

WORKHEALTH RESEARCH AND EVALUATION PROGRAM

RESEARCH PROJECT 3 – MODELLING THE IMPACT OF THE WORKHEALTH PROGRAM

FINAL REPORT

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Abbreviations:

CVD = Cardiovascular Disease

HRA = Health Risk Assessment

WHC= WorkHealth check

Executive summary

The WorkHealth program is a five-year statewide program beginning in 2009 following a pilot in 2008. For those Victorian workplaces that engage with the program, involvement includes provision of health risk assessments (WorkHealth checks) for individual workers, personalised health intervention programs based on individual risk level for workers identified as at medium and high risk (WorkHealth Coach and Life! Taking action on Diabetes program), WorkHealth grants for the development of workplace health promotion policy and programs, and employer information and advice.

Achievement of the WorkHealth goals of improved worker health and wellbeing alongside increased workplace safety and productivity relies on engagement of workplaces and workers with the various elements of the WorkHealth program, identification of workers at medium to high risk of chronic disease, and consequent uptake of effective health promotion activities and structures by workplaces and workers.

Three stated productivity targets of the program are to reduce absenteeism by 10%, to reduce compensable workplace injury/ illness by 5% and to boost productivity by \$44m per annum. Although presenteeism was not originally identified as a WorkHealth target it was included in the current project as an additional productivity outcome, complementary to the stated outcomes of absenteeism and compensable workplace injury/ illness. Direct measurement of the productivity outcomes of the WorkHealth program is not possible until 1-2 years after its completion by a large cohort of Victorian workers. In the interim, the current project aims to predict the potential impact of the program on these key productivity outcomes. This project aims to forecast the collective effect of the WorkHealth program as implemented to June 30 2012 on change in absenteeism, presenteeism, compensable work injury or illness, and through these overall productivity, for WorkHealth check participants over the short term (1-2 years from the WorkHealth check), based on the uptake of the various elements of the WorkHealth program. These forecasts are based on a model, in which data collected during the WorkHealth program is combined with information from scientific health literature. Estimates of the uptake of each WorkHealth program element come from the current program evaluation data. Estimates of the potential percentage change in absenteeism, presenteeism and

compensable workplace injury/ illness associated with each of the WorkHealth program elements is derived from a review of literature evaluating the impact of programs similar to each of the WorkHealth program elements. An average effect was derived from the highest quality studies. From the available literature, the most robust estimates were derived for absenteeism, followed by compensable workplace injury/ illness and presenteeism. Based on the flow of individuals through the model, a prediction of the overall percentage change in absenteeism, presenteeism and compensable workplace injury/ illness for the WorkHealth check participants was made.

For the 560,000 Victorian workers who underwent a WorkHealth check between the start of the program in 2009 and June 30 2012, we predict a potential reduction in absenteeism of around 11% within the first two years following the WorkHealth check. As the uptake of the WorkHealth grants and WorkHealth Coach and Life! Taking action on Diabetes programs increased over time, for those Victorians participating in WorkHealth checks between January 1st 2012 and June 30 2012 a reduction in absenteeism of around 15% was forecast. Reductions in claims for compensable workplace injury/illness were forecast at around 3% for all those participating in the WorkHealth check program, and around 5% for those participating between January 1st 2012 and June 30 2012. Similar reductions in presenteeism were forecast at around 3% for all those participating in the WorkHealth check program, and around 5% for those participating between January 1st 2012 and June 30 2012. It is important to note that the benefits of the WorkHealth grants programs will extend beyond the WorkHealth check participants, as they are available to all workers. Based on the guidelines for WorkHealth grant approval we estimate that the reach of the WorkHealth grants was to approximately a further 66,000 Victorian workers to June 30 2012.

The potential impact of the WorkHealth program on productivity outcomes is strongly dependent on both the effectiveness of the individual program elements, and their reach and uptake. The model demonstrated that if uptake of the WorkHealth grants and WorkHealth Coach and Life! Taking action on Diabetes programs was increased even further (to 50% and 30%, respectively), there is the potential to double the impact on productivity measures of the overall WorkHealth program. Further scenario analyses suggested that increasing the effectiveness of the WorkHealth

program elements (such as by increasing uptake of the most effective WorkHealth grant activities, and encouraging completion of the WorkHealth Coach and Life! Taking action on Diabetes programs by those at medium to high risk) has the potential to further improve productivity beyond the original targets set for WorkHealth.

Based on the current uptake of the WorkHealth program elements, and the best available evidence on the effectiveness of programs with similar elements to those of the WorkHealth program, it is expected that the WorkHealth targets for absenteeism and compensable workplace injury/illness will have been achieved. In addition, we forecast complementary improvements in presenteeism, which was not originally specified as a target within the WorkHealth program but is well recognised as a contributing factor to significantly reducing productivity savings. Achieving maximum productivity benefits for Victorian industry and workers will require access to all WorkHealth program elements by workers across all industry sectors, especially those shown to have the poorest indicators of chronic disease risk. The scenario analyses indicate that continuing to optimise the uptake and reach of the most effective elements of the WorkHealth program will enable productivity targets set at the inception of the WorkHealth program to be surpassed. A full economic analysis would also be useful in order to more fully understand the productivity impact of the WorkHealth program. To inform such an analysis, it will be important to collect empirical follow up data between 1 and 2 years after the WorkHealth check on absenteeism and workers' compensation claims from participating workplaces to monitor the actual impact of the program.

Overall goals

The WorkHealth program is a five-year Victorian statewide program beginning in 2009 following a pilot in 2008. For those workplaces that engage with the program, involvement includes access to health risk assessments (WorkHealth checks) for individual workers, personalised health intervention programs based on individual risk level for workers identified as at medium and high risk of chronic disease (WorkHealth Coach and Life! Taking action on Diabetes programs), WorkHealth grants for the development of workplace health promotion policy and programs, and employer information and advice. Achievement of the WorkHealth goals of improved worker health and safety alongside increased workplace productivity relies on engagement of workplaces and workers, identification of workers at medium to high risk, and consequent uptake of effective health promotion activities and structures by workplaces and workers.

The stated productivity targets of the program are to reduce absenteeism by 10%, to reduce compensable workplace injury/ illness by 5% and to boost productivity by \$44m per annum. Although presenteeism was not originally identified as a WorkHealth target it was included in the current project as an additional outcome, complementary to the stated outcomes of absenteeism and compensable workplace injury/ illness. Direct measurement of the productivity outcomes of the WorkHealth program is not possible until 1-2 years after its completion by a large cohort of Victorian workers. In the interim, the current project aims to predict the potential impact of the program on these key productivity outcomes. This project (3) aimed to forecast the collective effect of the WorkHealth program as implemented to June 30 2012 on change in absenteeism, presenteeism, compensable work injury or illness, and through these overall productivity, for WorkHealth check participants over the short term (1-2 years from the WorkHealth check), based on the uptake of the various elements of the WorkHealth program.

This report outlines the estimation of the exposure of Victorian WorkHealth check participant workers to the different program components as a consequence of the WorkHealth program. It also reports on the likely consequent changes in absenteeism, presenteeism and workers' compensation in WorkHealth check participants, and on how this is likely to affect overall productivity costs.

The key goals of the modelling project are to forecast the likely extent of the achievement of the WorkHealth program's publically announced productivity impacts, to inform the future focus for WorkHealth, and to provide leadership on the benefits of workplace based preventive health.

Background

WorkHealth is a State Government initiative delivered by WorkSafe Victoria.

WorkHealth aims to support Victorian workplaces in offering programs to promote the health and wellbeing of Victorian workers and reduce the incidence and impact of chronic disease. The WorkHealth program acts through four main platforms:

WorkHealth checks, WorkHealth Coach and Life! Take Action on Diabetes Programs, Workplace Health promotion grants, and Workplace Capacity Development Tools and Resources. The goals of the program are to increase workforce health, safety and productivity through maintenance of healthy lifestyles and reduced risk factors for chronic disease (Figure 1).



Figure 1. Hypothetical pathway of the effects of the WorkHealth program (from WorkHealth Program Logic, December 2010)

The specified long-term targets of the WorkHealth program are:

- 10% reduction in workers at high risk of targeted chronic disease;
- 5% reduction in compensable workplace injury/ illness attributed to targeted lifestyle risk factors;
- \$60m savings in health costs (per annum);
- 10% reduction in absenteeism; and
- \$44m boost in productivity (per annum)

The extent to which these goals are realised will depend on:

- The reach of the WorkHealth program, in terms of both engagement of workplaces *and* engagement of workers within workplaces;
- The current and future risk status of those workers reached;

- The uptake by workplaces and workers of effective health promotion strategies; and
- The effectiveness of the health promotion strategies and structures involved.

As direct measurement of the productivity outcomes of the WorkHealth program is not possible until 1-2 years after its completion by a large cohort of Victorian workers, in Project 3 we combine information on participation and risk status from the WorkHealth checks and uptake of the WorkHealth program with the published literature to forecast the potential effect of the current WorkHealth program on absenteeism, presenteeism and compensable workplace injury/ illness rates in the WorkHealth check participants. Analysis of the potential effect of the WorkHealth program on outcomes other than productivity (represented by the targets for health costs and chronic disease reduction), was outside the scope of this report. Estimates of the uptake of each WorkHealth program element come from the current program evaluation data. An estimate of the percentage change in absenteeism, presenteeism and compensable workplace injury/ illness associated with participation in each WorkHealth program element is derived from a review of the literature evaluating the impact of programs similar to each of the WorkHealth program elements. These two key pieces of information are combined to predict the effect of the overall WorkHealth program on each of the productivity outcomes for WorkHealth check participants within 1-2 years of their WorkHealth check. We aim to forecast the potential changes in productivity costs associated with the WorkHealth program based on the predicted changes in absenteeism, presenteeism and compensable workplace injury/ illness rate.

Aims

The primary aim of project 3 is to predict the impact of the WorkHealth Program as implemented to June 30 2012 on WorkHealth check participants' short-term (1-2 year):

- Absenteeism;
- Compensable workplace injury/ illness attributed to targeted lifestyle risk factors; and
- Presenteeism.

The secondary aim of project 3 is to predict the impact of the WorkHealth Program as implemented to June 30 2012 on WorkHealth check participants' short-term (1-2 year) productivity costs, based on its estimated effect on absenteeism, compensable workplace injury/ illness and presenteeism.

Modelling approach

Overall approach

The aim of the WorkHealth program is to increase knowledge and awareness about lifestyle factors and chronic disease, and to implement strategies at both the workplace and worker level to modify primary risk factors, including smoking, physical activity, diet, alcohol, blood pressure, blood glucose and blood cholesterol (Figure 2). Through these modifications it is expected that there will be a reduction in incident chronic disease, and an improvement in general health and wellbeing. Such improvements are also expected to lead to increased productivity, observable through decreases in absenteeism, presenteeism and compensable workplace injury. The links between effective workplace health promotion, reductions in chronic disease and improvements in wellbeing and improvements in productivity outcomes are well established, both nationally and internationally (World Health Organization / World Economic Forum 2008).

In this study we take advantage of research studies reporting the direct effects of programs similar to those offered in the WorkHealth program on the workplace-related outcomes of absenteeism, presenteeism and compensable workplace injury/ illness. This project involves (a) identifying the initial risk factor distribution of the WorkHealth check cohort; (b) identifying the exposure of the WorkHealth check cohort to each of the specific WorkHealth program components, (c) estimating, based on the available research literature, the effect of participating in each WorkHealth program component on each of the three productivity outcomes, and (d) linking a, b and c to forecast the changes in each productivity outcome associated with participation in the WorkHealth program.

This study forecasts the effect of the WorkHealth program to June 30 2012, at which time around 560,000 WorkHealth checks had been conducted. As the WorkHealth program evolved over time, this study also forecasts the potential impact of the WorkHealth program based on the levels of uptake of each of the program elements in the most recent time period, January 1st 2012 to June 30th 2012. The effects on productivity predicted within this study are short term effects - those likely to be observed within 1-2 years of participation in the program. This study forecasts the effects on productivity for the cohort of WorkHealth check participants, for whom the most data is available. However, it is

recognised that WorkHealth grants reach a greater number of Victorian workers than the WorkHealth checks alone.

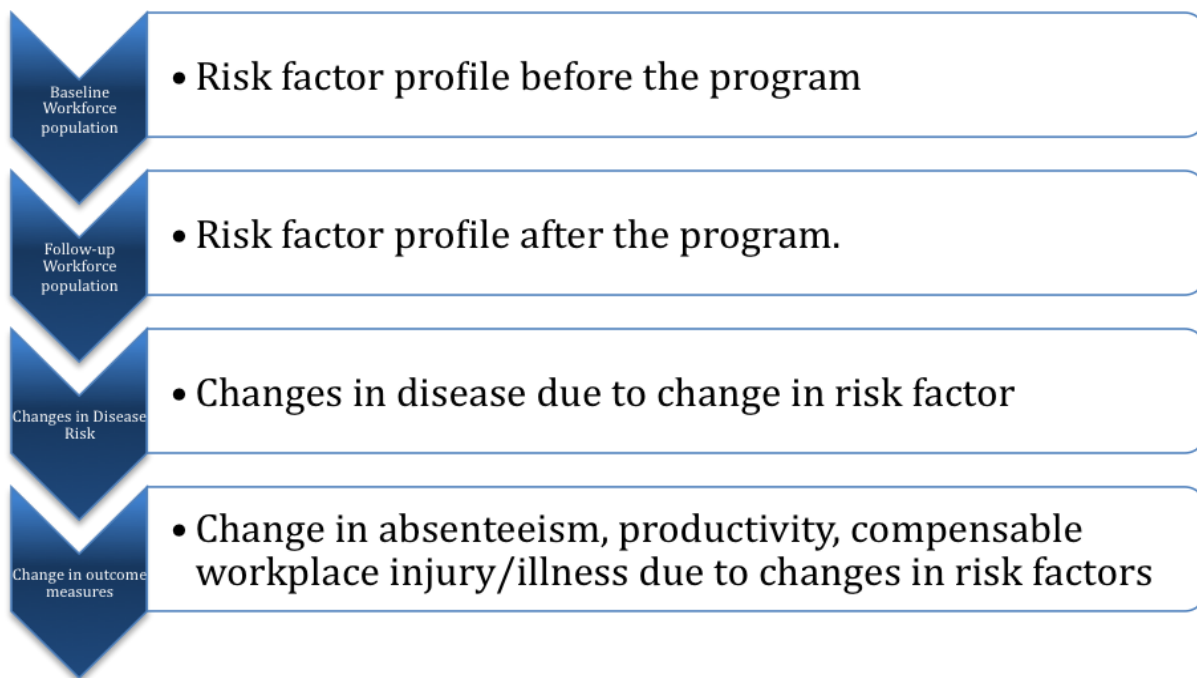


Figure 2. Schematic pathway of effect of the WorkHealth program through primary risk factors.

Input data

The modelling relies on four main data inputs: the initial risk factor status of the WorkHealth check participants, the distribution of the WorkHealth check population across the different elements of the WorkHealth program, the effects on absenteeism, presenteeism and compensable workplace injury/ illness of each element of the WorkHealth program, and the relationship between changes in absenteeism, presenteeism and compensable workplace injury/ illness and changes in productivity costs. These data are summarised in Table 1 and described in more detail in the following sections.

Table 1. Source of each data input

Data type	Source
Risk factor status of the WorkHealth check population	WorkHealth check evaluation data (unpublished data on the first 500,000; program monitoring data to June 30 2012)
Distribution of the WorkHealth check population across the different elements of the WorkHealth program	WorkHealth check evaluation data (see report 0112-008-R4; updated using program monitoring data to June 30 2012)
Effects on absenteeism, presenteeism and compensable workplace injury/ illness of each element of the WorkHealth program	Summary estimates derived from a review of the literature (see figures 5-7 and Appendix)
The relationship between changes in absenteeism, presenteeism and workers compensation and changes in productivity costs	Predicted per person costs associated with each productivity outcome for Australian adults were obtained from modelling reports by Medibank and Comcare.

Risk factor status of the WorkHealth check population

Within the WorkHealth checks, individuals had a range of risk factors measured. Based on their results individuals were categorised as either low risk, medium to high risk or having current diabetes or cardiovascular disease. For those free of diabetes and cardiovascular disease, the differentiation between low risk and medium to high-risk status was based on their scores from the AUSDRISK score and the absolute cardiovascular risk scores. A participant was considered medium to high risk if they scored either 6 or above on the AUSDRISK diabetes risk prediction score or 10% or greater on the absolute cardiovascular risk score. The risk factor status of the WorkHealth check population can be summarised from the detailed prevalence analyses of the first 500,000 WorkHealth check participants (unpublished data; Figure 3). Analysis of program monitoring data to June 30 2012 indicated little change in this distribution over time. Around 4% of participants reported a history of diabetes or cardiovascular disease. Around 65% of WorkHealth check participants were categorised as having a medium to high risk of developing either type 2 diabetes or cardiovascular disease. The prevalence of medium to high risk was higher in males, in those at older ages, in those born in Asia, those of indigenous status and those not working in white-collar occupations.

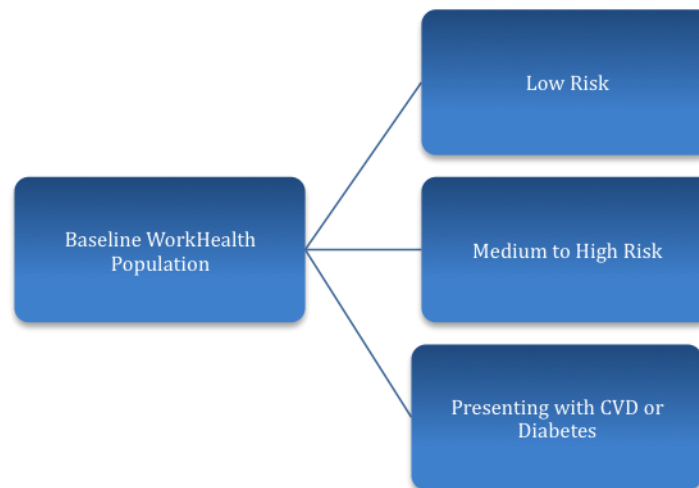


Figure 3. Schematic distribution of WorkHealth check participants according to risk status (CVD indicates cardiovascular disease)

Distribution of the WorkHealth check population across the different elements of the WorkHealth program

The distribution of the WorkHealth check population across the different elements of the WorkHealth program (Figure 4) can be summarised from a combination of the available WorkHealth Coach and Life! program uptake data and the WorkHealth grants uptake data. To 30th June 2012 around 20,000 workplaces had participated in the WorkHealth program. Within these workplaces around 560,000 WorkHealth checks had been conducted and around 750 WorkHealth grants had been implemented (across workplaces conducting 66,000 of the WorkHealth checks). As WorkHealth grants were allocated only to workplaces in which at least 50% of the workers had undergone a WorkHealth check we can assume that approximately a further 66,000 workers were exposed to WorkHealth grants.

To forecast the impact of the WorkHealth program on its participants we modelled the entire WorkHealth check cohort. For the 560,000 WorkHealth check participants we obtained the data on their exposure to WorkHealth grants (12%) and their uptake of WorkHealth Coach or Life! referrals (5% overall, or 7.5% of those at medium to high risk). In the most recent time period (January 1st 2012 to June 20th 2012) the exposure to WorkHealth grants was 29% and the uptake of WorkHealth Coach or Life! referrals was 8% overall (12% of those at medium to high risk). The internal WorkHealth uptake targets for 2012-2013 for these program elements were 7% by eligible workers (WorkHealth

Coach or Life!) and 20% (WorkHealth grants), both surpassed in the most recent time period.

Within the WorkHealth program, individuals identified as low risk through the WorkHealth check, and those presenting with diabetes or cardiovascular disease are not eligible for referral to the lifestyle programs. However, those with newly identified high risk are referred to a medical practitioner. In addition, all participants receive lifestyle advice and guidance through health advice documents (Tip sheets) which support health maintenance. They may also be inspired by the WorkHealth program to undertake their own health promotion strategy, and they may be exposed to workplace initiatives available from the WorkHealth grants. In this study potential benefits for those at low risk, those identified as medium to high risk who did not take up the lifestyle program referrals, and those presenting with diabetes or cardiovascular disease were based on the potential effect of the WorkHealth check itself and the effect of a WorkHealth grant if they were in workplaces partaking in the WorkHealth grants program.

The benefits to those at medium to high risk who took up the WorkHealth Coach or Life! referrals were modelled as the combined effects of the WorkHealth check, the WorkHealth Coach or Life! program, and the WorkHealth grant if they were in workplaces partaking in the WorkHealth grants program.

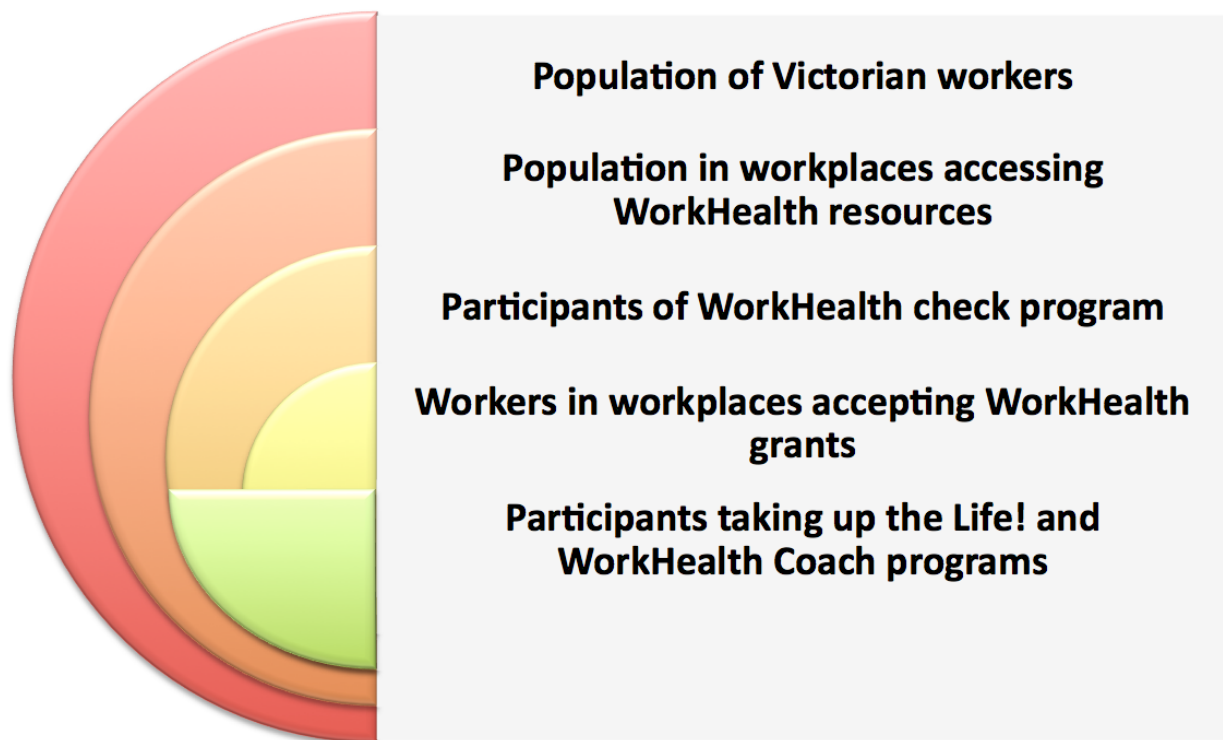


Figure 4 Distribution of workers across the different elements of the WorkHealth program.

Effects on absenteeism, presenteeism and compensable workplace injury/ illness of each element of the WorkHealth program

Evidence for each of the primary relationships of interest in the model (identified in Table 2) was summarised from the literature. Studies generally analysed the effect of a program on a productivity outcome over the short term (1-2) years. Here we use the estimated effectiveness to forecast the effect of the WorkHealth program within the first two years after the WorkHealth check.

Definitions used for each outcome

Absenteeism: Days (or time) off work due to personal illness or injury. Not days off work spent caring for another person (Australian Institute of Health and Welfare (AIHW) 2009). In the current study a reduction in days taken off work due to personal illness or injury was considered to be an improvement in absenteeism. Therefore a negative change in absenteeism was indicative of a beneficial outcome.

Presenteeism: The act of working during sickness (World health organisation (WHO) 2010). Presenteeism results in increased workplace accidents, and development of chronic diseases (World Health Organisation 2010), and consequently decreased productivity. In the current study a reduction in the act of working during sickness was considered to be an improvement in presenteeism. Therefore a negative change in presenteeism was indicative of a beneficial outcome.

Compensable workplace injury/ illness: An injury or illness that entitles the worker to claim damages under the workers compensation act (Australian Institute of Health and Welfare 2012). The injury or illness is defined by as a physical or mental injury/ illness arising out of, or in the course of, the worker's employment. In Victoria this is defined by the workers Accident Compensation Act 1985 (Victorian WorkCover Authority 2004). In the evaluation of studies, a reduction in either the monetary value of compensation or a reduction in the instances of compensation was considered to be an improvement in compensable workplace injury/ illness. Therefore a negative change in workers' compensation was indicative of a beneficial outcome.

Definitions used for each program element

Health risk assessment with feedback (representing the WorkHealth check): An intervention that included a questionnaire (health risk assessment (HRA)) covering a range of different chronic disease risk factors, with personalised feedback resulting from the questionnaire. Studies were not permitted if they included further health promotion program elements that lay outside of the boundaries of the WorkHealth check program. The questionnaire could be written, computer based or in the form of a consult with a health professional, and could include (but did not need to include) the measurement of biophysical markers. Feedback could be in the form of a computer-based quiz, in paper as a letter or report sheet and also through direct communication with a health professional. The feedback itself had to be based on personalised information obtained from the questionnaire. Studies where brief health promotion material was dispensed (regardless if it was personalised to the person's risk factor score) were included as this was a similar characteristic to the WorkHealth check program. An example of a primary study that fits these criteria can be seen in Fries et al. (1998). The control group of this study received a

health risk assessment known as the standard Healthtrac program, which involved a two-page questionnaire with health related questions as well as targeted to problem areas. Feedback was in the form of a letter and graphical summary of each individual's risk factors, signed by a physician. Participants also received books and audiotapes specific to their risk factors. The control group represented the general worker population from a Californian utility company and had absenteeism measures taken at baseline and at 12 months of follow-up.

Personalised health intervention based on individual risk level (representing WorkHealth Coach/Life!): An intervention including a HRA with feedback (fulfilling the criteria for a HRA with feedback as above) in addition to a more intensive health promotion program targeted at the individual's risk profile based on the HRA feedback. The interventions had to include one or more of the programs addressing the targets that WorkHealth programs focus on:

- Smoking cessation
- Excessive alcohol consumption
- Physical inactivity
- Poor nutrition
- Mental wellbeing

The studies included in this analysis represented a range of program elements. The majority of the primary studies included elements of the WorkHealth Coach and Life! programs, specifically a series of telephone risk factor counselling sessions or group lifestyle counselling sessions including a focus on diet and physical activity. An example of some of the studies that fulfilled these criteria are Musich et al. (2003), Loeppke et al. (2008) and Nilsson et al. (2001). Musich et al. (2003) involved an annual HRA that was either mailed or offered at the work site, including questions on exercise, weight, smoking and alcohol intake, and perception of health along with biometric screening for blood pressure and high cholesterol. An individualised health profile was given back to the individual outlining the biometric screening and HRA results. They also offered a quarterly health related newsletter, a self-care book, and an 1800 health information service to help clarify health issues and HRA results. Those in the high-risk category were put into the intervention group, which involved one on one telephone coaching for reduction of the

risks outlined within the personalised HRA results. Classes addressing health awareness and education were offered on site, with high-risk participants also being offered vouchers for physician office visits. In Loeppke et al. (2008), workers at high risk were offered lifestyle management programs specified for the health topics for which they were at risk. There were programs for diabetes prevention, stress management, blood pressure, smoking and weight management. Programs were supplemented by access to a nurse help line that allowed employees to call and get advice. In Nilsson et al. (2001), those with a high risk score for CVD or other associated risk factors were offered a lifestyle intervention study that included physical health checks by nurses, as well as group sessions with educational and practical content. Topics were weight reduction, stress management, smoking cessation, diet and physical activity. They also utilised video and outdoor activities.

Workplace health promotion program including a focus on physical activity or healthy eating open to all workers (representing WorkHealth grants): An intervention, or suite of interventions, similar to those offered within the WorkHealth grants program. The intervention had to be broadly applicable to the worker cohort, with no restrictions to participation based on individual health risk status. Interventions needed to be broadly related to any of the following topics:

- Health policy creation/implementation
- Healthy eating programs (eg. cooking lessons, hiring an external dietician)
- Smoking cessation
- Alcohol awareness (eg. responsible drinking information)
- Change in canteen or vending machine menu to healthier options
- Fitness and physical education interventions (eg. discounted or free gym memberships, running groups, provision of bike parking)
- Mental wellbeing workshops
- Health education programs

Combinations of programs were allowed since multifaceted interventions were also encouraged by the design of the WorkHealth grants program. The studies included in this analysis represented a range of program elements. Four examples of different studies

that fulfilled these criteria are Lynch et al. (1990), Renaud et al. (2008), Bertera et al. (1990) and Shi et al. (1993). In Lynch et al. (1990) all workers were offered the opportunity to attend an onsite fitness centre. In Renaud et al. (2008) a series of educational modules were made available to all workers, focusing on global health, stress management, healthy eating and healthy hearts, and physical activity. Also made available was a telephone service where HRA components could be clarified. In Bertera et al. (1990) a combination of group and self-directed programs were offered, with topics ranging from smoking cessation, to fitness, lipid and weight control, stress management and spine injury prevention. Cafeteria and vending machine modification to ensure healthier foods were on offer to workers were also provided. From a series of interventions in Shi et al. (1993), the intervention group that had relevant behaviour change workshop classes on exercise, weight control, nutrition, smoking cessation, stress management, high blood pressure and alcohol use was used in our analysis.

Literature searches

Estimates of the effect of each program element on each of the three productivity outcomes of interest were obtained through systematically searching PubMed to identify primary research articles describing studies of the relationships of interest. Reviews and editorials were also retrieved to identify further articles. A systematic literature search was conducted for absenteeism, presenteeism and workers' compensation respectively, described in more detail below. Reference lists from all retrieved articles were examined to assist retrieval of further articles. We extracted all effects as percentage change or difference in absenteeism, presenteeism or workers' compensation. In non-controlled pre-post analyses the effects reflect a percentage change in the outcome between the baseline and follow-up of the intervention. In controlled, pre-post analysis, the effect sizes reflect a percentage change difference between control and intervention groups in terms of the measured outcome differences between baseline and follow-up. In cross-sectional analyses the effects reflect percentage difference between intervention group and control.

Absenteeism

The literature search on absenteeism consisted of a series of PubMed searches using the following key search terms:

- Absenteeism
- Sickness leave
- Workplace Intervention
- Health Risk Assessment

Each of these key terms was entered in different combinations into the PubMed search engine in order to find peer reviewed sources of effect sizes. Once a search was completed, titles and abstracts were analysed for relevance, with relevant papers then being read and summarised into a set of tables based on the program element they were most similar to. The definition of absenteeism in each of the studies used had to be similar to the absenteeism definition within this report. Studies used a range of different measures, such as whole days, or a dichotomisation into high and low absenteeism (see Appendix for details).

Presenteeism

The literature search for presenteeism began by analysing previously discovered papers obtained while searching for absenteeism data that were relevant to presenteeism. This preceded a series of literature searches that were conducted using the PubMed search engine. The following key terms were used:

- Presenteeism
- Sickness leave
- Workplace intervention
- Health Risk Assessment

These key terms were entered in different combinations, and once a search obtained results, titles and abstracts were analysed for their relevance. Relevant papers were then read, summarised and put into a set of tables segregated by program element. Relevance was judged by similarity to the definition of presenteeism contained within this report. As presenteeism as a concept is a relatively new, measurement units used were not

standardised. However while units may have differed most measured presenteeism in terms of hours lost to sickness while at work (see Appendix for details).

Compensable workplace injury/illness

The literature search for workers' compensation began with the analysis of papers from previous searches for absenteeism and presenteeism. Once the relevant articles were obtained, a series of PubMed searches were conducted. The following key search terms were used to find the data on relationships with workplace compensation:

- Workers Compensation
- Health Intervention
- Workplace
- Compensation
- Health Risk Assessment
- HRA
- Compensable
- Injury

Each of these key terms was entered in different combinations into the PubMed search engine in order to find peer reviewed sources of effect sizes. The methodology and the procedure used in the selection of relevant papers from these searches was the same as that for absenteeism and presenteeism. Existing literature on workers' compensation has a variety of measures: the dollar amount of the workers' compensation claims within the past month/year, number of workers' compensation claims filed/reimbursed in the past year/month etc. While this was the case, the use of percentage differences attributable to the intervention as a uniform process of comparison meant that different units of measurement could be accurately compared across studies.

Study classification

To estimate the final effect sizes for WorkHealth check, grant, Coach and Life! program elements, studies were categorised as either primary or secondary studies. Primary studies reflected those with both high study quality and strong similarity to the WorkHealth program element they were being used to model. Criteria were developed to ensure that the studies being used had similar characteristics to the WorkHealth program element in question (see below). Papers with broadly similar characteristics to the WorkHealth program elements, but with differences in one or more key elements compared to the WorkHealth program were classified as secondary. Such elements included:

- Health topics for intervention,
- Lack of feedback,
- Very specific worker populations,
- Follow-up periods greater than one year in non-controlled studies,
- Lack of significant results.

Study classification with respect to the WorkHealth Coach and Life! program element

For a study to be classified as primary with respect to the WorkHealth Coach and Life! program element it had to have the following characteristics:

- Used a Health Risk Assessment with feedback to the participants (with no discrimination as to type of feedback given; therefore feedback sources range from direct contact from a health professional to a risk score print out with information outlining risks for the individual patient)
- Included a health promotion intervention personalised to the participant's risk status. To be included in primary analysis the intervention needed to be broadly similar to that in the WorkHealth Coach and Life! Programs;
- A controlled study with a period of time between baseline HRA administration and follow-up (including randomised controlled trials, cohort and time lapsed cross sectional study designs);
- Employed participants; and

- Included measurement of any of absenteeism, presenteeism or workers' compensation.

For secondary analysis classification with respect to the WorkHealth Coach and Life! programs, the intervention needed to be similar to the WorkHealth Coach and Life! programs but could include one or more characteristics that were not representative of the WorkHealth Coach and Life! programs or the population they were made available to. An example can be seen in Knight et al. (1994), where a lack of information within the article as to the availability of feedback to the participant combined with the fact that the presented results did not provide adequate information to allow an accurate percentage difference calculation to be conducted. This study was therefore classified as a secondary study.

Study classification with respect to the WorkHealth grants program element

For a study to be classified as primary with respect to the WorkHealth grants program elements it had to have the following characteristics:

- An intervention with similar characteristics to any of the grants offered in the WorkHealth grants program;
- The intervention had to be available to all members of the group being investigated (excluding control groups of the studies). Studies restricting access based on individual risk status were not included;
- Employed participants; and
- Included measurement of any of absenteeism, presenteeism or workers' compensation.

While interventions implemented by companies taking up the WorkHealth grant funding were likely to be of one standard design applied to a large group of people, there were also interventions implemented as part of the WorkHealth grant program which involved more personal one on one interventions. These usually involved an externally hired personal trainer or mental health advisor that gave personalised advice. As a result such studies were also included. The key exclusion characteristic was universal access to the program, i.e. the ability for the participants to be able to join independent of their risk factor status. If a study did not meet this it was excluded. For secondary analysis classification with respect to the WorkHealth grants program, the intervention needed to be similar to

the WorkHealth grants program but could include one or more characteristics that were not representative of the WorkHealth grants program or the population they were made available to. An example of a secondary grant can be seen in Shephard et al. (1981), which was a more intensive intervention than the typical WorkHealth grant program. As a result the study was classified as secondary.

An additional literature search was also undertaken for the WorkHealth grants program, based on those programs that were most commonly implemented by workplaces receiving the WorkHealth grants, and those that were a high priority target for WorkHealth (specifically, policy, healthy eating, physical activity, mental wellbeing and information provision). The topics involved in the search were:

- Healthy eating;
- Physical activity;
- Mental wellbeing;
- Management skills interventions;
- Fruit box and canteen interventions; and
- Workplace health policy development.

The majority of the studies retrieved were within the healthy eating, physical activity and mental wellbeing topic areas.

Study classification with respect to the WorkHealth check program element

For a study to be classified as primary with respect to the WorkHealth check program element it had to have the following characteristics:

- Used a Health Risk Assessment with feedback provided to participants (with no discrimination as to type of feedback given; therefore feedback sources range from direct contact from a health professional to a risk score print out with information outlining risks for the individual patient);
- Did not include any further intervention, or included a control group that had both baseline and follow-up measurements that had no further interventions (except one limited to giving out general pamphlets or health related information);

- A period of time no greater than one year between baseline HRA administration and follow-up (as participant groups exposed solely to HRAs were generally reported as the control group of an intervention study and did not have their own control);
- Employed participants; and
- Included measurement of any of absenteeism, presenteeism or workers' compensation.

The studies most commonly found that fulfilled such criteria for the WorkHealth check model were within the control group of intervention studies.

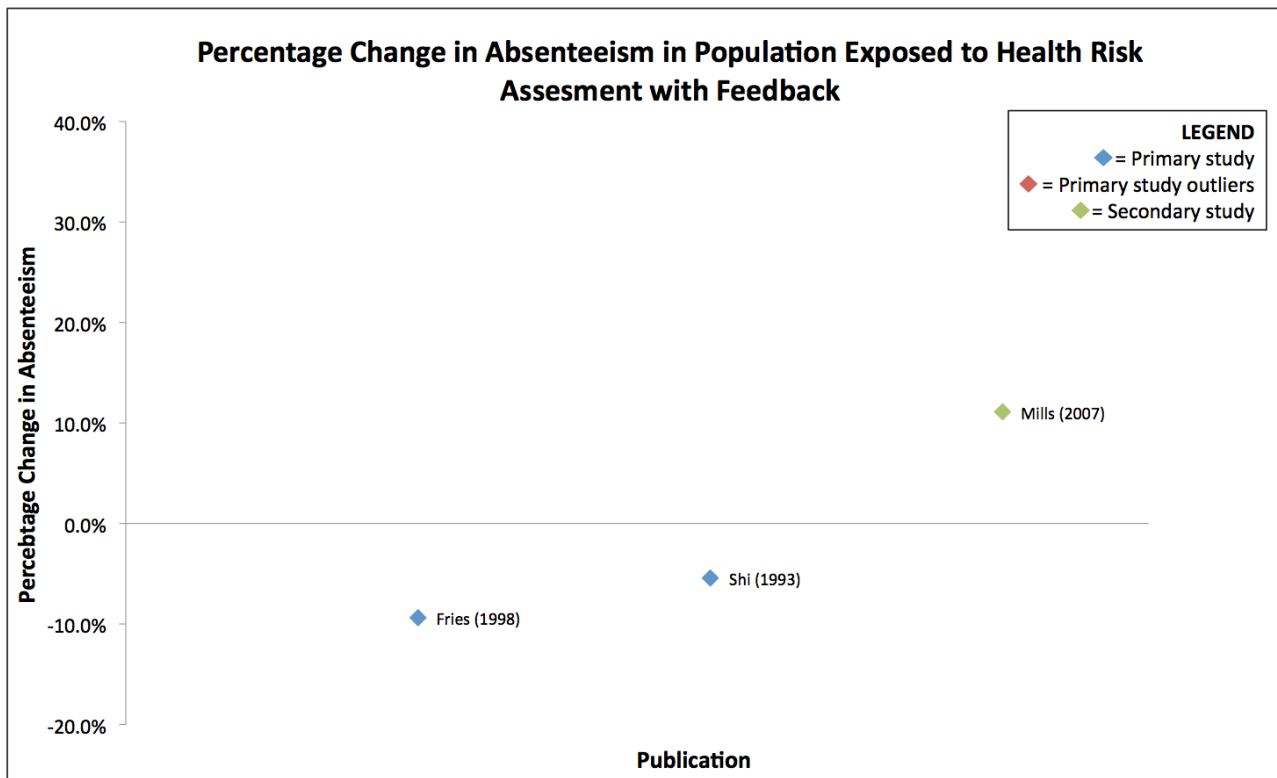
Final effect sizes

The effect sizes obtained were then graphed to allow for outlier identification. While ample literature on absenteeism was found, there was not a large amount of available literature relevant to the WorkHealth program elements that analysed workers' compensation or presenteeism as outcomes (see Figures 5-7).

Average effect sizes for the primary model were derived from primary studies, excluding outliers. Sensitivity analyses were performed after also including studies classified as secondary. For a summary of all effect sizes see Table 2.

Figure 5 Effect sizes used to model the effect of the WorkHealth check. Effect sizes are labelled according to primary study, primary study outliers, and secondary study. (A) absenteeism, and (B) presenteeism (Note: no compensable workplace injury/illness effect sizes were found within the literature that met the criteria for effect sizes representing the WorkHealth check model).

A



B

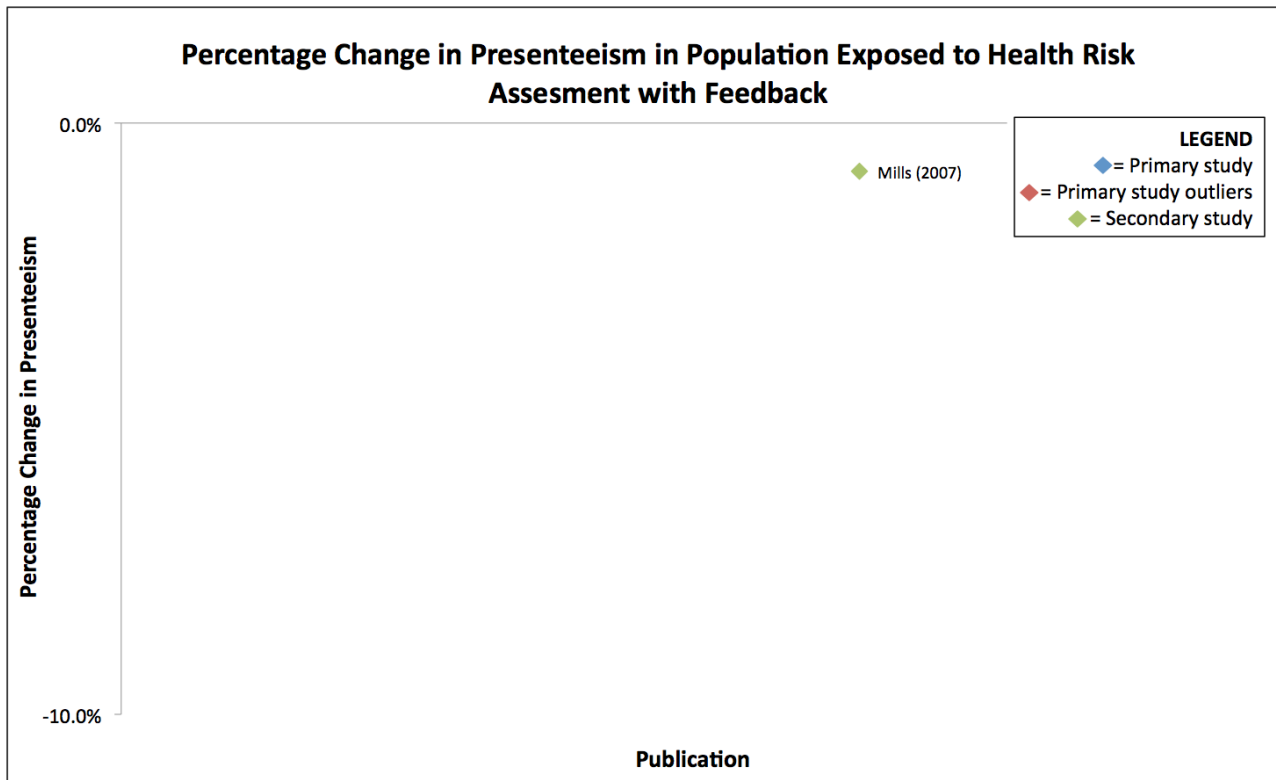
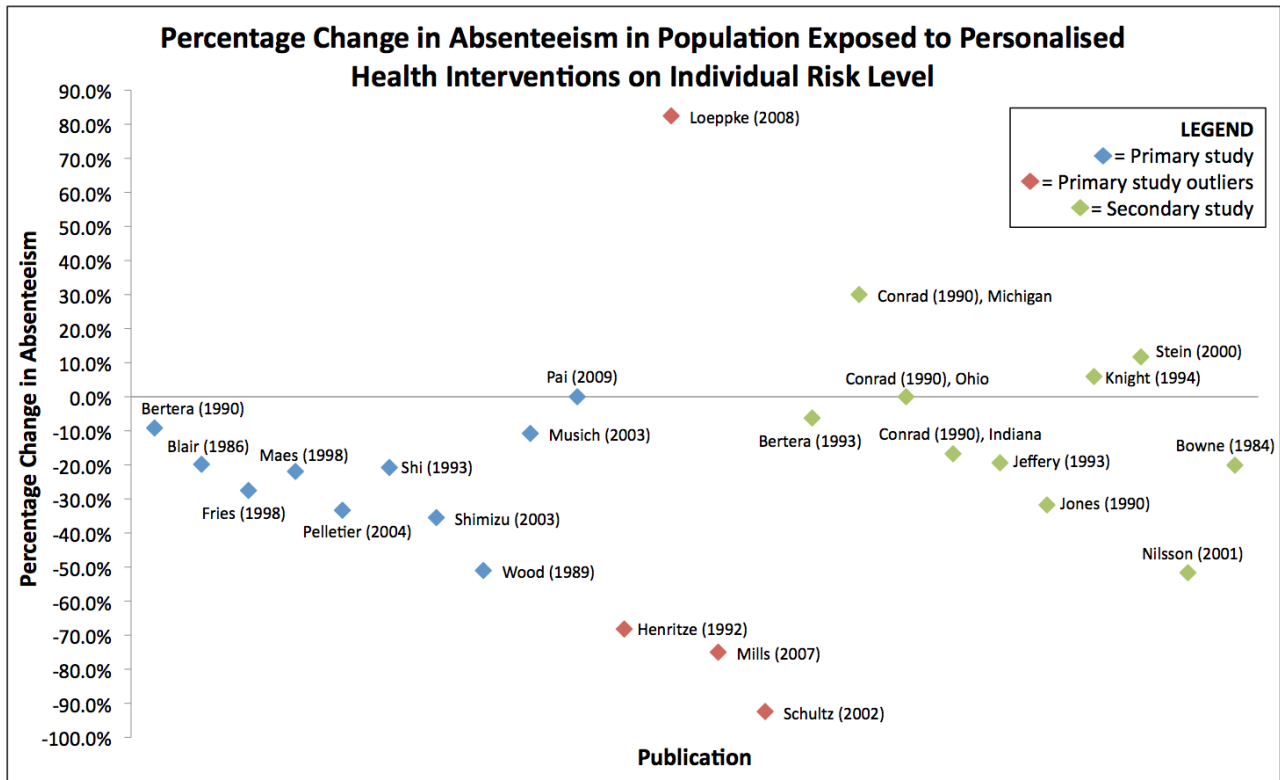
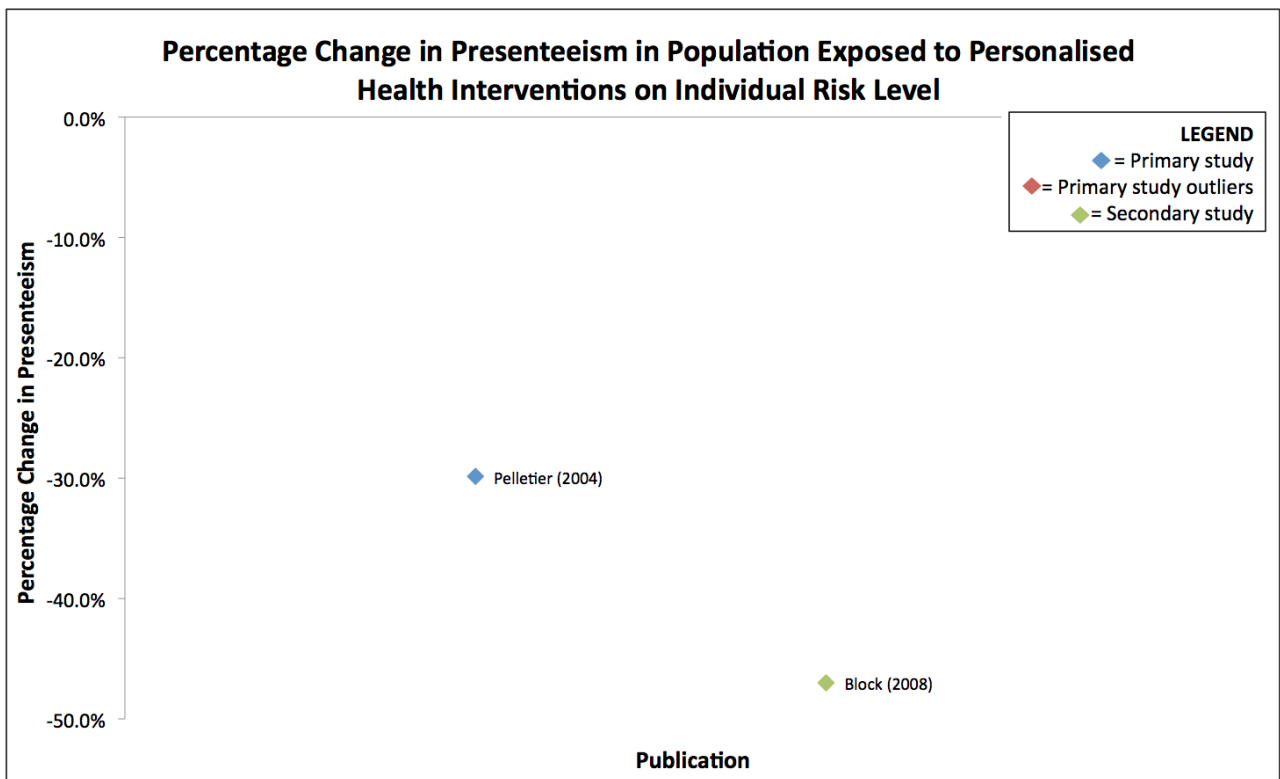


Figure 6: Effect sizes used to model the effect of the WorkHealth Coach and Life! programs. Effect sizes are labelled according to primary study, primary study outliers, and secondary study. (A) absenteeism, (B) presenteeism, and (C) compensable workplace injury/illness

A



B



C

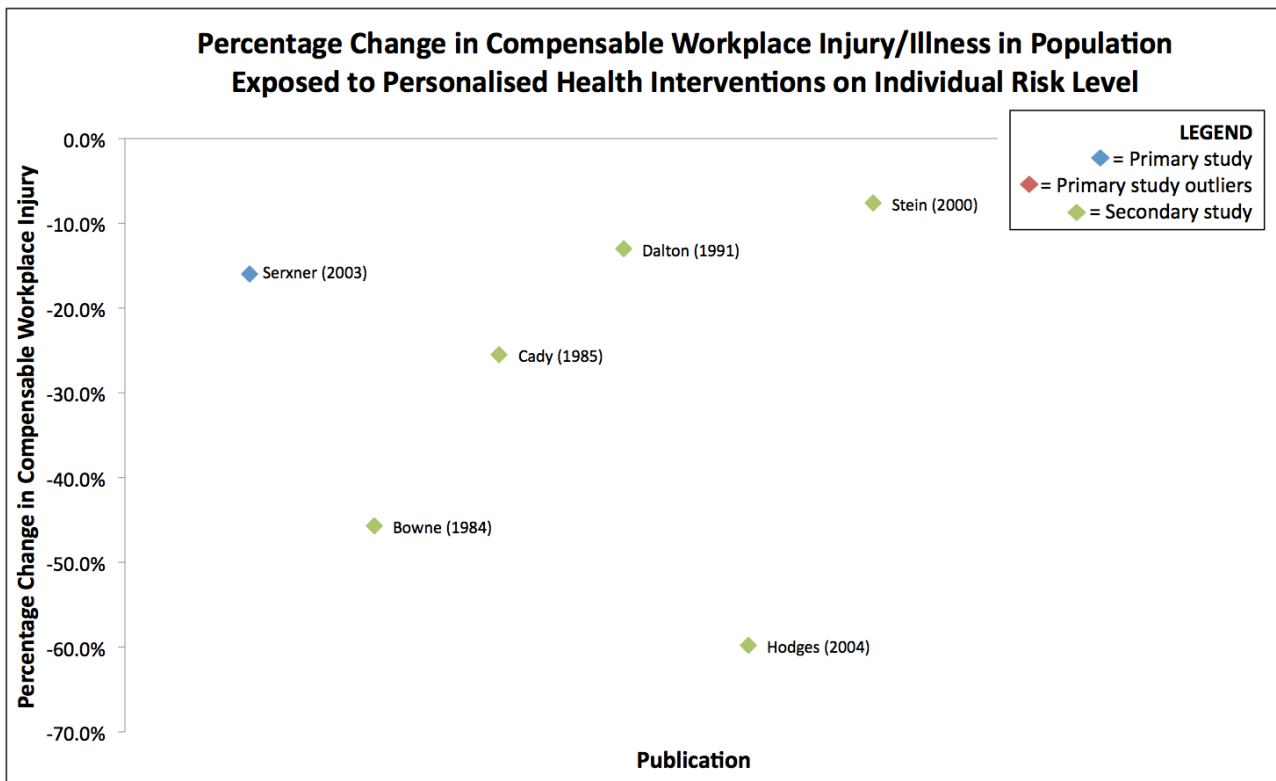
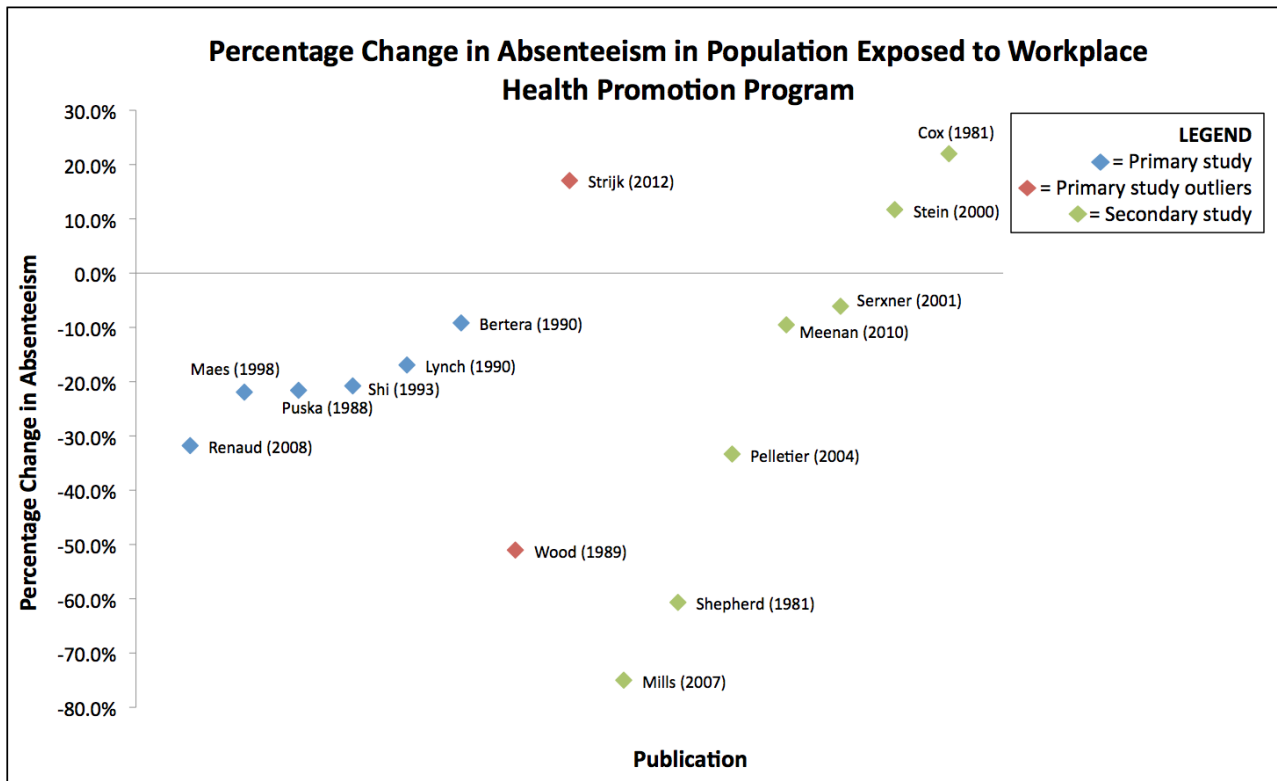
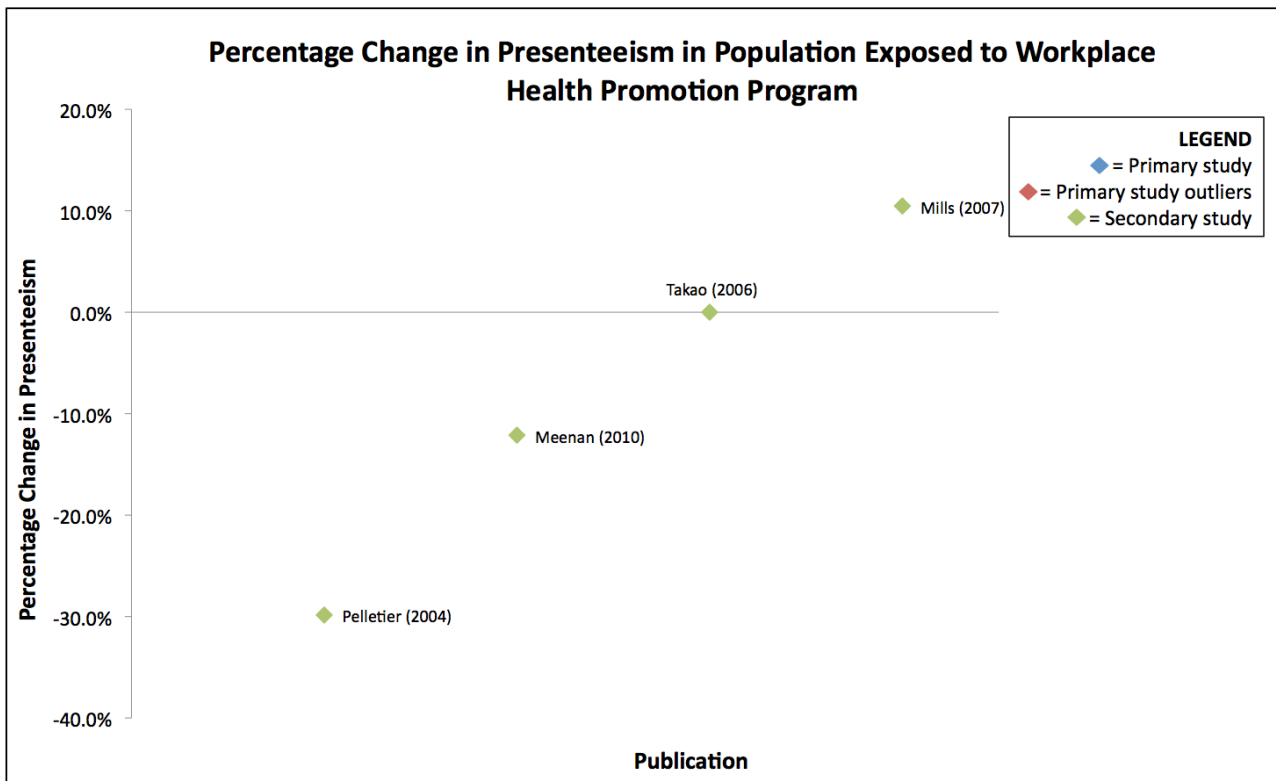


Figure 7 Effect sizes used to model the effect of the WorkHealth grants program. Effect sizes are labelled according to primary study, primary study outliers, and secondary study. (A) absenteeism, (B) presenteeism, and (C) compensable workplace injury/illness

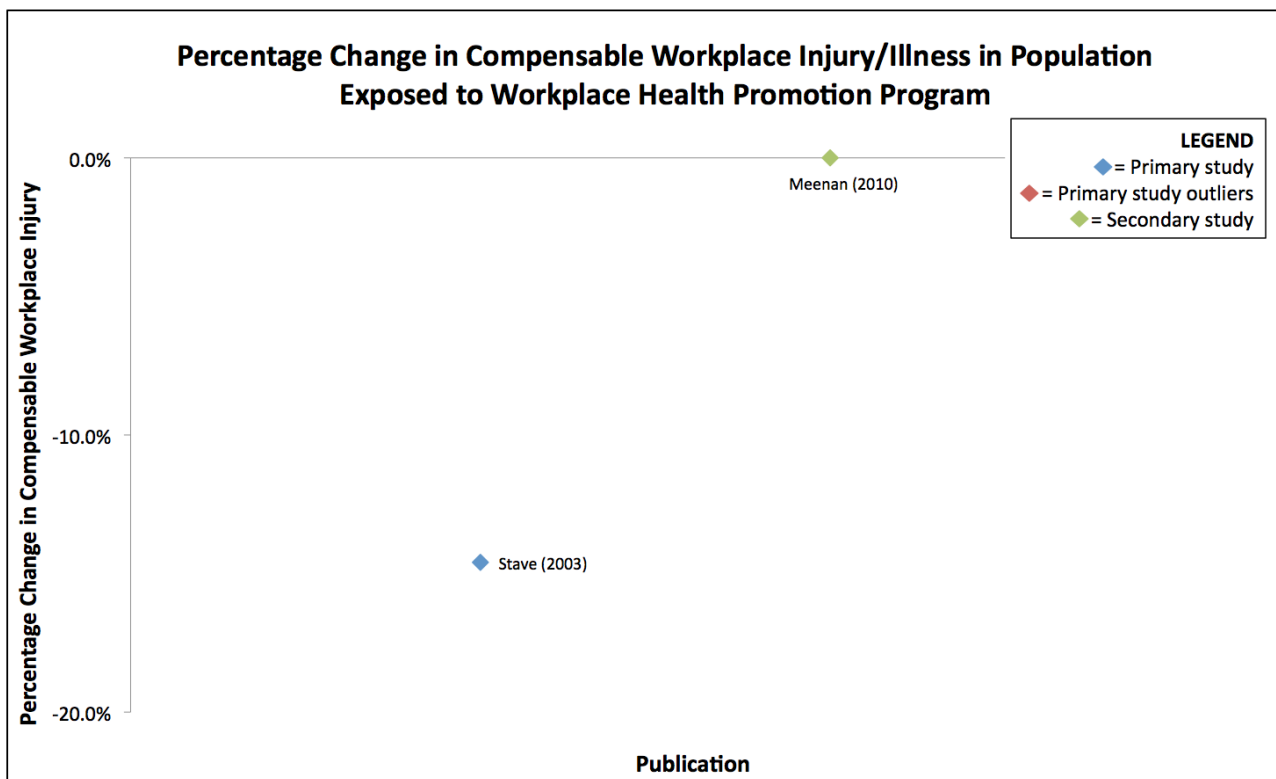
A



B



C



The most robust data was found for absenteeism, with a number of consistent estimates for each of the three program elements. Few primary studies were found for the outcomes of compensable workplace injury/illness and presenteeism. A number of further sensitivity analyses were undertaken. In addition to modelling the effects of primary plus secondary studies, the most conservative and most effective study findings were also analysed (Table 3). As neither compensable workplace injury/illness nor presenteeism had a range of primary studies to choose from these sensitivity analyses were only conducted for absenteeism. For WorkHealth checks, the most conservative estimate was set at no effect, and the most effective estimate was set at the most effective observed effect for absenteeism, -9% (Fries, 1998). For the WorkHealth Coach and Life! program element, the most conservative effect was based on the lowest observed effect (0%, Pai et al., 2009). The most effective estimate (-34%) was based on Shimizu et al. (2003) and Pelletier et al. (2004), as they were more similar in structure and focus to the WorkHealth program than Wood et al. (1998). Both programs included incentives for worker participation. For the WorkHealth grants element, the absenteeism effects were set based on the most (Renaud et al., 2008) and least (Bertera et al., 1990) favourable observed study effect from the primary studies.

Table 2. ‘Health promotion activity’-‘productivity outcome’ relationships used within the model

Intervention type similar to:	Outcome	Primary	Primary plus outliers	Primary plus secondary
WorkHealth checks				
	Absenteeism	-7%	-7%	-1%
	Presenteeism	-	-	-1%
	Compensable Workplace Injury/ Illness	-	-	0%
WorkHealth Coach and Life! programs				
	Absenteeism	-23%	-28%	-20%
	Presenteeism	-30%	-30%	-38%
	Compensable Workplace Injury/ Illness	-16%	-16%	-28%
WorkHealth grants				
	Absenteeism	-20%	-20%	-20%
	Presenteeism	-	-	-8%
	Compensable Workplace Injury/ Illness	-15%	-15%	-7%

Table 3. ‘Health promotion activity’-‘productivity outcome’ relationships used for the most conservative and most effective scenarios within the model

Intervention type similar to:	Outcome	Most conservative	Most effective
WorkHealth checks			
	Absenteeism	0	-9%
WorkHealth Coach and Life! programs			
	Absenteeism	0	-34%
WorkHealth grants			
	Absenteeism	-9%	-28%

Model structure

We used a Markov model, in which individuals move from one WorkHealth program element to another, based on the observed coverage and uptake of each program element (Figure 8). Each program element is weighted with an estimated percentage change in absenteeism, presenteeism and compensable workplace injury/ illness, derived from the

literature as described above (see Table 2 for summary of effects). Based on the flow of individuals through the model, an overall population forecast of the percentage change in absenteeism, presenteeism and compensable workplace injury/ illness is made. A steady-state model is used, in which it is assumed that all the potential benefits of the program have flown through and the model is in a state of equilibrium. Figure 8 represents the structure of the final model.

The model enables estimation of the exposure of Victorian WorkHealth check participants to each of the available health promotion activities as a consequence of participation in each element of the WorkHealth program. It further forecasts the percentage change in absenteeism, presenteeism and compensable workplace injury/ illness in the WorkHealth check population, associated with the program. The model directly forecasts the benefits of each element in the WorkHealth program for the enrolled workers. It can also be used to forecast the broader benefits for the Victorian working population.

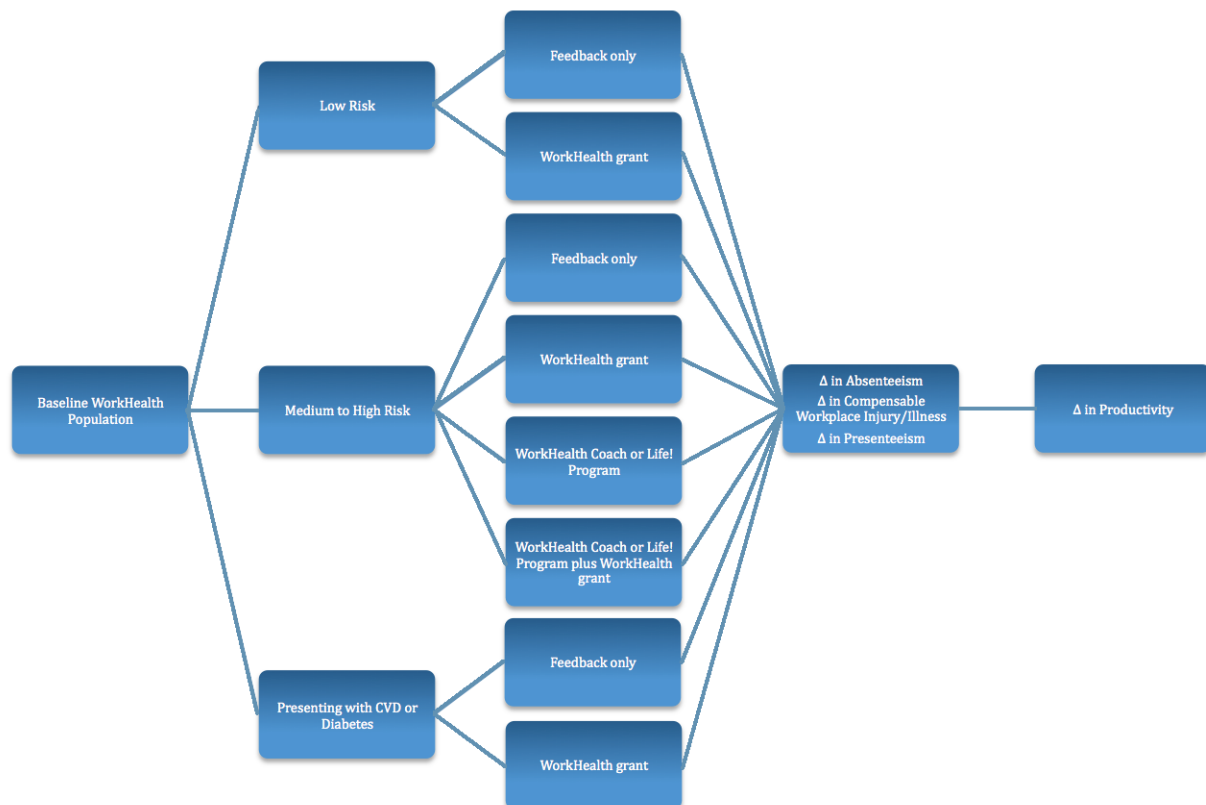


Figure 8. Markov model indicating the flow of WorkHealth check participants through the WorkHealth program elements

Scenario analyses

To test both the impact of the effect size assumptions made within the model, and the effect of potential modifications to the WorkHealth program on the forecast final productivity outcomes, a number of scenario analyses were run.

As indicated in Tables 2 and 3, the effect of different effect sizes was tested in four uncertainty analyses: 'primary plus outliers', 'primary plus secondary', 'most conservative', and 'most effective'.

In addition, scenario analyses were run to represent the impact of changes over time in the coverage and uptake of the different WorkHealth program elements. A forecast was made based on the most recent (January 1st 2012-June 30 2012) coverage and uptake of the WorkHealth grants (29%) and Coach and Life! (12%) programs. Another forecast was made based on the internal WorkHealth performance indicators for 2012-2013 of a 20% uptake of the WorkHealth grants and 7% uptake by eligible workers of the Coach and Life! programs. A further forecast was made based on more optimistic coverage and uptake of the WorkHealth grants (50%) and Coach and Life! (30%) programs.

Effect on productivity costs

The links between absenteeism, presenteeism and compensable workplace injury/ illness and productivity costs are well described. However, there is little data with which to estimate their precise relationships within the Victorian context. Consequently, the original WorkHealth target was derived based on the Victorian proportion of GDP applied to national absenteeism cost estimates. A further complication when trying to estimate the cost impact of factors such as absenteeism, presenteeism and compensable workplace injury/ illness is that these relationships are affected by the degree to which the following two assumptions hold: for short-term absence, production will be made up on the return to work, and employers usually have excess capacity in the labour force to cover absenteeism. For these reasons the Commonwealth Government (2006) recommends estimating a recovery of production lost due to returning to health from an episode of illness dependent on the extent to which each of the following occurs:

- the worker returns to work,

- the worker is productive,
- the production lost is not made up elsewhere by others in the company or the same worker following return to work,
- no temporary replacement from outside has been employed.

Such a full economic impact forecast is outside the scope of this project. In order to provide a broad estimate of the likely impact of the WorkHealth program on productivity costs through the forecast changes in absenteeism, presenteeism and compensable workplace injury/ illness we used the human capital approach, in which we modelled predictions of the per person cost of each productivity outcome for Australian adults. To estimate the average annual per person cost of absenteeism, presenteeism and workers' compensation for Australian workers we used three key reports:

- Medibank's Sick at Work: The cost of presenteeism to your business and the economy (2011),
- PricewaterhouseCoopers, (2010). Workplace Wellness in Australia, Aligning actions with aims: Optimising the benefits of workplace wellness, and
- The Australian government Comcare report: Effective Health and Wellbeing Programs (2010).

In these reports, the total annual cost of absenteeism, presenteeism and workers' compensation in Australia is forecast at \$7 billion (2005-6), \$26 billion (2005-6) and \$31 billion (2004), respectively. To forecast the cost per worker we can use the current estimate of number of Australian workers of around 11.5 million (Australian Bureau of Statistics 2012). This equates to an approximate annual cost per worker for each of absenteeism, presenteeism and workers' compensation of around \$600, \$2,300, and \$2,700, respectively. Other, reported, modelled annual per person forecasts of these costs range between \$1,000 to \$3,200 for absenteeism, and from \$500 for workers' compensation (Medibank Private 2008; Menzies Research Institute Tasmania 2010). Due to the lack of accurate data on these costs here we model only the most conservative annual cost estimates - at \$600 per person for absenteeism, \$2,300 for presenteeism and \$500 for workers' compensation. In addition, as it is difficult to disentangle independent cost impacts for each of these three outcomes, we report primarily the productivity cost improvements associated with changes to absenteeism alone as this was our most robust

outcome. We then additionally report the potential productivity cost improvements if we were to add each of the outcome costs together.

We can compare these estimates to the average weekly earnings (representing the average gross earnings of workers in Australia. For full time workers this was forecast at \$1405.50 (seasonally adjusted) in 2012 (Australian Bureau of Statistics 2012), suggesting that the estimated absenteeism costs used here are equivalent to around 2.5 days absent and fully non-productive from work each year.

We forecast the annual productivity cost savings based on the current experience of 200,000 WorkHealth check participants per year and we forecast the overall savings based on the projected completion of 810,000 WorkHealth checks by December 2013. In a secondary analysis we additionally forecast the productivity cost savings including the predicted effect on absenteeism for those Victorian workers who did not participate in a WorkHealth check but worked in a workplace that implemented a WorkHealth grant (approximately 24,000 per year and 95,000 to December 2013).

Outcomes

To 30th June 2012 around 20,000 workplaces had participated in the WorkHealth program. Within these workplaces around 560,000 WorkHealth checks had been conducted and around 750 WorkHealth grants had been implemented. Uptake of the WorkHealth grants represents around 130,000 Victorian workers who have been newly exposed to workplace health promotion activities, approximately half of whom have also participated in a WorkHealth check (Table 4). From the 560,000 WorkHealth checks, over 350,000 Victorian workers were identified as being at medium to high risk of diabetes or CVD (Figure 9). Of these, in addition to having their risk status newly identified, over 25,000 have taken part in the WorkHealth Coach and Life! programs (Table 4).

Table 4. Number of Victorian workers newly participating in a workplace health promotion program (WorkHealth grants) or a personalised risk factor modification program (WorkHealth Coach or Life!)

	WorkHealth grants	WorkHealth Coach or Life!
Percentage of WorkHealth check participants		
Between 2009 and June 30 th 2012	12%	7.5%
Between January 1 st and June 30 th 2012	29%	12%
Number		
To June 30 th 2012	132,000 (66,000 of whom also had a WorkHealth check)	27,000
To December 31 st 2013 (Estimate is based on continuation of uptake rates of WorkHealth program elements observed between January 1 st and June 30 th 2012)	280,000 (140,000 of whom also will have had a WorkHealth check)	47,000
To December 31 st 2013, WorkHealth uptake targets (Estimate is based on target uptake rates of the WorkHealth program, of 20% for WorkHealth grants and 7% for the WorkHealth Coach and Life! programs in those with medium to high risk.)	232,000 (116,000 of whom also will have had a WorkHealth check)	39,000
To December 31 st 2013, optimised (Estimate is based on optimised uptake rates of WorkHealth program elements, of 50% for WorkHealth grants and 30% for the WorkHealth Coach and Life!)	380,000 (190,000 of whom also will have had a WorkHealth check)	76,000

programs in those with medium to high risk.)		
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Given the current target to recruit 810,444 Victorian workers by December 2013, we would expect the WorkHealth program to have identified over 500,000 workers at medium to high risk of diabetes or CVD, of whom at least 47,000 are likely to have participated in an effective health promotion program to decrease their risk of future diabetes and CVD (Table 4).

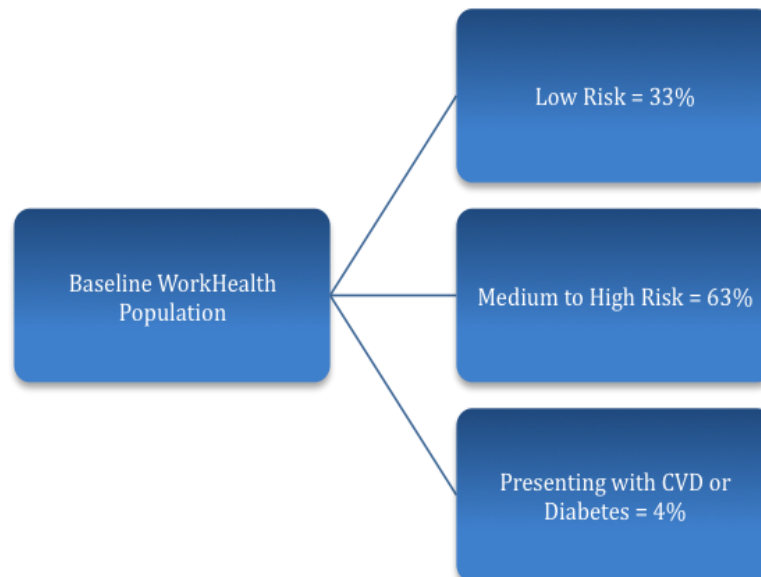


Figure 9. Distribution of the WorkHealth check participants according to risk status. It shows the distribution of risk in the working population as classified by the WorkHealth check



Figure 10. Distribution of the WorkHealth check participants according to risk status and uptake of WorkHealth programs, as represented by the Markov model.

*Note, all percentages refer to the percentage of the total WorkHealth population. 7.5% of those at medium to high risk enrolled in a WorkHealth Coach or Life! program, corresponding to 4.9% of the entire WorkHealth population.

Impact of the WorkHealth program on absenteeism, presenteeism and compensable workplace injury/illness

The most robust estimates of effectiveness were found for absenteeism as an outcome (Figures 5A, 6A, and 7A). Consequently, this outcome was analysed in the most detail. For compensable workplace injury/illness, no studies were found for programs similar to WorkHealth checks alone so a null effect was assumed. Only two studies were found looking at programs similar to the WorkHealth grants, one of which was considered primary. While six studies were found analysing the association between participation in programs similar to the WorkHealth Coach and Life! programs, only one was considered primary (Figures 6C, and 7C). Data was also sparse for presenteeism as an outcome, likely reflecting its relatively new introduction as a concept. Only one primary study with presenteeism as an outcome was found for each of the three program element types (Figures 5B, 6B, and 7B).

The current implementation of the WorkHealth program to June 30th 2012 is estimated to lead to a decrease in absenteeism in those workers who undertook a WorkHealth check of around 11% (Table 5A). Inclusion of lower quality studies to estimate program effectiveness decreased this estimated effect by approximately half.

Increasing uptake of the WorkHealth program elements had a strong effect, with the most recent program uptake rates associated with around a 15% decrease in absenteeism (Table 5A). If uptake rates of 50% for WorkHealth grants and 30% for the WorkHealth Coach and Life! programs in those with medium to high risk could be obtained, it may be possible to achieve a decrease in absenteeism of around 20% in WorkHealth check participants.

Ensuring maximum effectiveness of the program elements is another means to improve overall outcomes. If the most effective WorkHealth grants are selectively implemented, along with maximising benefit from the WorkHealth Coach and Life! programs, it may be possible to achieve a decrease in absenteeism of around 14% with current uptake rates (based on the most effective studies found, Shimizu et al. (2003) and Pelletier et al. (2004) -34% and Renaud et al, 2008 -28%). These sensitivity analyses also indicate the importance of ensuring the effectiveness of the selected grants and of the WorkHealth

Coach and Life! programs as use of less effective programs would result in minimal change in absenteeism.

The forecast effect of implementation of the WorkHealth program to June 30th 2012 on presenteeism was an improvement of around 3% (Table 5B). This forecast was essentially the same when effect estimates from secondary studies were also included. The forecast for presenteeism is the least robust of the three outcomes as no primary studies were found to represent the effect of the WorkHealth check alone or WorkHealth grants.

The current implementation of the WorkHealth program to June 30th 2012 is forecast to lead to a decrease in compensable workplace injury/illness in the WorkHealth check participants of around 3% (Table 5C). This effect would be expected to be observed in a decrease in liability claims experienced by WorkSafe from workplaces participating in the WorkHealth checks. This forecast was essentially the same when effect estimates from secondary studies were also included. This forecast is likely to be a slight under-estimation of the effect as no studies were found to estimate the association between the WorkHealth check alone and change in compensable workplace injury/illness.

Once again, increasing uptake of the WorkHealth program elements had a strong effect, with the most recent program uptake rates associated with around double the improvement in compensable workplace injury/illness (-6%) and presenteeism (-5%) (Table 5C). If uptake rates of 50% for WorkHealth grants and 30% for the WorkHealth Coach and Life! programs in those with medium to high risk could be obtained, it may be possible to achieve a decrease in compensable workplace injury/illness and presenteeism of around 10% in WorkHealth check participants.

Table 5. Predicted effect of the WorkHealth program on A) absenteeism, B) presenteeism and C) compensable workplace injury/ illness in WorkHealth check participants

A. Absenteeism

Program element uptake	Effect size source	
	Primary	Primary plus secondary
Current	-11%	-5%
Recent (January 1 st – June 30 th 2012)	-14%	-9%
WorkHealth uptake targets (This forecast is based on the WorkHealth target uptake rates of the WorkHealth program elements, of 20% for WorkHealth grants and 7% for the WorkHealth Coach and Life! programs in those with medium to high risk.)	-12%	-6%
Optimal (This forecast is based on optimised uptake rates of the WorkHealth program elements observed from June 30 th 2012, of 50% for WorkHealth grants and 30% for the WorkHealth Coach and Life! programs in those with medium to high risk.)	-20%	-15%
Target	-10%	

B. Presenteeism

	Effect size source	
Program element uptake	Primary	Primary plus secondary
Current	-3%	-4%
Recent (January 1 st – June 30 th 2012)	-5%	-6%
WorkHealth uptake targets (This forecast is based on the WorkHealth target uptake rates of the WorkHealth program elements, of 20% for WorkHealth grants and 7% for the WorkHealth Coach and Life! programs in those with medium to high risk.)	-4%	-4%
Optimal (This forecast is based on optimised uptake rates of the WorkHealth program elements observed from June 30 th 2012, of 50% for WorkHealth grants and 30% for the WorkHealth Coach and Life! programs in those with medium to high risk.)	-10%	-12%
Target	N/A	

C. Compensable workplace injury/ illness

	Effect size source	
Program element uptake	Primary	Primary plus secondary
Current	-3%	-2%
Recent (January 1 st – June 30 th 2012)	-6%	-4%
WorkHealth uptake targets (This forecast is based on the WorkHealth target uptake rates of the WorkHealth program elements, of 20% for WorkHealth grants and 7% for the WorkHealth Coach and Life! programs in those with medium to high risk.)	-4%	-3%
Optimal (This forecast is based on optimised uptake rates of the WorkHealth program elements observed from June 30 th 2012, of 50% for WorkHealth grants and 30% for the WorkHealth Coach and Life! programs in those with medium to high risk.)	-10%	-9%

programs in those with medium to high risk.)		
Target	-5%	

Impact of the WorkHealth program on productivity costs

The impact of the WorkHealth program on productivity costs in Victoria in the first year after participation in the program was forecast based on the estimated decreases in absenteeism (-11%), presenteeism (-3%), and workers' compensation (-3%) applied to the average annual number of WorkHealth check participants from 2010 and 2011 (approximately 200,000), estimated based on the number of WorkHealth checks per year. For each annual cohort of 200,000 participants we forecast annual productivity cost improvements of around \$13m (absenteeism-related), \$14m (presenteeism-related), and \$2.5m (workers' compensation related). As improvements in absenteeism associated with improved health will be ongoing, as each new cohort enters the program this represents an additional productivity cost improvement each year. The forecast effect on annual productivity costs of the final WorkHealth cohort of around 810,000 Victorian workers to December 2013 is around \$50m (absenteeism-related), \$57m (presenteeism-related), and \$10m (workers' compensation related). Approximate additional productivity cost savings associated with absenteeism improvements in workers who do not have a WorkHealth check but do work in a workplace implementing a WorkHealth grant are \$11m to December 2013.

Discussion

In this analysis of the collective effect of the WorkHealth program (as implemented to June 30 2012) on change in absenteeism, presenteeism, compensable workplace injury/ illness and overall productivity for WorkHealth check participants over the short term (1-2 years from their WorkHealth check), it is forecast that the targets for absenteeism and compensable workplace injury/illness are likely to be met. Based on the actual uptake of the WorkHealth checks, grants and Coach/Life! programs, an 11% decrease in absenteeism is forecast for the 560,000 Victorian employees who underwent a WorkHealth check between 2009 and June 30 2012. Alongside this, decreases of around 3% for both presenteeism and compensable workplace injury/ illness are forecast. The impact on compensable workplace injury/ illness would be expected to be observed in a decrease in liability claims experienced by WorkSafe from workplaces participating in the WorkHealth checks. Additional improvements are expected in workers who did not undergo a WorkHealth check themselves but were employed in a workplace that implemented the WorkHealth checks, through exposure to general workplace changes and WorkHealth grants.

The effect of the WorkHealth program elements on the three productivity outcomes was based on current observed participation in WorkHealth program elements combined with health program effectiveness data derived from the literature. We conducted a review of the literature evaluating the impact of programs similar to each of the WorkHealth program elements on absenteeism, presenteeism and compensable workplace injury/ illness. An average effect was derived from the highest quality studies. The most robust estimates were derived for absenteeism. A basic forecast of the impact of the changes in productivity outcomes on productivity costs was estimated. Assuming that prior estimates of the average annual per capita absenteeism, presenteeism and compensable workplace injury/illness cost for Australian workers applies to the estimated 810,000 Victorian WorkHealth check participants, we would expect the decreases of 11%, 3% and 3% described above to be associated with an increase in overall annual productivity costs for Victoria of around \$128M between 2009 and December 2014. The productivity cost saving forecast based on changes in absenteeism alone is around \$60M.

The scenario analyses demonstrate that the potential impact of the WorkHealth program on productivity outcomes is strongly dependent on both the effectiveness of the individual program elements, and their reach and uptake. Over time, the uptake of the WorkHealth

grants and WorkHealth Coach and Life! Taking action on Diabetes programs have increased. In the most recent WorkHealth check participants, increasing uptake of the WorkHealth grants and WorkHealth Coach and Life! Taking action on Diabetes programs even further has the potential to double the impact on compensation claims and other productivity outcomes of the overall WorkHealth program. Ensuring expanded availability of WorkHealth grants activities with evidence of greatest effectiveness, and encouraging completion of the WorkHealth Coach and Life! Taking action on Diabetes programs has the potential to further improve productivity.

Model strengths and weaknesses

To forecast the effect of a multi-component program such as WorkHealth on downstream outcomes such as absenteeism, presenteeism and compensable workplace injury/ illness, the simplest strategy is to combine information on the observed uptake of the program elements with research evidence of the association between such elements and the outcomes of interest. The key underlying assumption of this model is that the effect estimates are broadly representative of the eventual effects of the specific WorkHealth program elements. For absenteeism, the data were robust, with a number of studies fulfilling our primary quality criteria of likeness to the WorkHealth program, controlled study (for grants and Coach/Life!), and a sample size greater than 100. Figures 5, 6 and 7A also indicate the minimal variation of the different study effects around the average effect size.

However, for the outcomes of presenteeism and compensable workplace injury/ illness primary study sources were less frequent, and for three estimates no primary studies were found. Consequently, the estimated changes in these outcomes are less reliable and would benefit from more published studies in the literature.

In general, the health risk assessments in the studies used were very similar to the WorkHealth check, generally measuring the same risk factors and providing personalised feedback on individual risk factor levels, either in a written form or in person.

The personalised health promotion programs used in the studies to estimate the effect of the WorkHealth Coach and Life! programs were also generally similar to the WorkHealth program. The majority of studies were based on interventions including both group health information sessions and personalised health coaching, available to participants based on their risk levels. A minority also included broader workplace interventions (Bertera et al.

1990) and the majority additionally had program elements that were not targeted based on risk (Blair, Smith et al. 1986; Wood, Olmstead et al. 1989; Bertera et al. 1990; Henritze, Brammell et al. 1992; Maes, Verhoeven et al. 1998; Stein, Shakour et al. 2000; Schultz, Lu et al. 2002; Serxner, Gold et al. 2003; Shimizu, Nagashima et al. 2003; Pelletier, Boles et al. 2004; Mills, Kessler et al. 2007). The interventions with the most similarity to the WorkHealth Coach and Life! programs were Musich et al. (2003), Nilsson et al. (2001), and Fries et al. (1998), none of which included broader workplace programs. These studies had effect forecasts close to the average estimate used in the model.

There was a large degree of variation in the interventions with similarity to the WorkHealth grants program. Intervention elements included provision of written health promotion materials, health promotion seminars, guided physical activity sessions, canteen/cafeteria changes, and provision of free fruit. The most common risk factors targeted were smoking, healthy eating, physical activity, and stress. Due to the variability in both the literature and the grants implemented within the WorkHealth Program, the WorkHealth grants element is likely to be the least accurately forecast. However, as the primary study estimates cluster tightly around the average, the effect estimate is likely to provide a good indication of the effect of a multi-component strategy targeting these risk factors across a workplace.

Although we selected interventions based on the grants that have been most commonly selected by workplaces within the WorkHealth program (healthy eating, wellbeing and physical activity, particularly information provision) it will be important to evaluate the effectiveness of the specific grants implemented and in future guide selection of those grants with the greatest evidence of effectiveness. The majority of the studies used did not include implementation of a general workplace policy on healthy eating and activity. The mandatory implementation of this as part of the WorkHealth grants program is likely to increase the effectiveness of the other individual grant elements (World Health Organisation 2008).

Finally, a full economic evaluation of the impact of the WorkHealth program on annual productivity costs for Victoria was beyond the scope of this report. We have provided a general estimation of the potential productivity boost associated with the implementation of the WorkHealth program to the forecast 810,000 WorkHealth checks in Victorian workers by the end of 2013. It would be useful to build on the forecast changes in absenteeism, presenteeism and compensable workplace injury/ illness provided here with a full

economic analysis estimating the potential impact on productivity costs for the WorkHealth population, with specific attribution to each of the industries involved.

Further considerations

In this report we forecast the potential impact of participation in the WorkHealth program on productivity outcomes for the population of workers that enrolled in the WorkHealth check. This has two main implications that require consideration.

The first is that a number of other, flow on benefits will arise from the WorkHealth program that have not been included in the forecasting here. This includes potential health improvements to other employees in the same companies participating in the WorkHealth check, through both the WorkHealth grants and general culture change, including, further initiatives initiated by workplaces outside the WorkHealth grants program, and to employees in other companies through both access to the Healthy Workplace Kit and further culture change. We have provided broad estimates of the additional impact on productivity costs of exposure to WorkHealth grants but it will be important to evaluate the exposure to these other WorkHealth elements more precisely.

The second is that the estimates of change here cannot necessarily be applied to the entire Victorian working population, as we know that those who enrolled in WHCs are not representative of the average Victorian worker. If the WorkHealth program expands in future, it will be important to ensure that the uptake of the grants and Coach/Life! programs does not decrease. It will also be important to continue to work to reach the most at risk, disadvantaged and less accessible Victorian workers as it is in these workers that there is likely to be the greatest potential for improvement in productivity outcomes.

To build on the current forecast of the effect of the WorkHealth program on productivity outcomes in Victoria there are five key steps to consider.

1. To take advantage of the roll out of the WorkHealth program to collect data on compensation claims and absenteeism (sick days). The ideal study design would be to compare absenteeism rates between two groups of large companies of similar type, one group of which participated in the WorkHealth program and the other of which did not. Comparison of absenteeism rates in the year before program

implementation with the year after program implementation would be very informative.

2. To evaluate the effectiveness of the WorkHealth Coach/Life! and grants programs through thorough evaluation of the available process data and collection of WorkHealth check data a second time in a cohort of WorkHealth check participants who had undertaken these programs one and two years after their initial WorkHealth check.
3. To expand the current model to forecast the effect of the WorkHealth program on the intermediate health outcomes of diabetes and cardiovascular disease. Such estimation is useful for both individual worker motivation to participate fully in the WorkHealth program elements and for full health cost evaluations.
4. To build on the current model to forecast the added impact on productivity outcomes of expanding the reach of the WorkHealth program to the harder to reach individuals, workplaces and industries.
5. To undertake a full economic analysis to forecast the potential costs saved through productivity and healthcare needs.

Conclusions

Based on the current coverage of the WorkHealth program elements, and the best available evidence on effectiveness of programs similar to the WorkHealth program elements, we forecast that the WorkHealth targets for absenteeism and compensable workplace injury/illness have been achieved, alongside additional improvements in presenteeism. Improvements in absenteeism of 11% in WorkHealth check participants are forecast, based on the uptake of the WorkHealth program elements between 2009 and June 30 2013. Achieving maximum productivity benefits for Victorian industry and workers will require access to all WorkHealth program elements by workers across all industry sectors, especially those shown to have the poorest indicators of chronic disease risk. The scenario analyses indicate that continuing to optimise the uptake and reach of the most effective elements of the WorkHealth program will enable the productivity targets to be surpassed. A full economic analysis would be useful in order to more fully understand the productivity impact of the WorkHealth program. It will also be important to collect empirical data on absenteeism and workers' compensation claims from participating workplaces to monitor the actual impact of the program.

Appendix

Table 6.1: Literature similar to the WorkHealth check program with absenteeism as an outcome

Name (Year)	Observed difference	Primary or Secondary	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Fries (1998)	-9.38%	Primary	Difference between the baseline and follow up of the control group	2586 High-risk persons (according to HRA results) with private health insurance that were part of the Healthtrack (employed) or senior health track (retiree) programs. Had both intervention and control groups, with Control group only receiving standard Healthtrack program, while the intervention received a high-risk educational module. Data set was randomised into intervention and control groups (control group was obtained through convenience sampling) 12 months	Two page Health track assessment questionnaire involving questions on general health or in specific problem areas. Participants receive a letter outlining their risk areas and possible behaviour changes that could occur to rectify them. Feedback included a graphic summary of the risk problems, progress made, books, audiotapes, and videotapes specific to the identified risk. This is what the Control group received	Programs run in cycles of 6 months. Control group were given healthtrack intervention regardless of risk status, however the intervention involved provision of specific books, audiotapes, and videotapes. Intervention group was allocated to specific high-risk educational module based on the most serious problem they face. There were 12 main chronic illness interventions: Arthritis, back pain, high blood pressure, diabetes, heart problems, smoking, obesity, stroke, chronic obstructive pulmonary disease, alcohol intake, and a final group which was a combination of risk factors. The Intervention group also had relevant videotapes, audiotapes and books available for further education on healthy behaviours. (Intervention is not available to all)

Name (Year)	Observed difference	Primary or Secondary	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Shi (1993)	-5.43%	Primary	Change shown is the difference between baseline and follow up of Group 1 participants (HRA only)	1188 Employees in a Northern California Utility company. Quasi-experimental design, 9 company divisions were randomly assigned into four groups, control group only completed HRA. (Randomised control trial) 1988-1989.	Participants completed a Health Risk Assessment (HRA). It outlined major health risks and was hoped to suggest to the worker which intervention group the participant would go to. Had feedback based on mortality tables and behavioural measures as well as on overall risk status measure.	Four different intervention groups, with the Control group only completing the HRA. Group two was a low intensity intervention using a health library and self care books on overcoming bad habits and leading a healthy lifestyle. Group 3 was a medium intensity intervention involving behaviour change workshop classes (exercise, weight control, nutrition, smoking cessation, stress management, high blood pressure and alcohol use). Also had group meetings to monitor progress and exchange experiences. This group was most similar to WorkHealth program and was used for absenteeism calculations. Group 4 was for high-risk employees and used Case management nurses to undergo weekly monitoring of progress and behavioural changes. New exercise spaces, and smoking policy was created as well. Bimonthly health news letters were given to all groups, while all groups aside from the control had access to a health resource centre, and a self care book. Program specifics may have varied between worksites. (Intervention available to all workers within control)

Name (Year)	Observed difference	Primary or Secondary	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Mills (2007)	11.11%	Secondary	Value is derived from the control mean difference in absenteeism (logistic regression) divided by the mean absences in the preceding month. Classified as secondary as unsure about significance	2297 participants (618 in the intervention group and 1679 in the control group). Control selection was via convenience sample. Intervention group were workers at one of 3 UK locations of Unilever PLC, and were employed full time in office based jobs. No random allocation into groups occurred. (Cohort Study) 12 month study	All intervention group members needed to fill out a secure online survey about health and work performance. The control group also needed to complete the baseline survey. Baseline and 12 month surveys included a HRA questionnaire and absenteeism questions. The 24 questions on the HRA were specifically designed to analyse 12 health risk factors for a corporate environment. Alcohol, smoking, body weight, physical activity, nutrition, medical health, pain, stress, sleep, perception of general health, job satisfaction, and Seat belt usage. Lottery tickets for a prize draw were used as an incentive for HRA participation. Once completed a personalised health and well being report gave a wellness score, information and advice tailored to the participants health related behaviours	The intervention was driven by HRA data in terms of programs that best suited the risk factors from participants. Involved personalised health, wellbeing and lifestyle web portal with articles, assessments, and interactive behaviour change programs. Tailored emails were received every two weeks, with self-improvement suggestions and tips. Paper based information was also handed out with newsletters and health promotional literature on stress management, sleep improvement, nutritional balance, and physical activity. Seminars were also given on the four most prevalent health risk issues. Since aggregate data from the HRA was used to drive the programs at each of the work sites it was partially driven by the intervention (Intervention was available to all within workplace BUT was based on HRA of all workplace)

Table 6.2: Literature similar to the WorkHealth check program with presenteeism as an outcome

<u>Name (Year)</u>	<u>Observed difference</u>	<u>Primary or Secondary</u>	<u>How Values were calculated</u>	<u>Participant Details</u>	<u>Feedback Details</u>	<u>Intervention Details</u>
Mills (2007)	-0.82%	Secondary	Value is derived from the control mean difference in work performance (logistic regression) divided by the mean work performance in the preceding month. Negative percentage difference shown indicates improvement in productivity. Classified as secondary as unsure about significance	2297 participants (618 in the intervention group and 1679 in the control group). Control selection was via convenience sample. Intervention group were workers at one of 3 UK locations of Unilever PLC, and were employed full time in office based jobs. No random allocation into groups occurred. (Cohort Study) 12 months	All intervention group members needed to fill out a secure online survey about health and work performance. The control group also needed to complete the baseline survey. Baseline and 12 month surveys included a HRA questionnaire and absenteeism questions. The 24 questions on the HRA were specifically designed to analyse 12 health risk factors for a corporate environment. Alcohol, smoking, body weight, physical activity, nutrition, medical health, pain, stress, sleep, perception of general health, job satisfaction, and Seat belt usage. Lottery tickets for a prize draw were used as an incentive for HRA participation. Once completed a personalised health and well being report gave a wellness score, information and advice tailored to the participants health related behaviours	The intervention was driven by HRA data in terms of programs that best suited the risk factors from participants. Involved personalised health, wellbeing and lifestyle web portal with articles, assessments, and interactive behaviour change programs. Tailored emails were received every two weeks, with self-improvement suggestions and tips. Paper based information was also handed out with newsletters and health promotional literature on stress management, sleep improvement, nutritional balance, and physical activity. Seminars were also given on the four most prevalent health risk issues. Since aggregate data from the HRA was used to drive the programs at each of the work sites it was partially driven by the intervention (Intervention was available to all within workplace BUT was based on HRA of all workplace)

Table 6.3: Literature similar to the WorkHealth Coach/Life! program with absenteeism as an outcome

Name (Year)	Observed difference	Primary or Secondary	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Bertera (1990)	-9.2%	Primary	Differences between baseline and follow-up compared between the intervention and control groups. Study measured absenteeism in disability days, which includes illnesses not related to occupational causes.	43888 employees of a large diverse manufacturing company including both white and blue-collar workers. Study focused on hourly employees. Used a pre-test, Post-test comparison with an equivalent control group. Intervention sites consisted of 41 different locations. The 41 program sites did not differ significantly from the 19 non-program sites (control). There was no randomisation of sites into control and intervention since it was based on the uptake timing for the program of each workplace. (Cohort Study) 1984-1986	All participants completed a computer scored HRA with 36 items on health status, personal habits and lifestyle. Interpretation of results is given through videotape explanation as well as individual consultation with medical personnel when requested.	Involved both group and self-directed programs, with topics involving smoking cessation, fitness, weight control, lipid control, stress management and prevention of spine and back injuries. 4 to 10 week class cycles were used. A bimonthly magazine outlined health and fitness developments as well as cafeteria and vending machine modifications to offer healthier foods. Employees could also check and record their weight and blood pressure with equipment provided in high traffic locations. Intervention was open to all but had both videotape explanation of appraisal results as well as the option of individual consultation for those that requested it. (Intervention was available to all)
Bertera (1993)	-6.3%	Secondary	Before intervention vs. after comparison (no control used)	7178 employees from a large manufacturing company in the USA were compared to a time lagged non-equivalent comparison group of 7101 participants. Inclusion criteria included being at a site with the program between 1987 and 1988 and completing the initial HRA. Pre-test, post-test comparison. (Cohort study) 1984-1986	38 item HRA involving illness days, behavioural risks, as well as company records of physical examinations.	On site classes, safety meetings and self-help options were also made available to address the topics of smoking, cholesterol, high blood pressure, overweight, fitness, stress, cancer, seatbelt use and aids education. Environmental changes such as changes in smoking policy, cafeteria menu and the availability of blood pressure checking machines also were implemented as well as fitness trails, aerobic exercise rooms and physical conditioning equipment. They also attempted to acknowledge and provide recognition for goals and achievements. HRA did not direct intervention. (Interventions were available to all)

Name (Year)	Observed difference	Primary or Secondary	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Blair (1986)	-19.8%	Primary	Difference between non-participants versus entire program participants.	3846 employees working in a large (approx 200 locations) metropolitan school district within the USA. The three different groups starting the program at a different time allowed for comparisons with a control. Was a pre-test vs. post test study. No mention of randomisation into groups (Cohort Study) 1982-1983	Used a HRA while the on site physician conducted a physical, measuring blood chemistry, ECG, height, weight and blood pressure. Also collected previous medical history, a psychosocial questionnaire (using the general wellbeing schedule), job satisfaction, health habits questionnaire (involving smoking, exercise and diet habits). A physical fitness assessment was also conducted that involved a treadmill exercise test, strength test and a test for motor fitness. This was used to give personalised feedback including suggested intervention programs to take. Participants were put into one of three program groups: Pre, post and non-participants based on their participation in the health promotion program.	The intervention consisted of pre and post testing as well as a 10-week intervention phase. Intervention programs involved guided smoking cessation, diet, weight loss, and stress management. Also offered were weekly exercise classes. Pre-test evaluation was used to set specific intervention goals, during the review of the pre-test evaluation by the project staff member. This does not indicate that they were limited to specific intervention however. (Intervention was available to all participants)

Name (Year)	Observed difference	Primary or Secondary	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Conrad (1990)	30.0%	Secondary	Separated calculations into each different program site. The Michigan site quoted the difference before and after in the group that received the more extensive intervention program	3643 American employees with Ohio Blue Cross and Blue Shield plans. Three separate intervention program sites, in Michigan (1449), Indiana (1448) and northern Ohio (746) made up the study. Health screening was also undergone. Eligibility criteria for inclusion at each site differed, as Michigan only had employees with no heart disease, stroke or cancer, while in Indiana, only smokers, high cholesterol, obesity and high blood pressure were included. Ohio had no health related eligibility criteria each study had differing methodology, but all studies employed a quasi-experimental design. Assortment into groups was not random (Cohort study) 1976-1981	In all sites offered a health risk appraisal (HRA) with a follow up health counselling session to clarify results.	All included a smoking cessation program, the Michigan and Ohio sites offered stress management and exercise programs, while both the Ohio and Indiana sites offered nutrition education. Michigan had the most comprehensive intervention program with blood pressure and cholesterol control classes, readiness training, self care, cancer awareness, back health, Aikido training and sexual awareness classes. Intervention was not based on HRA results (Intervention was available to all participants)
Conrad (1990)	0%	Secondary	Ohio program was mainly a physical conditioning program, and measured follow-up results of the group with a comparison group. Found no significant results			

Name (Year)	Observed difference	Primary or Secondary	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Conrad (1990)	-16.74%	Secondary	Indiana program compared those who didn't participate with those that did participate and had completed the mini exam health screening.			
Fries (1998)	-27.5%	Primary	Difference used is between comparison group (control) with a mean age of 41.2 and High-risk employee group that had the intervention.	2586 High-risk persons (according to HRA results) with private health insurance that were part of the Healthtrack (employed) or senior health track (retiree) programs. Had both intervention and control groups, with Control group only receiving standard Healthtrack program, while the intervention received a high-risk educational module. Data set was randomised into intervention and control groups (RCT) 12 months.	Two page Health track assessment questionnaire involving questions on general health or in specific problem areas. Participants receive a letter outlining their risk areas and possible behaviour changes that could occur to rectify them. Feedback included a graphic summary of the risk problems, progress made, books, audiotapes, and videotapes specific to the identified risk. This is what the Control group received	Programs run in cycles of 6 months. Control group were given healthtrack intervention regardless of risk status, however the intervention involved provision of specific books, audiotapes, and videotapes. Intervention group was allocated to specific high-risk educational module based on the most serious problem they face. There were 12 main chronic illness interventions: Arthritis, back pain, high blood pressure, diabetes, heart problems, smoking, obesity, stroke, chronic obstructive pulmonary disease, alcohol intake, and a final group which was a combination of risk factors. The Intervention group also had relevant videotapes, audiotapes and books available for further education on healthy behaviours. (Intervention is not available to all)

Name (Year)	Observed difference	Primary or Secondary	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Henritze (1992)	-68.2%	Primary	Detailed description unavailable, and therefore date remains unknown. Change in absenteeism from Chapman (2005). Also examined cardiac rehabilitation savings and saving from treadmill testing	499 employees at "Coors Engineering and Can manufacturing complex". Colorado (USA) No mention of randomisation. Study design in terms of control group presence is unclear, but appears to be pre-post test comparison with no control group. (Cohort Study) (Length of stay N/A)	Involved a health screening, including height, weight, blood pressure, cholesterol, smoking history, weekly calorie expenditure, self-rating of health and stress. Wellness councillor reviewed results and referred them to an appropriate intervention activity.	Intervention was specific to their risk factors, involved activity competitions and classes (nutrition, hypertension, smoking, lipids). Also held smoke out days to help smoking cessation. Counselling as well as posters, table tents and electronic messages promoting healthy behaviours were made available to further promote healthy behaviours. Intervention lasted 8 weeks, and was available to all shifts. (Intervention available to all)
Jeffery (1993)	-19.4%	Secondary	Differences between baseline and follow-up compared between the intervention and control groups.	1242 employees (597 in intervention, 645 in control) of 32 work sites in Minnesota, USA. Companies were diverse, and on average had 600 employees. Random selection of 200 employees occurred at baseline, these were then followed up to form a cohort, however a secondary random sample at follow up formed a cross sectional sample. Used a control group to compare results to. Randomisation into Intervention and control groups occurred after baseline survey completion. (Cohort vs. Cross section comparison) 1987-1990	12 page questionnaire (Similar to HRA) was used, as was an invitation to attend a measuring session. Survey questions were regarding smoking, diet and exercise habits, health and job history. Both intervention and control completed the Questionnaire. Level of feedback is unclear, however some level of feedback occurred to allow incentive program to occur.	Intervention focused on smoking and obesity reduction classes, and had an 11-part behaviour change program. Held by professional educators and held on site during employee time or lunchtime. Included an incentive program for improvement that deducted pay from paycheck as a commitment deposit toward their goals. (Unknown if intervention available to all or not but appears to be)

Name (Year)	Observed difference	Primary or Secondary	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Jones (1990)	-31.8%	Secondary	Differences between baseline and follow-up compared between the intervention and control groups.	1893 Johnson and Johnson employees (1406 Intervention and 487 Control). Pre-test, Post-test comparison study that used control group for comparison. (Cohort study) 1979-1981	Questionnaire about health and lifestyle behaviours. Given to both control and intervention. Self reported sick days, smoking status, and other lifestyle variables were measured. Questionnaire was highly standardised, Details of feedback not given.	Focused on smoking cessation, weight control, stress management, nutrition education, and held fitness and blood pressure control classes. (Intervention available to all)
Knight (1994)	5.9%	Secondary	Differences between baseline and follow-up compared between the intervention and control groups.	4972 Duke university (USA) employees that had worked for at least two years full time employment. Those included within the study were current full time hourly workers who had worked for the duration of the study as well. Used non-participants as controls. 1988-1999	Questionnaire involving lifestyle behaviours such as smoking, weight control, stress, nutrition, and fitness. Has annual health screenings and lifestyle improvement programs. Level of feedback was unclear	Interventions focused on smoking cessation, weight control, stress management, nutrition education as well as fitness maintenance and blood pressure monitoring. Had a quarterly newsletter and personal health consultations, Offered lifestyle improvement programs and discounted fitness membership. Also offered customised health and fitness programs to different work areas. Held monthly events. Article does not mention any restrictions to access to the programs (intervention available to all)

Name (Year)	Observed difference	Primary or Secondary	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Maes (1998)	-21.9%	Primary	Differences between baseline and follow-up compared between the intervention and control groups.	346 Dutch Barbantia Employees. Study used pre-test, Post-test comparison with a control group as its design, with the experimental group being located at one site while the control was made up of two other sites. Allocation of site as control or intervention was random, however allocation to the site itself was not random. (Cohort study) 1990-1993	Measurements included an interview to collect socio-demographic data, health behaviour data and quality of work questions. Questions involved smoking, alcohol, and medicine consumption habits as well as quality of sleep, nutrition and exercise frequency. Self-report questionnaires were also used for stress and social assessment. Biomedical measures like a blood sample, heart rate, blood pressures, body weight and height were also taken. All employees were informed about the results of their measurements, and if this exceeded high risk levels that were set within the study they were referred to a general practitioner	The interventions available to all were the health education programs: (topics were: alcohol, drug, work conditions, stress, smoking behaviour, headaches, and back pain), Physical exercise sessions (choice of type of exercise up to participant), and training in social skills and leadership. There were also promotional items for healthy lifestyles. All employees had the opportunity to participate in the half hour intervention sessions that were held 3 times per week, and the content of physical exercise were the choice of the participant. However upper and middle management also received training in social skills and leadership, however this was not based on HRA allocation. (GP referral was only intervention based on risk level, other interventions were available to all)

Name (Year)	Observed difference	Primary or Secondary	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Pelletier (2004)	-33.3%	Primary	Before intervention vs. after comparison (no control used)	500 subjects participating in a wellness program at a large national employer located in the northeast US. Designed as a one group pre-post respondent comparison (prospective cohort) 2001-2002	An online self reported Health Risk Assessment (HRA) asked 20 questions on chronic conditions, health status, demographics, biometric measures, and lifestyle risk factors (smoking, exercise, and diet). This was then combined to give a risk score indicating coronary disease risk. Work productivity was obtained through the Work Productivity and Activity Impairment Questionnaire (General Health), which looked at hours missed due to illness as well as productivity while working. 11 health risks were: poor diet, BMI (under and overweight), high cholesterol, physical inactivity, excessive stress, overdue preventive visits, lack of emotional fulfilment, high blood pressure, tobacco use, diabetes or high blood glucose and alcohol use. Risks were used to create a risk score that was indicative of coronary disease. (The article did not state if feedback was given or not)	The intervention involved online wellness programs, incentive campaigns, and offline behaviour change workshops and nutritional counselling. There was also promotion of health issues and health wellness benefits as well as fitness centre services. (Intervention targeting was unclear).

Name (Year)	Observed difference	Primary or Secondary	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Shi (1993)	-20.8%	Primary	Before Intervention vs. after comparison, (No control group used)	1188 Employees in a Northern California Utility company. Quasi-experimental design, 9 company divisions were randomly assigned into four groups, control group only completed HRA. (Randomised control trial). 1988-1989	Participants completed a Health Risk Assessment (HRA). It outlined major health risks and was hoped to suggest to the worker which intervention group the participant would go to. Had feedback based on mortality tables and behavioural measures as well as on overall risk status measure.	Four different intervention groups, with the Control group only completing the HRA. Group two was a low intensity intervention using a health library and self care books on overcoming bad habits and leading a healthy lifestyle. Group 3 was a medium intensity intervention involving behaviour change workshop classes (exercise, weight control, nutrition, smoking cessation, stress management, high blood pressure and alcohol use). Also had group meetings to monitor progress and exchange experiences. This group was most similar to WorkHealth program and was used for absenteeism calculations. Group 4 was for high-risk employees and used Case management nurses to undergo weekly monitoring of progress and behavioural changes. New exercise spaces, and smoking policy was created as well. Bimonthly health news letters were given to all groups, while all groups aside from the control had access to a health resource centre, and a self care book. Program specifics may have varied between worksites. (Intervention available to all workers within control)

Name (Year)	Observed difference	Primary or Secondary	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Shimizu (2003)	-35.5%	Primary	Difference in sickness absence day rate before Intervention vs. after comparison, (No control group used)	1029 Male employees in a Japanese manufacturing company involved in the production of industrial chemicals within the Kanto area. Females were excluded due to the small sample size. Participation was defined by the number of employees who joined GPP or IPP and the number of observed employees. No randomisation occurred (Cohort study) 1991-1999	Used a Health Risk Appraisal (HRA) to gauge risk of ischemic diseases and cancer. Administered to employees unless they already had high anxiety tendencies, cerebro/cardiovascular ischemic diseases or cancer in their medical history. Health interviews on health status were also conducted. Involved a lifestyle questionnaire and health check up data. HRA predicted health risk for ischemic disease and cancer, and this was a form of feedback given to participants.	The intervention program was called a Health Promotion Program (HPP) consisting of both group and individual promotion programs. The group program had each work section set a target, which the group attempted to achieve. The individual promotion program involved an individual healthy lifestyle target (e.g.. one less cigarette per day, or walking more than 5 minutes). The Individual program involved a lifestyle target chosen by the employee himself. (Intervention was available to all)
Stein (2000)	11.7%	Secondary	Difference shown is from Chapman (2005) since the mean difference in absence days has no baseline from which to draw a comparison from	Between 2421 and 2868 (between 1994 to 1997) Butterworth hospital employees were eligible for inclusion to the HealthPlus Health Quotient program. There were participants in the program and these were compared to the non-participants. Non randomised, (Cohort study) 1994-1997	Part of the program was a yearly health appraisal that focused on lifestyle factors including serum cholesterol levels, blood pressure, tobacco use, body fat, physical fitness, motor vehicle safety, nutrition, alcohol consumption. The result of which adjusts the employers contribution too a benefit package.	Program provided incentives for employees to improve their own health by converting the results from the health screening to a positive or negative dollar equivalent, and then applying this to the total value of the cafeteria benefit plan available to eligible employees. Health promotion activities included smoking cessation, weight management, fitness, and stress reduction. Discounts were negotiated with local fitness clubs and exercise equipment and apparel stores. Interest free loans were also offered for these purchases. (Intervention was open to all)

Name (Year)	Observed difference	Primary or Secondary	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Wood (1989)	-51.0%	Primary	Differences between baseline and follow-up compared between the intervention and control groups.	688 participants were Field sales employees at General Mills Inc. Needed to be employees for the entire three-year period of the study. Those who did not choose to participate formed the comparison group for absenteeism. Non randomised, (Cohort study) 1984-1986	Participants (unlike non-participants) Filled out a computerised lifestyle appraisal form at the start of the program and again later on. Lifestyle appraisal involved questions about health history including age, sex, heredity and state of health, level of physical activity. A computer printout of the lifestyle appraisal was then returned to the participant as a goal-setting guide.	Self directed voluntary health promotion program known as TriHealthalon, which focused on improving physical, mental and social wellbeing. Every three months needed to complete one of three optional activities. These included fitness, nutrition and weight control, safety, stress management, recreation, relaxation and entertainment, smoking, chemical usage, cancer prevention interpersonal relations, positive thinking and goal setting. Different intervention options were available for each category to meet individual health goals. The HRA gave suggestions however did not limit entry to programs. (Intervention was open to all)
Nilsson (2001)	-51.7%	Secondary	Differences between baseline and follow-up compared between the intervention and control groups.	454 Public sector employees in Helsingborg, Sweden. This includes nurses, cleaners, gardeners, drivers, and transportation workers. 80% response rate also observed. Used a control group (Cohort Study) 18 months	Screening questionnaire involving a self-administered questionnaire with 54 questions including family history of CVD, current treatment, psychosocial factors, social network characteristics, and work related stressors. Scores of questionnaire gave an overall risk score, and this determined if the respondent was randomised into a life style intervention study. Those in the control group received advice on cardiovascular risk factors	Those with a risk score sum of 9 or above were included into a lifestyle intervention study for 18 months and invited to a physical health check including examination by nurses. BMI and waist to hip ratio were calculated, blood samples were taken and analysed. Subjects were offered 16 group sessions a year with educational and practical content in addition to individual counselling by a nurse. Weight reduction, stress management, smoking cessation, diet and physical activity were part of the program and involved video sessions, outdoor activities and discussions. Control group received feedback (both written and oral) about cardiovascular risk factors but did not receive any other advice on other activities. (Intervention was limited to high risk participants)

Name (Year)	Observed difference	Primary or Secondary	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Musich (2003)	-10.77%	Primary	Difference between prevalence of Baseline absence due to illness and follow-up (One-year values absence.	2141 active employees at the General Motors Corporation in the US. Had to be active employees from 1996-2001, located at either two worksites that offered the Health promotion programs, and had completed three Health Risk Appraisals. No mention of randomisation. (Cohort study) 1996-2001	HRA was used, and mailed annually to each employee. In the work site locations, HRA were also offered on certain worksites with biometric screening for blood pressure and cholesterol. The HRA tested for exercise level, weight level, smoking, alcohol intake, not using seat belt, high blood pressure, high cholesterol, life dissatisfaction, perception of health, medical problems, and absenteeism rates. Risk status resulted by comparison to High-risk cut-off points. An individualised health profile was given back to the individual that outline both biometric screening and HRA results. A quarterly health newsletter and a self care book as well as a 1800 health information service were also offered to help clarify health issues and HRA results	Those of high-risk category were offered telephonic one on one health coaching to set and achieve health goals based on the personal health risks from the HRA. Wellness Support programs such as classes addressing health awareness and education were provided on site. High risk participants qualified for vouchers for physical (intervention was only available to high risk category)

Name (Year)	Observed difference	Primary or Secondary	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Loeppke (2008)	82.47%	Primary	Difference between intervention groups and comparison groups, with the 4 intervention groups that were previously split by risk change difference compiled together.	543 employees at a large US company called DIRECTV. Subjects were included if they completed both baseline and follow-up questionnaires. No randomisation occurred although there were two different comparison groups, with a control and an intervention. (Cohort study) 2003-2005	HRA was given out as part of a self-insured health plan, where a \$15 dollar gift certificate was used as incentive for its completion. Based on risks from HRA, employees could earn a \$300 reduction on the health insurance premium for the following year if they were willing to participate in the program as a moderate to high-risk employee, or if they were low risk. They were also encouraged to have blood pressure, cholesterol, height and weight measured by a nurse. The HRA measured sex, age, health risk level, health conditions, absenteeism and presenteeism levels. Questions included alcohol intake, obesity, cholesterol levels, previous medical problems, diet, perception of health, physical activity, stress levels, smoking habits. Control group was given a HPQ rather than a HRA and were selected from a database of workers from many different companies. Feedback was given	Lifestyle management programs were made available to those with high risk factors for that program. The programs included prediabetes, cholesterol, stress management, blood pressure, smoking and weight management. Later on in the program 24/7 access to a nurse help line that allowed employees to call and gain advice on health conditions etc. (Intervention was limited to high risk participants)

Name (Year)	Observed difference	Primary or Secondary	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Mills (2007)	-75.00%	Primary	Mean change in absenteeism for the intervention group	2297 participants (618 in the intervention group and 1679 in the control group). Control selection was via convenience sample. Intervention group were workers at one of 3 UK locations of Unilever PLC, and were employed full time in office based jobs. No random allocation into groups occurred. (Cohort Study) 12 month study	All intervention group members needed to fill out a secure online survey about health and work performance. The control group also needed to complete the baseline survey. Baseline and 12 month surveys included a HRA questionnaire and absenteeism questions. The 24 questions on the HRA were specifically designed to analyse 12 health risk factors for a corporate environment. Alcohol, smoking, body weight, physical activity, nutrition, medical health, pain, stress, sleep, perception of general health, job satisfaction, and Seat belt usage. Lottery tickets for a prize draw were used as an incentive for HRA participation. Once completed a personalised health and well being report gave a wellness score, information and advice tailored to the participants health related behaviours	The intervention was driven by HRA data in terms of programs that best suited the risk factors from participants. Involved personalised health, wellbeing and lifestyle web portal with articles, assessments, and interactive behaviour change programs. Tailored emails were received every two weeks, with self-improvement suggestions and tips. Paper based information was also handed out with newsletters and health promotional literature on stress management, sleep improvement, nutritional balance, and physical activity. Seminars were also given on the four most prevalent health risk issues. Since aggregate data from the HRA was used to drive the programs at each of the work sites it was partially driven by the intervention (Intervention was available to all within workplace BUT was based on HRA of all workplace)

Name (Year)	Observed difference	Primary or Secondary	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Pai (2009)	0%	Primary	Before Intervention vs. after comparison, (No control group used)	3790 employees from a Midwest health care system in America. (Observational study) 2006-2007	Used a HRA that looked at biometric variables, 13 health risks and 16 self-reported health problems. Also included a work limitation questionnaire. Which contained questionnaires on productivity and presenteeism. Also gave individualised feedback to participants and offered a series of education seminars	Had education seminars on disease specific management, diet management, weight control and offered fitness centre usage. Dependent on their HRA were aligned into disease management or health coaching programs. (Intervention was based on HRA results of participants)
Bowne (1984)	-20.10%	Secondary	Difference between Intervention and the home office worker comparison group. (One year data used)	184 South-western Home Office Employees in Houston (USA). Majority were engaged in sedentary desk jobs. A rolling entry program existed allowing employees to enter the program at any time. Control was formed through the used of a comparison group of employees with health insurance and home office jobs. No randomisation occurred, (Cohort study) 12 months.	Data was collected on family history, lifestyle risk factors (smoking, sleeping, exercising etc) during interview. No indication of a written questionnaire. Feedback was from a physical examination and lab profile at entry into the programs monitored the health of the participant, while screening rechecks were used every two months.	Intervention was a structured fitness program involving intensity enough to raise heart rate to 70-80% of maximum. Efforts were also made to correct factors that were negative on fitness. Had a full time fitness instructor, and a half time assistant. Classes in aerobic dancing, calisthenics and jogging were held, while seminars on obesity, smoking, alcohol, diet and stress reduction were also offered. (Intervention was available to all participants)
Schultz (2002)	-92.4%	Primary	Difference between average annual absence days	2596 Male hourly employees, in a manufacturing company who worked for the entire study period within the Midwest in the US. Had participants and non participants (not randomised) (Cohort Study) 1995-2000	More than half the population completed at least one HRA (health risk appraisal). This was made available to all employees annually. This measured 13 risk factors: Exercise, smoking, weight, blood pressure, cholesterol, HD-LC levels, medical problems, self perceived health status, illness days, life satisfaction, alcohol use, stress levels and safety belt use in cars.	Telephonic wellness programs, medical vouchers, and telephonic nurse counselling were available. (Intervention was open to all)

Table 6.4: Literature similar to the WorkHealth Coach/Life! program with presenteeism as an outcome

Name (Year)	Observed difference	Primary or Secondary	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Pelletier (2004)	-29.85%	Primary	Presenteeism is given by the change in percentage presenteeism between T1 and T2 (baseline and follow-up). Reduction indicates reduction in presenteeism	500 subjects participating in a wellness program at a large national employer located in the northeast US. Designed as a one group pre-post respondent comparison (prospective cohort) 2001-2002	An online self reported Health Risk Assessment (HRA) asked 20 questions on chronic conditions, health status, demographics, biometric measures, and lifestyle risk factors (smoking, exercise, and diet). This was then combined to give a risk score indicating coronary disease risk. . 11 health risks were: poor diet, BMI (under and overweight), high cholesterol, physical inactivity, excessive stress, overdue preventive visits, lack of emotional fulfilment, high blood pressure, tobacco use, diabetes or high blood glucose and alcohol use. Risks were used to create a risk score that was indicative of coronary disease. (The article did not state if feedback was given or not)	The intervention involved online wellness programs, incentive campaigns, and offline behaviour change workshops and nutritional counselling. There was also promotion of health issues and health wellness benefits as well as fitness centre services. (Intervention targeting was unclear).
Block (2008)	-47%	Secondary	Defined as an improvement in ability to concentrate and accomplish work tasks. Measured on a positive scale, so the reduction observed is good.	787 participants (351 intervention Participants and the 436 control group). Were non-medical regional employees of Kaiser Permanente employees in northern California. Randomisation into groups occurred (RCT) 12 months	The program was delivered by email, and gave Individualised feedback through use of an automated computer program. Used SF-8 health survey, and analysed quality of life, mental and physical health.	Behaviour change model designed to elicit healthy behaviours. Program involved tailored goals, tips reminders, and social support. Also included weekly goal settings. After randomisation, participants chose a topic for the period of intervention: Increasing physical activity, increasing fruit and veg, decreasing saturated and trans fats, and sugars. (Programs were available for all but they had tailored goals).

Table 6.5: Literature similar to the WorkHealth Coach/Life! program with compensable workplace injury/illness or workers' compensation as an outcome

Name (Year)	Observed difference	Primary or Secondary	Compensation measurement	Participant Details	Feedback Details	Intervention Details
Bowne (1984)	-45.70%	Secondary	Disability absences converted into dollars using the participant's job level and the salary. They then compared follow-up to their baseline measurements	184 South-western Home Office Employees in Houston (USA). Majority were engaged in sedentary desk jobs. A rolling entry program existed allowing employees to enter the program at any time. Control was formed through the use of a comparison group of employees with health insurance and home office jobs. No randomisation occurred, (Cohort study) 12 months	Data was collected on family history, lifestyle risk factors (smoking, sleeping, exercising etc) during interview. No indication of a written questionnaire. Feedback was from a physical examination and lab profile at entry into the programs monitored the health of the participant, while screening rechecks were used every two months.	Intervention was a structured fitness program involving intensity enough to raise heart rate to 70-80% of maximum. Efforts were also made to correct factors that were negative on fitness. Had a full time fitness instructor, and a half time assistant. Classes in aerobic dancing, calisthenics and jogging were held, while seminars on obesity, smoking, alcohol, diet and stress reduction were also offered. (Intervention was available to all participants)
Cady (1985)	-25.50%	Secondary	Worked out the change in costs per \$100 of payroll between baseline and follow-up.	1800 Los Angeles Country Fire fighters. To be included in this study an employee's measurement had to have had measurements before the departmental program and at least 9 years after. Also needed a baseline measurements physical exam before entering the program. Pre-test, post-test comparison, no control group (cohort study) 1971-1981	Program began with physical exam (chest roentgenograms, spirometry, ECG). After each exam, a 20 minute individualised counselling session on the results of the physical exercise tests were available	Intervention involved individual exercise prescriptions and fitness counselling based on the fitness tests and the physical exams. A fitness manual and stationary exercise bike were made available, group nutritional counselling and lectures were also offered and encouraged. (Intervention was available to all BUT Specifics of intervention were unique for each participant)

Name (Year)	Observed difference	Primary or Secondary	Compensation measurement	Participant Details	Feedback Details	Intervention Details
Dalton (1991)	-13.00%	Secondary	Accident frequency, severity and costs per year. No control. Baseline vs. follow-up analysis.	Around 6000 Northern Telecom employees within several divisions from Nashville, Tennessee (USA). (Cohort study) 1984-1989	Surveys on health risk were given which gave personal risk factor prevalence as feedback. Internal records of the company were also used for additional information on subjects. Used Health check screenings to establish baseline health records.	Used a Health Enhancement Program, which is a combination of primary prevention and targeted secondary prevention. Information on personal health risks, living a healthy lifestyle, self care, appropriate use of medical care system and personal planning and action were provided at spaced out intervals. Intervention was based on screening (Intervention was based on risk factors of participant)
Hodges (2004)	-59.80%	Secondary	Workers compensation at baseline minus that at follow up	Offered to employees and family members of the city of North Little Rock (USA). Workers included members of the local fire and police force. During the three years 1250 participated in the wellness screenings. Pre-test, Post-test comparison, no control (Cohort study) 2000-2003	Pre placement health screening tested applicants to physically meet work standards of their positions, while existing employees received physicals in accordance to the Occupational safety and health administration. This included drug screenings as well. Health risk screening involved 75 health related questions in the areas of personal health, family health, nutrition, exercise, safety stress and health interests. This survey was followed by a physical assessment looking at lipid profile, height, weight, waist/hip ratio, 3 minute step test, lower back flexibility, blood pressure and a test for a prostate antigen in males above 40. After completing the screening they received a 22 page global wellness profile with recommendations for improvements	The intervention involved targeted wellness activities and educational classes. Diet and weight maintenance, cholesterol screening, skin cancer screening, diabetes, smoking cessation, depression and competitive athletics events were all focuses of the program and were targeted through certain education programs. The programs were driven by the results of the health surveys of the collective group. Also incorporated an immunisation program and a care program that ensured first aid and health care for injured employees. (Intervention was available to all BUT was the type of interventions were determined by the HRAs of the collective group)

Name (Year)	Observed difference	Primary or Secondary	Compensation measurement	Participant Details	Feedback Details	Intervention Details
Serxner (2003)	-15.98%	Primary	Compared non participants dollar value of health care claims paid between non participants and participants	26411 total employees, with 13048 participant and 13363 non-participants. All were employees of DaimlerChrysler AG's Chrysler Group in the USA. Most participants lived in the Michigan area. No randomisation into groups occurred as participation was voluntary (Retrospective Cohort study) 1992-1997	Used either the HealthPlan or HealthStep HRA depending on the specific work site, with either survey collecting self-reported health risk information. Biometric markers such as weight, blood pressure, and cholesterol were also recorded. Feedback was given from the HRA results	A broad range of activities offered at each location. Multi session courses, one on one counselling or self directed activities were all offered. Ongoing awareness and group support campaigns were also offered. Fitness facilities, cafeteria and vending machine improvement programs as well as walking routes were all implemented and supplemented with publications on health care utilisation and self-care education material. (Intervention available to all participants)
Stein (2000)	-7.60%	Secondary	Calculations here were undergone by taking the difference between participants and non-participants and comparing them from the baseline to follow-up.	Between 2421 and 2868 (between 1994 to 1997) Butterworth hospital employees were eligible for inclusion to the HealthPlus Health Quotient program. There were participants in the program and these were compared to the non-participants. Non randomised, (Cohort study) 1994-1997	Part of the program was a yearly health appraisal that focused on lifestyle factors including serum cholesterol levels, blood pressure, tobacco use, body fat, physical fitness, motor vehicle safety, nutrition, alcohol consumption. The result of which adjusts the employers contribution too a benefit package.	Program provided incentives for employees to improve their own health by converting the results from the health screening to a positive or negative dollar equivalent, and then applying this to the total value of the cafeteria benefit plan available to eligible employees. Health promotion activities included smoking cessation, weight management, fitness, and stress reduction. Discounts were negotiated with local fitness clubs and exercise equipment and apparel stores. Interest free loans were also offered for these purchases. (Intervention was open to all)

Table 6.6: Literature with intervention elements similar to the WorkHealth grants program

Name (Year)	Observed difference	Primary or Secondary	Outcome Variable	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Stein (2000)	11.7%	Secondary	Absenteeism	Difference shown is from Chapman (2005) since the mean difference in absence days has no baseline from which to draw a comparison from	Between 2421 and 2868 (between 1994 to 1997) Butterworth hospital employees were eligible for inclusion to the HealthPlus Health Quotient program. There were participants in the program and these were compared to the non-participants. Non randomised, (Cohort study)	Part of the program was a yearly health appraisal that focused on lifestyle factors including serum cholesterol levels, blood pressure, tobacco use, body fat, physical fitness, motor vehicle safety, nutrition, alcohol consumption. The result of which adjusts the employers contribution too a benefit package.	Program provided incentives for employees to improve their own health by converting the results from the health screening to a positive or negative dollar equivalent, and then applying this to the total value of the cafeteria benefit plan available to eligible employees. Health promotion activities included smoking cessation, weight management, fitness, and stress reduction. Discounts were negotiated with local fitness clubs and exercise equipment and apparel stores. Interest free loans were also offered for these purchases. (Intervention was open to all)
Stave (2003)	-14.60%	Primary	Workers Compensation	Workers compensation for those completing 3 years of the intervention compared to those who have never completed the program. Contains both Workers comp as well as medical costs and both short and long term disability costs.	6049 GlaxoSmithKline employees active and employed from 1996 to 2000. Cheyenne, USA. Compared those that completed the 3-year programs with those that did not. Had to complete registration and completion data to be included. (Cohort study)	No HRA but had survey data from the GlaxoSmithKline internet database. It indicated cost data, and there were also a survey given out at the beginning of 1997 as well as a completion survey. The program involved a standardised, workplace wide intervention and a contract with an incorporated questionnaire.	Program incorporates a concept of signing a contract. Had 5 focus areas: (these were in the contract) tobacco use, nutrition, activity, stress management/depression and preventative health practices. Had ongoing goals to promote culture of health and productivity, adopt a positive health behaviour and reduce expenditure. Had 5 stages of completion, and held on site seminars and programs to meet the needs of each focus area. Points were earned for program attendance and rewards given at the end. Program design meant that the program was wide reaching, and the feedback from each seminar is used to design the next round of programs. (Intervention available to all).

Name (Year)	Observed difference	Primary or Secondary	Outcome Variable	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Renaud (2008)	-31.78%	Primary	Absenteeism	Change in percent of absent days between intervention baseline and follow up one year after intervention had started.	270 employees of a financial organisation based in Quebec, Canada. Pre study versus post study analysis, therefore not randomised (Prospective Cohort study).	Had multiple HRAs that were specific to the risk factors in the health improvement module that was being completed. The HRA had a personalised health status and was sent to employees four weeks after the educational session. HRA was intervention specific. Could have a telephone interview to clarify HRA components if you wanted	Had 6 modules following 5 themes: Global health, stress management, heart health (blood pressure and cholesterol screening) healthy eating and physical activity. Each module involved a 1.5-2 hour educational session, delivered by an external health professional. HRA was intervention specific. Could have a telephone interview to clarify HRA components if you wanted. (Intervention was available to all)

Name (Year)	Observed difference	Primary or Secondary	Outcome Variable	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Mills (2007)	-75.00%	Secondary	Absenteeism	Mean change in absenteeism for the intervention group	2297 participants (618 in the intervention group and 1679 in the control group). Control selection was via convenience sample. Intervention group were workers at one of 3 UK locations of Unilever PLC, and were employed full time in office based jobs. No random allocation into groups occurred. (Cohort Study)	All intervention group members needed to fill out a secure online survey about health and work performance. The control group also needed to complete the baseline survey. Baseline and 12 month surveys included a HRA questionnaire and absenteeism questions. The 24 questions on the HRA were specifically designed to analyse 12 health risk factors for a corporate environment. Alcohol, smoking, body weight, physical activity, nutrition, medical health, pain, stress, sleep, perception of general health, job satisfaction, and Seat belt usage. Lottery tickets for a prize draw were used as an incentive for HRA participation. Once completed a personalised health and well being report gave a wellness score, information and advice tailored to the participants health related behaviours	The intervention was driven by HRA data in terms of programs that best suited the risk factors from participants. Involved personalised health, wellbeing and lifestyle web portal with articles, assessments, and interactive behaviour change programs. Tailored emails were received every two weeks, with self-improvement suggestions and tips. Paper based information was also handed out with newsletters and health promotional literature on stress management, sleep improvement, nutritional balance, and physical activity. Seminars were also given on the four most prevalent health risk issues. Since aggregate data from the HRA was used to drive the programs at each of the work sites it was partially driven by the intervention (Intervention was available to all within workplace BUT was based on HRA of all workplace)

Name (Year)	Observed difference	Primary or Secondary	Outcome Variable	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Mills (2007)	10.47%	Secondary	Presenteeism	Mean change in presenteeism for the intervention group. Negative percentage difference shown indicates improvement in productivity	2297 participants (618 in the intervention group and 1679 in the control group). Control selection was via convenience sample. Intervention group were workers at one of 3 UK locations of Unilever PLC, and were employed full time in office based jobs. No random allocation into groups occurred. (Cohort Study)	All intervention group members needed to fill out a secure online survey about health and work performance. The control group also needed to complete the baseline survey. Baseline and 12 month surveys included a HRA questionnaire and absenteeism questions. The 24 questions on the HRA were specifically designed to analyse 12 health risk factors for a corporate environment. Alcohol, smoking, body weight, physical activity, nutrition, medical health, pain, stress, sleep, perception of general health, job satisfaction, and Seat belt usage. Lottery tickets for a prize draw were used as an incentive for HRA participation. Once completed a personalised health and well being report gave a wellness score, information and advice tailored to the participants health related behaviours	The intervention was driven by HRA data in terms of programs that best suited the risk factors from participants. Involved personalised health, wellbeing and lifestyle web portal with articles, assessments, and interactive behaviour change programs. Tailored emails were received every two weeks, with self-improvement suggestions and tips. Paper based information was also handed out with newsletters and health promotional literature on stress management, sleep improvement, nutritional balance, and physical activity. Seminars were also given on the four most prevalent health risk issues. Since aggregate data from the HRA was used to drive the programs at each of the work sites it was partially driven by the intervention (Intervention was available to all within workplace BUT was based on HRA of all workplace)

Name (Year)	Observed difference	Primary or Secondary	Outcome Variable	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Maes (1998)	-21.9%	Primary	Absenteeism	Differences between baseline and follow-up compared between the intervention and control groups.	346 Dutch Barbantia Employees. Study used pre-test, Post-test comparison with a control group as its design, with the experimental group consisting of one site while the control was made up of two other sites. Allocation of site as control or intervention was random, however allocation to the site itself was not random. (Cohort study)	Measurements included an interview to collect sociodemographic data, health behaviour data and quality of work questions. Questions involved smoking, alcohol, and medicine consumption habits as well as quality of sleep, nutrition and exercise frequency. Self-report questionnaires were also used for stress and social assessment. Biomedical measures like a blood sample, heart rate, blood pressures, body weight and height were also taken. All employees were informed about the results of their measurements, and if this exceeded high risk levels that were set within the study they were referred to a general practitioner	The interventions available to all were the health education programs: (topics were: alcohol, drug, work conditions, stress, smoking behaviour, headaches, and back pain), Physical exercise sessions (choice of type of exercise up to participant), and training in social skills and leadership. There were also promotional items for healthy lifestyles. All employees had the opportunity to participate in the half hour intervention sessions that were held 3 times per week, and the content of physical exercise were the choice of the participant. However upper and middle management also received training in social skills and leadership, however this was not based on HRA allocation. (GP referral was only intervention based on risk level, other interventions were available to all)

Name (Year)	Observed difference	Primary or Secondary	Outcome Variable	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Bertera (1990)	-9.2%	Primary	Absenteeism	Differences between baseline and follow-up compared between the intervention and control groups. HRA participation from all participants unknown	43888 employees of a large diverse manufacturing company including both white and blue-collar workers. Study focused on hourly employees. Used a pre-test, Post-test comparison with an equivalent control group. Intervention sites consisted of 41 different locations. The 41 program sites did not differ significantly from the 19 non-program sites (control). There was no randomisation of sites into control and intervention since it was based on the uptake timing for the program of each workplace. (Cohort Study)	All participants completed a computer scored HRA with 36 items on health status, personal habits and lifestyle. Interpretation of results is given through videotape explanation as well as individual consultation with medical personnel when requested.	Involved both group and self-directed programs, with topics involving smoking cessation, fitness, weight control, lipid control, stress management and prevention of spine and back injuries. 4 to 10 week class cycles were used. A bimonthly magazine outlined health and fitness developments as well as cafeteria and vending machine modifications to offer healthier foods. Employees could also check and record their weight and blood pressure with equipment provided in high traffic locations. Intervention was open to all but had both videotape explanation of appraisal results as well as the option of individual consultation for those that requested it. (Intervention was available to all)

Name (Year)	Observed difference	Primary or Secondary	Outcome Variable	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Takao (2006)	0	Secondary	Presenteeism	The differences in the job performance (from pre to post intervention) between the control and the intervention. Positive difference means that job performance has increased and presenteeism has gone down. Intervention effects were not significant	226 workers in an old and established Japanese sake brewery (Japan). RCT, 134 were in intervention and 92 in the control. Random allocation of the supervisors of teams within the workplace occurred, this led to either education or waiting list (control) group allocation. (RCT)	Two questionnaires were given out, one pre-intervention survey, and one at follow-up. Pre intervention was administered before randomisation and before intervention, and included an informational brochure on mental health that was given to all employees. Follow up was administered after the 3-month education program had finished. Supervisors were also encouraged to improve their workplace environment. The questionnaire used a scale of psychological reaction and behavioural improvements.	Supervisors within the education group were given a single session of training by a physician and a psychologist, regarding mental health promotion and active listening training. Intervention program was standardised and based on manuals and protocols. A 60-minute program called positive mental health in the workplace was the supervisor's intervention. This program had segments making supervisors aware of their roles, early awareness of mental health issues, and support for those returning to work. Active listening involved stress reduction approaches and counselling ability. It was taught by two clinical psychologists (60 min lecture and 120 min practise session). The program was standardised and offered to all no matter what their questionnaire stated. (Intervention available to all)
Serxner (2001)	-6.11%	Secondary	Absenteeism	Difference in the percentage of participants with Absenteeism (hours/month) between those of High total risk and Low total risk.	35451 employees from 28 client organisations from both public and private sector within the US workforce. One group pre-post respondent comparison (prospective cohort)	Used the stay well HealthPath HRA which collected self reported health risk and absenteeism data. It involves 78 questions on chronic disease, health status, demographics and lifestyle items like smoking, exercise and alcohol use. Uses an algorithm to work out risk scores. Each participant received personalised HRA results which included motivating and positive messages for changing unhealthy habits, and stages of change to facilitate behaviour change	Participation in change programs was not controlled since in certain cases there were no follow up study completed on the health promotion programs. These programs ranged from topic specific education to work site campaigns, workshops and individual or community based interventions. (Interventions were available to all).

Name (Year)	Observed difference	Primary or Secondary	Outcome Variable	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Pelletier (2004)	-33.33%	Secondary	Absenteeism	Before intervention vs. after comparison (no control used). The observed change in percentage absenteeism is not a significant result since p value of change between the two time points is 0.308.	500 subjects participating in a wellness program at a large national employer located in the northeast US. Designed as a one group pre-post respondent comparison (prospective cohort)	An online self reported Health Risk Assessment (HRA) asked 20 questions on chronic conditions, health status, demographics, biometric measures, and lifestyle risk factors (smoking, exercise, and diet). This was then combined to give a risk score indicating coronary disease risk. . 11 health risks were: poor diet, BMI (under and overweight), high cholesterol, physical inactivity, excessive stress, overdue preventive visits, lack of emotional fulfilment, high blood pressure, tobacco use, diabetes or high blood glucose and alcohol use. Risks were used to create a risk score that was indicative of coronary disease. (The article did not state if feedback was given or not)	The intervention involved online wellness programs, incentive campaigns, and offline behaviour change workshops and nutritional counselling. There was also promotion of health issues and health wellness benefits as well as fitness centre services. (Intervention targeting was unclear).

Name (Year)	Observed difference	Primary or Secondary	Outcome Variable	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Pelletier (2004)	-29.85%	Secondary	Presenteeism	Presenteeism is given by the change in percentage presenteeism between T1 and T2 (baseline and follow-up). Reduction indicates reduction in presenteeism	500 subjects participating in a wellness program at a large national employer located in the northeast US. Designed as a one group pre-post respondent comparison (prospective cohort)	An online self reported HRA asked 20 questions on chronic conditions, health status, demographics, biometric measures, and lifestyle risk factors (smoking, exercise, and diet). Answers were combined to give a risk score for coronary disease risk. 11 health risks were: poor diet, BMI (under and overweight), high cholesterol, physical inactivity, excessive stress, overdue preventive visits, lack of emotional fulfilment, high blood pressure, tobacco use, diabetes or high blood glucose and alcohol use. Risks were used to create a risk score that was indicative of coronary disease. (The article did not state if feedback was given or not)	The intervention involved online wellness programs, incentive campaigns, and offline behaviour change workshops and nutritional counselling. There was also promotion of health issues and health wellness benefits as well as fitness centre services. (Intervention targeting was unclear).
Puska (1988)	-21.60%	Primary	Absenteeism	Looked at differences in absenteeism levels in intervention compared to reference worksites	425 in intervention sites, 290 in reference workplaces. Eight intervention worksites were chosen from parents of eight randomised upper level schools participating in the north Karelia youth project. 8 other worksites in North Karelia were chosen with similar worker profiles as a reference (control) group. (RCT)	Measurements were carried out by nurse and assistant of project. Included self-administered questionnaire involving smoking, dietary and physical activity habits. There was also height, weight, heart rate, blood pressure, serum cholesterol, HDLC, thocyanate and GT enzyme measurements taken by the nurse, and she tested knowledge on fats as well. These were given back along with written advice and other information materials to the other workers.	The aims for the intervention were: smoking cessation, Dietary changes, increased physical activity, reduction in heavy alcohol consumption and reduced stress. The interventions were delivered through a national TV program broadcast during the first 6 months of the study which involved an employee from the intervention site, and group discussions with experts advising changes in health habits. Sessions were held showing healthy behaviours and social support at the worksite. Health educational materials were distributed; canteens and managements were also approached. (Intervention was open to all)

Name (Year)	Observed difference	Primary or Secondary	Outcome Variable	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Meenan (2010)	-9.52%	Secondary	Absenteeism	Difference between Level 1 and 2. Looked at improvement in absenteeism (24 months)	6958 hotel employees in over 31 Oahu hotels in Hawaii. Hotels were pair matched on workforce size, luxury and union status into minimal or intensive intervention. Pair matching was then followed by random assortment into minimal or intensive intervention. (Group Randomised RCT)	No HRA as such but level one and two intervention both had a questionnaire that looked at BMI measured it and gave feedback about actual weight relative to ideal weight and flyer about good health habits. Three of these were distributed over the 24-month period. Also had an environmental intervention that involved looking at work environment to promote health, employee medical care costs, self reported absenteeism and presenteeism	A level one intervention involved raising awareness of weight and health habits. Level 2 involved a multicomponent lifestyle approach, had two years of on site weight management as well as environmental initiatives to level 1 feedback and advice. It involved monthly newsletters, electronic signs, healthier choices and the highlighting of healthier food in the cafeteria. They also held contests and had support from management. Weekly onsite groups had goal setting, social support, food intake, calorie maintenance, physical activity, decision training, and dietary education. Obese employees had access to an offsite program, which was similar to the weekly onsite education but was both longer and more intense. This was not conducted during shifts and was for highly committed obese people only. Since randomisation causes level 1 or 2 categorisation any employee has access to the program. (Intervention was available to all AND for obese program intervention was specific to questionnaire results)

Name (Year)	Observed difference	Primary or Secondary	Outcome Variable	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Meenan (2010)	-12.12%	Secondary	Presenteeism	Difference between Level 1 and 2. Looked at improvement in presenteeism (24 months)	6958 hotel employees in over 31 Oahu hotels in Hawaii. Hotels were pair matched on workforce size, luxury and union status into minimal or intensive intervention. Pair matching was then followed by random assortment into minimal or intensive intervention. (Group Randomised RCT)	No HRA as such but level one and two intervention both had a questionnaire that looked at BMI measured it and gave feedback about actual weight relative to ideal weight and flyer about good health habits. Three of these were distributed over the 24-month period. Also had an environmental intervention that involved looking at work environment to promote health, employee medical care costs, self reported absenteeism and presenteeism	A level one intervention involved raising awareness of weight and health habits. Level 2 involved a multicomponent lifestyle approach, had two years of on site weight management as well as environmental initiatives to level 1 feedback and advice. It involved monthly newsletters, electronic signs, healthier choices and the highlighting of healthier food in the cafeteria. They also held contests and had support from management. Weekly onsite groups had goal setting, social support, food intake, calorie maintenance, physical activity, decision training, and dietary education. Obese employees had access to an offsite program, which was similar to the weekly onsite education but was both longer and more intense. This was not conducted during shifts and was for highly committed obese people only. Since randomisation causes level 1 or 2 categorisation any employee has access to the program. (Intervention was available to all AND for obese program intervention was specific to questionnaire results)

Name (Year)	Observed difference	Primary or Secondary	Outcome Variable	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Meenan (2010)	0%	Secondary	Workers Compensation	Difference between Level 1 and 2. Looked at improvement in workers compensation (24 months)	6958 hotel employees in over 31 Oahu hotels in Hawaii. Hotels were pair matched on workforce size, luxury and union status into minimal or intensive intervention. Pair matching was then followed by random assortment into minimal or intensive intervention. (Group Randomised RCT)	No HRA as such but level one and two intervention both had a questionnaire that looked at BMI measured it and gave feedback about actual weight relative to ideal weight and flyer about good health habits. Three of these were distributed over the 24-month period. Also had an environmental intervention that involved looking at work environment to promote health, employee medical care costs, self reported absenteeism and presenteeism	A level one intervention involved raising awareness of weight and health habits. Level 2 involved a multicomponent lifestyle approach, had two years of on site weight management as well as environmental initiatives to level 1 feedback and advice. It involved monthly newsletters, electronic signs, healthier choices and the highlighting of healthier food in the cafeteria. They also held contests and had support from management. Weekly onsite groups had goal setting, social support, food intake, calorie maintenance, physical activity, decision training, and dietary education. Obese employees had access to an offsite program, which was similar to the weekly onsite education but was both longer and more intense. This was not conducted during shifts and was for highly committed obese people only. Since randomisation causes level 1 or 2 categorisation any employee has access to the program. (Intervention was available to all AND for obese program intervention was specific to questionnaire results)

Name (Year)	Observed difference	Primary or Secondary	Outcome Variable	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Lynch (1990)	-16.9%	Primary	Absenteeism	Average differences over time between Males and Females from baseline to follow-up used control. Intervention length was one year	2232 members, and 5837 non-members. Full time employees of "The Travellers" that had joined the Taking Care Centre (a fitness centre). Those in the control were those who had not joined the taking care centre. All full time members with a year of employment were eligible to become members of the facility, and therefore be part of the study. Non randomised (Cohort Study).	No HRA, but feedback on health came from a rule that Participants were required to organise a physical examination with their personal physician.	Fitness testing and orientation sessions were given to employees to ensure they knew how to use equipment safely, the Intervention was access to the fitness centre that was made available to all employees (intervention is available to all)
Cox (1981)	22.00%	Secondary	Absenteeism	Difference is between intervention and control. Influenza epidemic caused both intervention and control to go down by 20%. However in the high adherents had a 42% decrease over the same period.	1858 employees of Two large Canadian Assurance companies. There were 1281 in the intervention while 577 were the control. One site chosen as intervention, other as control, experimental company sorted themselves into four categories. No randomisation occurred. (Cohort Study)	Volunteers were classified into non-participants, dropouts, low adherents and high adherents. The subjects completed the questionnaires about satisfaction with life and employment and attitudes to physical activity. Manifest anxiety was assessed on a scale, and general health also on a scale. There were also physiological tests through standardised fitness tests.	Physical activity intervention, 6 months of 30 min classes, moved from 450kj per participant to 700kj. These were held three times per week in a basement exercise room. Activities included rhymic calisthenics, jogging as well as ball manipulation. (Intervention is available to all)

Name (Year)	Observed difference	Primary or Secondary	Outcome Variable	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Shi (1993)	-20.8%	Primary	Absenteeism	Before Intervention vs. after comparison, (No control group used)	1188 Employees in a Northern California Utility company. Quasi-experimental design, 9 company divisions were randomly assigned into four groups, control group only completed HRA. (Randomised control trial).	Participants completed a Health Risk Assessment (HRA). It outlined major health risks and was hoped to suggest to the worker which intervention group the participant would go to. Had feedback based on mortality tables and behavioural measures as well as on overall risk status measure.	Four different intervention groups, with the Control group only completing the HRA. Group two was a low intensity intervention using a health library and self care books on overcoming bad habits and leading a healthy lifestyle. Group 3 was a medium intensity intervention involving behaviour change workshop classes (exercise, weight control, nutrition, smoking cessation, stress management, high blood pressure and alcohol use). Also had group meetings to monitor progress and exchange experiences. This group was most similar to WorkHealth program and was used for absenteeism calculations. Group 4 was for high-risk employees and used Case management nurses to undergo weekly monitoring of progress and behavioural changes. New exercise spaces, and smoking policy was created as well. Bimonthly health news letters were given to all groups, while all groups aside from the control had access to a health resource centre, and a self care book. Program specifics may have varied between worksites. (Intervention available to all workers within control)

Name (Year)	Observed difference	Primary or Secondary	Outcome Variable	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Wood (1989)	-51.0%	Primary	Absenteeism	Differences between baseline and follow-up compared between the intervention and control groups.	688 participants were Field sales employees at General Mills Inc. Needed to be employees for the entire three-year period of the study. Those who did not choose to participate formed the comparison group for absenteeism. Non randomised, (Cohort study)	Participants (but not non-participants) Filled out a computerised lifestyle appraisal form at the start of the program and later on. Lifestyle appraisal involved questions about health history including age, sex, heredity and state of health, level of physical activity. A computer printout of the lifestyle appraisal was then returned to the participant as a goal-setting guide.	Self directed voluntary health promotion program known as TriHealthalon, which focused on improving physical, mental and social wellbeing. Every three months needed to complete one of three optional activities. These included fitness, nutrition and weight control, safety, stress management, recreation, relaxation and entertainment, smoking, chemical usage, cancer prevention interpersonal relations, positive thinking and goal setting. Different intervention options were available for each category to meet individual health goals. The HRA gave suggestions however did not limit entry to programs. (Intervention was open to all)

Name (Year)	Observed difference	Primary or Secondary	Outcome Variable	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Strijk (2012)	17.05%	Primary	Absenteeism	Difference between baseline and 12 month follow up and between control and intervention. Original values are percentage that stated they had sick leave during the past 3 months	730 workers at or over 45 years old from two academic hospitals (one in Leiden, the other in Amsterdam). Intervention group had 367 workers, while the control had 363 workers. An RCT. Workers were eligible if they worked above or equal to 16 hours per week, gave written informed consent, and had no risk of developing adverse health effects when becoming active. Allocation to groups was random (RCT)	No HRA, but used Physical Activity Readiness Questionnaire (PAR-Q), which had lifestyle questions. Workers were randomly allocated to groups after baseline measurements were taken and consent was given. After allocation the assistant informed each worker which group they were allocated to but kept the investigator blind.	After randomisation both intervention and control received written information about healthy lifestyle (diet, physical activity and relaxation). Intervention group had 6 months of a vitality exercise program, which involved the provision of free fruit, and a combination of three visits to a personal vitality coach. The program consisted of once a week guided yoga group sessions involving relaxation exercises, once a week guided aerobic workout group sessions aimed at fitness and muscle strength. Older workers were asked to perform vigorous physical activity without face-to-face instruction for more than 45 minutes once a week. Yoga was based on Hatha yoga and guided by qualified yoga instructors. The workout sessions were guided by certified fitness instructors and had a warm up, aerobic exercises, and resistance training. The intensity was 65-90% of age predicted max heart rate. After the group sessions the fruit was given. The visits to a personal coach taught psychological behaviour changing theory such as goal setting feedback etc. (intervention available to all)

Name (Year)	Observed difference	Primary or Secondary	Outcome Variable	Methodology behind differences	Participant Details	Feedback Details	Intervention Details
Shepherd (1981)	-60.66%	Secondary	Absenteeism	Difference between number of illness absences from work at baseline and follow-up as well as between control and intervention.	484 participants in the follow-up questionnaire (336 in the test, 148 in the control). Involving two large offices, with one company forming the control company (deferred uptake of program) and the other forming the test company. A gym and changing area were constructed in the basement of the main office building. Volunteers self sorted into categories. (Cohort Study)	Questionnaires were used in October, December, February, April and June. These were given to supervisors and employees and had questions on number of healthcare visits, number of days in hospital, expenditures on prescription and non prescription drugs, number of colds and absences from work. Supervisors noted productivity, cooperation with fellow workers and supervisors, satisfaction with the job, accuracy of work and attendance. A fitness demonstration was organised and here employees were invited by letter. The fitness program started in January.	Classes were age specific and based on three, 30-minute gymnasium sessions per week. The classes emphasised slow but progressive cardio respiratory fitness. This was a level of conditioning that allowed lay supervision. By the end of the 6 months subjects had progressed into 17 minutes of endurance training. During this period they also self sorted into non participants (took test but didn't attend classes), Dropouts (two month or less participation then dropped out), and high adherence (average of two classes a week throughout 6 month period), and low adherents who attended fewer than two classes per week throughout the six months. (Interventions were available to all)

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