouraged to log in at least weekly and enter their current weight for 30 months. The website contained features that encouraged setting short-term goals, creating action plans, and reinforcing self-management habits. The website also included motivational modules, daily tips, and tailored messages. Dependant on how often they used the intervention, participants were divided into three categories: consistent, some, and minimal.

Results
- People who used the intervention regularly were around twice as likely to maintain their weight loss.
- 51% of consistent users kept their weight loss compared with 27% of some use and 24% of minimal users.
- Interactive and engaging features increased user log in: motivational modules, daily tips, tailored content, and group interaction.
- Automated email prompts and reminders also encouraged participants to login.
- Over 65% of participants were still actively logging onto the website at the end of the study.

What does this mean?
Online interventions that are interactive and tailored can provide feedback and support for people to maintain long-term weight loss.
Online intervention increases fruit and vegetable consumption


Aim
To assess the change in fruit and vegetable consumption in participants taking part in an online intervention.

Looked at
2,540 health plan members from five US health plans, aged 21 to 65 years.

How?
Participants were randomized to one of three groups (arms), and followed an online intervention aimed to increase fruit and vegetable consumption. The three arms were: Arm 1: a non-tailored online healthy eating intervention, Arm 2: a tailored healthy eating online intervention, and Arm 3: the tailored online intervention plus additional motivational email counseling. The change in fruit and vegetable consumption in the three arms was compared after 12 months.

Results
- Average fruit and vegetable intake increased by more than 2 servings across all study arms over 12 months.
- In the non-tailored intervention (Arm 1) the increase was 2.3 servings.
- When the online intervention was tailored (Arm 2) the increase was 2.7 servings.
- The greatest increase was an additional 2.8 servings among participants of Arm 3, the tailored online tool with additional email counseling.
- Overall program satisfaction was high.
- The program was well received and participants reported telling their family about the intervention.

What does this mean?
Online nutritional intervention can successfully improve diets, even more so when they are tailored and supported by additional motivational counseling.

Frequent health risk appraisal can improve employee health status


Aim
To examine the association between employees’ repeated participation in health risk appraisals (HRA) and changes in their health status.

Looked at
Data were taken from 3,384 employees who completed a HRA between 1997 to 2004. Most of the employees worked in manufacturing and were male (83%) with an average age of 50 years.

How?
An HRA was offered to the employees that assessed a range of health risks including: alcohol use, blood pressure, body weight, cholesterol, cigarette smoking, health perception, high-density lipoprotein cholesterol, illness days, life satisfaction, major medical conditions, physical activity, safety belt use and stress. The number of times an individual took a HRA was monitored and compared against any change in their health status. Employees’ health risks were assessed from the HRA data and classified as either low, medium or high. A group who were identified as taking the assessment 3-5 times were classified as ‘repeat HRAs’, compared to those who took it 1-2 times.

Results
- Employees who took the HRA more than once were more likely to have a beneficial change in health status.
- Repeat HRA employees had an 8.5% increase in the low-risk group compared with a 3.2% increase for the one-time HRA employees.
- 41.4% of employees in the HRA repeat group improved their status and 26% got worse compared with 38.1% in the one-time group improving their status and 31% getting worse.

What does this mean?
Repeatedly taking health risk assessments can help provide employees with continued engagement in maintaining a healthy lifestyle.
Activity interventions can improve health, absence rates and stress


Aim
To perform a comprehensive review of workplace activity interventions and their effects on employee health & well-being, activity, and absence levels.

Looked at
Global studies on workplace activity programs, dating from 1969 through to 2007. Data from 38,231 study participants were included in the analysis.

How?
A comprehensive search of workplace activity interventions was conducted using established research databases, followed by further searches to find relevant unpublished primary studies. Unpublished studies were included to reduce publishing bias (when positive results are more likely to be published).

Results
- Fitness outcomes were significantly better in employees who were involved in activity programs. For one measure, the average VO2 max was 37.7 mL/kg/min compared to an average of 34.2 mL/kg/min for those who didn’t take part in activity programs.
- Diabetes risk was significantly reduced by interventions. Average blood sugar levels (post-intervention fasting glucose) were 81.0 mg/dL for employees in activity programs compared to 93.6 mg/dL in those who didn’t.
- Employees who took part in activity programs had lower absenteeism and job stress. Job satisfaction was also reported as higher in those who had taken part in an activity program.

What does this mean?
Workplace interventions to increase activity can improve fitness and job satisfaction, reduce risk factors for long-term health conditions, and reduce absenteeism and job stress.

Online depression support helps recovery


Aim
To investigate the effectiveness of online cognitive behavioral therapy (CBT) delivered in real time by a therapist to patients with depression.

Looked at
297 UK patients with a diagnosis of depression and a score of 14 or more on the Beck Depression Inventory (BDI).

How?
Participants were randomly assigned to have either online CBT as an intervention in addition to usual care or the usual care from their family doctor while on an 8-month waiting list for online CBT.

Results
- More patients receiving the online CBT intervention recovered from depression (had a BDI score of less than 10) compared to those receiving usual care only.
- After 4 months 38% of patients had recovered in the intervention group versus 24% in the control group.
- After 8 months 42% of patients had recovered in the intervention group versus 26% in the control group.

What does this mean?
Online cognitive behavior therapy can provide extra support to help people to recover from depression.
Health promotion strategy lowers healthcare expenditure


Aim
To assess the effect of a health promotion program on healthcare costs over time.

Looked at
1,892 US-based employees who participated in an online and onsite health promotion program between 2002 and 2005; a risk-matched group of 1,892 nonparticipants were used as a control.

How?
Medical claims cost data were compared before program initiation and at study end for participants and nonparticipants.

Results
- The total cost of healthcare grew more slowly between 2001 and 2005, and annual healthcare costs were lower for those who joined the wellness program than for nonparticipants.
- Program participation was associated with a statistically significant saving of US$176.47 per person per year.
- Over the four-year study $1.3 million was saved, which when compared with program expenses of $808,403 yielded a return on investment of $1.65 for every $1 invested.

What does this mean?
Work-based health promotion strategies can lower future healthcare costs and are associated with a positive return on investment, which should encourage employers to take a proactive stance in lowering their employees’ health risks.

Smoking cessation strategy yields substantial ROI


Aim
To predict the health and economic benefits of providing a work-based smoking cessation program.

Looked at
A hypothetical group of 10,000 employees from across the US.

How?
A 20-year impact model was developed and used to project the costs and savings of a work-based smoking cessation strategy. Three smoking-related conditions were identified (coronary heart disease [CHD], chronic obstructive pulmonary disease [COPD], and lung cancer).

Results

<table>
<thead>
<tr>
<th>Industry and geographical US regions</th>
<th>Number of prevented CHD cases per 10,000</th>
<th>Number of prevented COPD cases per 10,000</th>
<th>Number of prevented lung cancer cases per 10,000</th>
<th>Medical care cost savings at 20 years (US$)</th>
<th>Workplace cost savings at 20 years ($)</th>
<th>Combined total savings ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education and health services (West)</td>
<td>27</td>
<td>23</td>
<td>2</td>
<td>$1.1 million</td>
<td>$1.6 million</td>
<td>$2.7 million</td>
</tr>
<tr>
<td>Business and professional services</td>
<td>78</td>
<td>52</td>
<td>6</td>
<td>$2.7 million</td>
<td>$4.7 million</td>
<td>$7.4 million</td>
</tr>
<tr>
<td>Manufacturing (Midwest)</td>
<td>84</td>
<td>51</td>
<td>7</td>
<td>$2.7 million</td>
<td>$3.5 million</td>
<td>$6.2 million</td>
</tr>
<tr>
<td>Wholesale and retail trades (South)</td>
<td>94</td>
<td>61</td>
<td>7</td>
<td>$2.9 million</td>
<td>$4.1 million</td>
<td>$7.0 million</td>
</tr>
</tbody>
</table>

What does this mean?
Investing in a smoking cessation program for employees can yield return on investment at 20 years of $1.21-1.52 for every $1 invested.
Broad-spectrum fluorescent lighting linked to improved productivity

Aim
To quantify the impact of broad-spectrum fluorescent lighting on employee health and performance at work.

Looked at
69 UK-based employees of Standard Life Healthcare, 46 of whom had a broad-spectrum fluorescent lighting system installed in their office, and 23 of whom worked elsewhere and did not have access to the lighting (the control group).

How?
Data on alertness, work performance, concentration and health-related quality of life of the two groups were compared between February and May 2005.

Results
- The lighting group’s ability to concentrate improved significantly over the study period when compared with the control group; the mean individual score improved by 36.8% in the intervention group vs 1.7% in the control group.
- Further improvements were observed in the intervention group in areas of fatigue (26.9% improvement in score), alertness (28.2%), daytime sleepiness (31.0%) and work performance (19.4%).

What does this mean?
Broad-spectrum fluorescent lighting could improve employee well-being and work performance.

Health risks and productivity improve with health promotion

Aim
To assess the impact of a work-based health promotion program on employee health risk status and work performance.

Looked at
266 full-time employees of Unilever PLC (UK), who participated in an online health promotion program and who completed questionnaire-based assessment at the beginning and end of the study.

How?
Data from the questionnaire-based assessment were used to compare health risk status and work performance at study start with that at 12 months.

Results
- Health risk status, absence from work and performance at work all improved significantly in the program group when compared with the control group.
- The average number of health risk factors dropped by nearly a half (0.45), average days lost each month through absenteeism was reduced by over a third of a day (0.36) and average work performance score improved by close to one point (0.79).
- Looking at the returns from both the improvements in absenteeism and work performance, the return on investment was positive (6.19:1).

What does this mean?
Well-implemented, work-based health promotion programs can improve the overall health risk status of participants and their work performance, providing a positive return on investment for employers.
Employer-sponsored weight management program a success


Aim
To evaluate the health and economic outcomes associated with a company-lead weight management program.

Looked at
516 US-based employees who participated in an employer-sponsored, lifestyle-based weight management program (for either 26 or 52 weeks), all of whom had a body mass index of ≥27 kg/m² with two or more health risk factors.

How?
Data for the 26-week and 52-week groups, and drug usage and health outcomes were compared at study start and study end.

Results
- The health-related outcomes did not differ between the 26-week and 52-week groups.
- Minutes of exercise per week increased from an average of 58 minutes to 236 minutes at study end, and average self-esteem score and depressive symptom score also improved significantly (moderate depression symptoms to less than mild symptoms).
- One year after finishing the program, average weight loss was maintained in a subgroup of 46 individuals who were followed long term.
- The average number of prescription drugs taken per participant decreased by 44% over the study, an approximate decrease in annual drug costs of US$2,382 per individual.

What does this mean?
Comprehensive employer-sponsored lifestyle management programs are an effective method for weight loss, improving self-esteem and depressive symptoms, and decreasing costs.

Health risks strongly influence productivity


Aim
To determine whether changes in health risks are associated with self-reported changes in at-work productivity loss (presenteeism).

Looked at
7,026 employees from a large US financial services company who completed two health risk appraisals (HRAs) between 2002 and 2004.

How?
Data from the first and second HRA were used to compare health risk status with self-reported presenteeism.

Results
- Analysis showed that employees who increased their risk status, or stayed high risk, had greater productivity losses than those who remained at low risk or dropped a risk category.
- A total of 55% of individuals who were classified as low risk by the first HRA remained low risk according to the second HRA, with their productivity loss decreasing by 1.1% over this period.
- However, excess productivity loss increased by 8.1% for 1.5% of employees who moved from low to high risk over the assessment period.

What does this mean?
Changes in self-reported health risks, whether positive or negative, are strongly associated with changes in self-reported productivity at work. Here, the yearly cost of lost productivity relating to risk increase was estimated at US$950 per risk factor increase.
Health risk appraisal essential for medical cost savings

Aim
To estimate the savings in medical costs incurred by Medicare beneficiaries through use of a health promotion strategy.

Looked at
59,324 retired employees (and their dependents) of a large US-based company who between 1996 and 2002 participated in one or more health promotion programs.

How?
Medical costs year on year and health risk status of this population were compared with those who did not participate in any health promotion programs. Health promotion programs include:

- Health risk appraisal (HRA)
- On-site biometric screenings
- Telephone-based lifestyle management consulting
- Educational classes offered at the worksite

Results
- Healthcare expenditure was lower for those who took the HRA than for those who didn’t participate in any health program, and lower again for those who also took part in an intervention.

<table>
<thead>
<tr>
<th>Health promotion strategy</th>
<th>Average annual savings in medical costs (US$)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRA only</td>
<td>408</td>
</tr>
<tr>
<td>HRA and one other program component</td>
<td>442</td>
</tr>
<tr>
<td>HRA and two other program components</td>
<td>569</td>
</tr>
</tbody>
</table>

What does this mean?
An HRA is a key aspect of a health promotion program and when incorporated can have a considerable positive impact on financial savings in medical costs.

*Compared with nonparticipating individuals.

Work-based health promotion has strong positive financial impact

Aim
To determine the impact of wellness programs on employee healthcare costs and absence rates.

Looked at
6,246 employees and retirees of the Nevada School District who had the opportunity to participate in a wellness program via the internet and email.

How?
Absenteeism and healthcare cost claims between 2001 and 2002 for those who did and did not participate were compared.

Results
Program participation was estimated to be associated with US$3 million lower absenteeism costs during 2001 and 2002 compared with nonparticipation.

<table>
<thead>
<tr>
<th>Wellness participation</th>
<th>Average days missed per participant per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>15.4</td>
</tr>
<tr>
<td>One year (n = 1,407)</td>
<td>15.1</td>
</tr>
<tr>
<td>Two years (n = 1,264)</td>
<td>14.3</td>
</tr>
</tbody>
</table>

What does this mean?
Improvement of health risks through voluntary work-based health promotion programs can yield beneficial financial returns for employers.
On-site fitness center ups staff productivity and reduces absence


Aim
To examine the effect of an on-site corporate fitness center on employees’ productivity and absenteeism.

Looked at
999 US-based employees of Bank One who completed a health risk appraisal and the Work Limitations Questionnaire in 2002; 200 participated in the fitness center (the intervention group) and 799 did not (the control group).

How?
Data from the questionnaires and absence records for participants were compared with data from nonparticipants.

Results
■ When baseline demographic differences were controlled for, strong associations were found between participation in the fitness center and improved productivity as well as reduced work absence.
■ Fewer fitness center participants reported work impairment than nonparticipants.
■ Those who did not join the fitness center were nearly twice as likely as participants to report health-related work limitations in time management and physical work, and 1.5 times as likely to report limitations in overall output.
■ Assuming an average wage of US$200 per day, it was calculated that nonparticipants cost $258 more in lost work time per employee than participants.

What does this mean?
A work-based fitness center such as this can make a valuable contribution to increasing productivity and decreasing absence.

Small cuts in health risk lead to large savings


Aim
To estimate whether health risk reduction strategies are worthwhile investments for companies.

Looked at
25,828 individuals employed by the Dow Chemical Company in 2001, all of whom completed the Dow Health Questionnaire and underwent health screening.

How?
A 10-year financial impact model was developed and used to predict healthcare expenditures for the next 10 years in four different scenarios.

Results
■ For the Dow Chemical Company to break even, only a 0.17% reduction in each of the following health risks per year would be needed: poor exercise habits, poor eating habits, being overweight, current or former tobacco use, high total cholesterol level, high blood glucose level, high blood pressure, high stress, depression, and heavy alcohol use.

<table>
<thead>
<tr>
<th>Intervention scenario</th>
<th>Increase in healthcare expenditure per year (%)</th>
<th>Return on investment (per US$1 invested)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No intervention</td>
<td>3.1</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Modest (each risk factor reduced by 0.1% per year)</td>
<td>2.6</td>
<td>0.76</td>
</tr>
<tr>
<td>Major (each risk factor reduced by 1% per year)</td>
<td>1.3</td>
<td>3.21</td>
</tr>
</tbody>
</table>

What does this mean?
In large corporate populations, small reductions in health risk status can lead to large savings. The potential financial benefits could be even greater if indirect costs associated with ill-health (lost productivity and absenteeism) were considered.
Small risk reductions cover costs of health promotion


Aim
To estimate the reduction in health risks that would be needed to break even financially following the launch of a company-based health promotion program.

Looked at
52,124 US-based employees of Motorola who had received a health risk appraisal.

How?
A 10-year financial impact model was developed using data collected in 2001 to predict the demographic make-up of the employees for the next 10 years.

Results
- The health promotion program in question had an annual cost of US$282 per employee.
- To break even on the health promotion investment (i.e. for the amount invested to match the amount saved in healthcare costs), the health risks of the employees would need to be reduced by 1.15% per year.

What does this mean?
Small shifts in risk status can easily cover the costs associated with implementing a health promotion strategy. Furthermore, company data and information from published studies can be used to estimate the risk reduction required to break even on potential health promotion programs.

Wellness program coupled to positive changes in productivity


Aim
To assess the effect of a work-based wellness program on health risk status and at-work productivity levels.

Looked at
500 employees from a large US-based company who participated in an online and onsite wellness program. The employees who completed a health risk appraisal (HRA) and a productivity questionnaire in 2001 and 2002.

How?
Data about health risk factors and productivity before and after implementation of the health promotion strategy were compared.

Results
- Over the course of the program, 49% of individuals reduced their number of health risk factors (19% dropped two or more risk factors; 30% dropped one factor).
- A reduction of one health risk factor resulted in a 9% improvement in presenteeism and a 2% reduction in absenteeism, when adjusted for baseline demographic characteristics.

<table>
<thead>
<tr>
<th>Health risk factors</th>
<th>Proportion of employees</th>
<th>Change in proportion of employees (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Before program</td>
<td>% After program</td>
<td></td>
</tr>
<tr>
<td>Poor diet</td>
<td>80</td>
<td>73</td>
</tr>
<tr>
<td>High cholesterol levels</td>
<td>50</td>
<td>18</td>
</tr>
<tr>
<td>Overdue preventative visits</td>
<td>32</td>
<td>20</td>
</tr>
<tr>
<td>High stress levels</td>
<td>31</td>
<td>27</td>
</tr>
</tbody>
</table>

What does this mean?
The positive changes seen in presenteeism and absenteeism support investment in such wellness programs.
Health promotion scheme associated with reduced absenteeism


Aim
To assess the impact of participation in a work-based health promotion program on absence from work.

Looked at
2,596 US-based male employees of General Motors Corporation who participated in a health promotion program between 1995 and 2000. Although invited, an additional 1,593 chose not to participate.

How?
The number of sickness absence days (both long-term and short-term) was compared between participants of the program and nonparticipating individuals from 1995 to 2000.

Results
- The proportion of employees absent due to illness or disability increased by 160% for the health promotion strategy group and by 252% for the nonparticipants during the study period.
- Similarly, an increase in the average number of annual sickness absence days per person was seen in both groups; however, those who did not participate had a greater absence rate than those who did (23.2 vs 17.2 days).
- Cost-to-benefit analysis found a return of US$2.3 for every $1 invested in the program.

What does this mean?
The reductions in absenteeism that can be achieved with health promotion programs can result in a strong cost-to-benefit ratio.

Musculoskeletal pain prevention program associated with savings


Aim
To investigate the financial impact of a musculoskeletal pain prevention program.

Looked at
199 new employees of a large US aircraft manufacturer who received an initial musculoskeletal health risk appraisal followed by a tailored intervention program; a group of 240 employees (matched for age, sex and job type) who did not participate in the program were used as a control.

How?
Outcome measures (including injury rates, injury severity, compensation costs, and productivity) were compared for the risk assessment group, the matched control group, and the total company between 1998 and 1999.

Results
- Employees who took part in the program had lower injury rates, less severe injuries, lower compensation costs, and better productivity than the control employees.
- Musculoskeletal problems that did develop in the intervention group cost less to treat than those in the control group (US$2,468 vs $3,800, respectively).
- The net direct cost saving per musculoskeletal pain case was $1,332, giving an overall benefit-to-cost ratio of more than 34:1.

What does this mean?
The musculoskeletal pain prevention program was associated with substantial employer benefits; direct dollar savings of $2.42 million and estimated indirect dollar savings of over $13.5 million.
Short-term disability absence cut by health promotion strategy


Aim
To examine the impact of a work-based health promotion program on short-term disability days.

Looked at
1,628 employees from a large US-based telecommunications company who had at least one episode of short-term disability between 1996 and 1998. Of these employees, 450 participated in a voluntary health promotion program; 1,178 did not.

How?
The net work days lost over this three-year study were assessed at three time points (one year before and again one and two years after program implementation), and data for participants and nonparticipants compared.

Results
- At study start there was no significant difference between days lost due to short-term disability between the two groups.
- At study end, the days lost due to short-term disability had increased by 14.8% in the nonparticipating group (from 33.2 days per year to 38.1), whereas days lost had decreased by 3.6% for those who had joined the program (from 29.2 days per year to 27.8).
- After adjusting for baseline differences, the average difference between groups was six days; a potential saving in excess of US$1.4 million over a two-year period for the entire population, not just participants.

What does this mean?
This health promotion program effectively lowered absenteeism caused by short-term disability days.
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