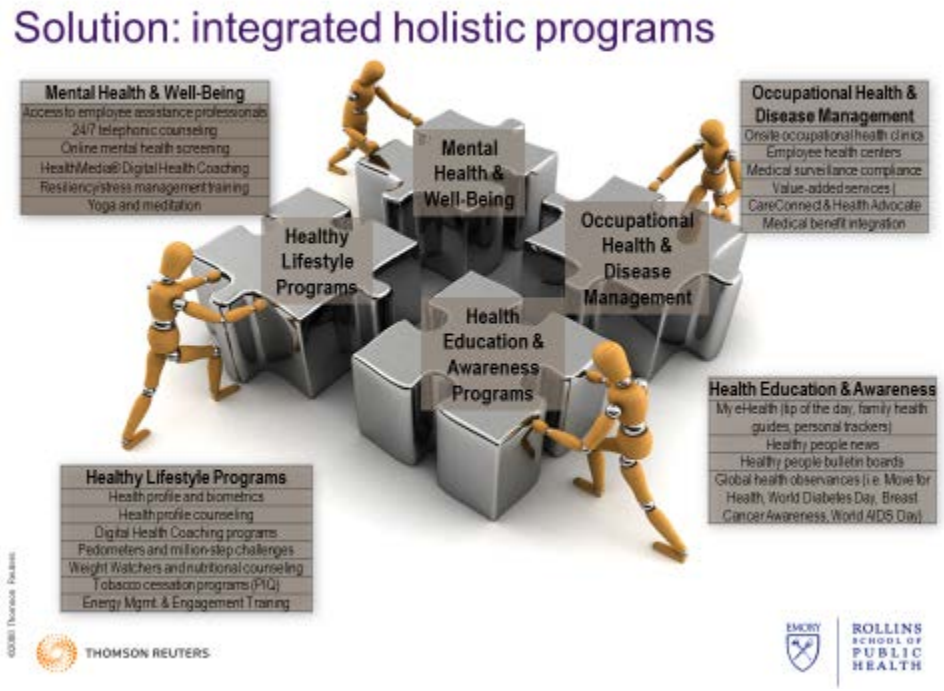
Total Worker Health® Research Methodology Workshop
Case Study - 1

A *Total Worker Health* approach is defined as policies, programs, and practices that integrate protection from work-related safety and health hazards with promotion of injury and illness–prevention efforts to advance worker well-being.

Citation:
Henke RM, Goetzel RZ, McHugh J, Isaac F. Recent Experience in Health Promotion at Johnson & Johnson: Lower Health Spending, Strong Return on Investment. Health Aff (Millwood). 2011 Mar;30(3):490-9.

Goal of the study:
To evaluate the impact of Johnson & Johnson's Health and Wellness Program on employee health risks and medical care costs in the third decade of its existence. Since all Johnson & Johnson's employees are exposed to the "culture of health" created from the program, this study takes a unique approach to identifying treatment and control groups that minimizes self-selection bias. Data from Johnson & Johnson were compared to those of 16 other large companies, some of whom also have health and wellness programs in place. Thus, the comparison of Johnson & Johnson as a treatment group to similar companies acting as a comparison group is conservative since none of the other companies can be described as "naïve subjects," that is, many of the comparison group companies also have well-developed health promotion programs. Finally, the comparison being made was over a seven-year timeframe whereby the experience of Johnson & Johnson, a company with a very mature program, was contrasted with that of companies that may have only recently introduced wellness programs, and in some cases, may have fashioned their programs after Johnson & Johnson.

Description of Intervention:
Every Johnson & Johnson employee has access to the Health and Wellness Program through a team of health professionals who promote and support a healthy lifestyle. Johnson & Johnson's numerous programs include offerings related to improving physical activity (e.g., onsite fitness centers, exercise reimbursement, pedometer program, seasonal fitness challenges); nutrition (e.g., healthy cafeteria choices, Weight Watchers, online weight management courses/tools); lifestyle management and computerized coaching programs (e.g., health coaching for blood pressure management, tobacco cessation, and blood lipid control); and chronic disease management. Johnson & Johnson routinely analyzes aggregate health assessment (HRA) data to identify employee health risk trends. HRAs ask individuals about their health habits and risk factors, and are often accompanied by biometric screenings of height and weight, blood pressure, and cholesterol values. Customized programs to address employees' health risks are then developed, implemented, and evaluated through subsequent health assessments.
Illustration of J&J's Integrated TWH Program



Content of the intervention including:
Promotion of injury and illness prevention efforts (WHP): Yes

- **Delivery format: Various**
- **Duration and follow-up: 37 years**

How is integration defined: Health and Wellness Program

Study Design: Quasi-Experimental – Propensity Score Matching Methods
We compared 2002-2008 medical and drug cost trends of Johnson & Johnson employees to employees working for companies similar in industry and size. Propensity score methods were applied to minimize the effects of selection bias, a common problem faced by researchers conducting "real-world" evaluations of intervention programs. The aim of propensity score matching is to find statistical "twins" of employees at intervention and comparison companies. Once those twins are found, one can track health and cost measures for the two groups over time to determine whether the intervention group outperforms the comparison group on key outcome measures.

In a second analysis, we compared Johnson & Johnson employee health risks to employees from a subset of the comparison companies for whom health risk data were available, adjusting for employee demographics. Finally, we estimated the return on investment from the Health and Wellness Program by comparing medical savings to program costs.

Participants
The sample included U.S. employees from Johnson & Johnson and comparison companies who were active, full-time, and between the ages of 18 and 64. Employees had to be continuously

enrolled in a health plan offered by their employer for one year in the analysis of health risks and two years for the medical cost analysis. Employees with pregnancy-related medical care claims, employees not enrolled in a prescription drug plan, and employees who had records of claims adjustments resulting in negative medical costs values, were excluded from the sample during the year of the occurrence. Employees enrolled in health plans featuring capitation (health maintenance organizations or point of service plans with capitation) were also excluded because complete claims data were not available for them. Employees had to have completed at least one health assessment to be included in the analysis of health risks.

The study samples analyzed were subsets of the entire employee populations studied after applying certain inclusion and exclusion criteria. This is especially relevant to the risk analysis because only employees who completed a health assessment were included in that study. At Johnson & Johnson, 76% of eligible employees completed a health assessment between 2002 – 2007 largely due to a significant financial incentive tied to program participation. Health assessment participation rates at the benchmark companies were likely lower, which might have influenced the observed prevalence of health risks among benchmark company employees.

There were 32,478 Johnson & Johnson employees and 273,213 employees from comparison companies in the medical care savings analysis sample after applying inclusion and exclusion criteria. Before matching, there were significant demographic differences between the Johnson & Johnson and comparison group employee populations. After propensity score matching, the cohorts were well balanced. The matched sample included 31,823 Johnson & Johnson employees with an equal number of employees from the 16 comparison companies.

There were 31,220 Johnson & Johnson employees and 169,153 comparison group employees included in the health risk analysis after applying inclusion and exclusion criteria.

Intervention Setting:
All U.S.-based J&J employees who met the inclusion/exclusion criteria for the study.

Outcome Measures:
Medical care costs were calculated as total payments (inpatient, outpatient, and pharmaceutical), and included both the employer and employee shares of costs. Yearly medical care and drug payments were inflation-adjusted to 2007 U.S. dollars using the Medical Care Services Consumer Price Index (CPI) and Medical Care Commodities CPI, respectively.

In examining health risks, the following nine health risks were considered: overweight/obesity (BMI ≥ 30); high blood pressure (systolic blood pressure ≥140 mmHG or diastolic blood pressure ≥90 mmHG); high cholesterol (total cholesterol ≥ 240 mg/dl); physical inactivity (moderate exercise less than 2-3 days a week); poor nutrition (less than 5 servings fruit and vegetables); excessive alcohol consumption (alcohol servings > 14/week for males, > 7/week for females); tobacco use (any current tobacco use); depression (feeling unhappy with little interest or pleasure in doing things); and high stress (feeling stressed and having trouble coping).

Confounders:
Two severity adjustment scores were included in the growth curve model as time varying covariates: the Charlson Comorbidity Index (CCI)[17], and Psychiatric Diagnostic Groups (PDG)[18]. CCI estimates a patient's risk of death or serious disability in the coming year, based on whether diagnosis codes for 18 conditions are observed during a baseline period. PDG is a measure of mental health constructed by adding the number of Psychiatric Diagnosis Groups found on patient's medical claims record in a given time period. Other model covariates included employee age, sex, health plan type (POS without capitation vs. other), and region (West, North Central, South, Northeast).

To reduce the variation in medical care due to benefit plan design differences, most notably the "richness" of the plan, we created a plan design variable which was calculated as the ratio of the employer paid amounts divided by total allowed costs. This plan richness ratio was measured each year for each employer and included in the growth curve model as a time-varying covariate.

Results:
We found that Johnson & Johnson experienced a 3.7% lower average annual growth in medical costs compared to the comparison group ($p<0.0001$) for the period of 2002 - 2008. Johnson & Johnson's annual average percentage increase in medical and drug costs was 1.0%, which was lower than the average expected increase in costs, estimated from the experience of the 16 comparison companies, which was 4.8%.

The average annual savings for Johnson & Johnson, when its total medical costs are contrasted to expected costs from the comparison companies, was $535 per employee per year in 2007 dollars. Adjusting this savings estimate to 2009 dollars using the Medical Care Services CPI yielded an average annual per employee savings of $565.

Johnson & Johnson employees had a lower average predicted probability of being at high risk for six of the nine health risks examined: high blood pressure, high cholesterol, poor nutrition, overweight/obesity, physical inactivity, and tobacco use. The most favorable trends were for tobacco and overweight/obesity risks. Comparison companies increased their rates of overweight and obese employees from 26.0% to 27.8% between 2005 and 2008, Johnson & Johnson's rate remained fairly stable, increasing from 21.1% to 21.5% over the same time period. Similarly, tobacco use dropped precipitously among Johnson & Johnson employees from 7.5% to 3.8% between 2005 and 2008, while a less dramatic decrease was observed at the comparison companies where the smoking rate dropped from 14.7% to 11.9%. The two health risks where Johnson & Johnson employees were at higher risk than those in the comparison group were psychosocial in nature: depression and stress

Please describe if there are alternative methods that could have improved the study:

More "digging" into the categories of cost savings would have been useful.

Other Comments:
This approach is like an intent to treat model used in medical experiments. An alternative approach to evaluating a program would be a participant vs. non-participant approach. Both population vs. population and participant vs. participant models have limitations and either design should be considered given the circumstances of the intervention program, especially program participation rates.

Total Worker Health® Research Methodology Workshop
Case Study - 2

A *Total Worker Health* approach is defined as policies, programs, and practices that integrate protection from work-related safety and health hazards with promotion of injury and illness–prevention efforts to advance worker well-being.

Citation:
LaMontagne, Anthony D. Keegel, Tessa, Shann, Clare, D'Souza, Rennie. (2014) An integrated approach to workplace mental health: an Australian feasibility study. International Journal of Mental Health Promotion Vol 16 (4) pg 205-215.

Goal of the study:
The study was designed to test the feasibility of developing, implementing and evaluating an integrated workplace mental health program through a practitioner–researcher partnership, and to yield practice and policy as well as research value.

> **The hypothesis** - Mental health literacy and job stress intervention would improve working conditions and mental health literacy (primary outcomes evaluated), which in turn would improve mental health and work performance (as secondary outcomes, not evaluated).

Description of Intervention:
Site-specific, tailored intervention action plans were developed for each workplace using participatory methods, including:
. intervention brainstorming and planning meetings with management;
. insight gained from general staff project information sessions;
. full-day Future Inquiry workshops for each workplace, to develop action plans to promote mental health and reduce job stress. The Future Inquiry workshops consisted of a series of facilitated group exercises culminating in the development of site-specific action plans outlining priorities for job stress and mental health promotion intervention

The beyondblue National Workplace Program (NWP) is a mental health literacy program that was offered to all worksites. A 2-hour face-to-face workshop was delivered to general staff and a 3-hour workshop was delivered to managers. All sessions were facilitated by a mental health professional with experience delivering workplace training. Both workshops had two parts. The first part of the workshop was psycho-educational which presented the prevalence rates of common mental health problems, signs and symptoms in the workplace, effective treatment and management approaches and included short videos of real people describing their own experiences of managing their depression and anxiety in the workplace. The design of this section reflected other approaches to increasing mental health literacy and reducing stigma (Kitchener & Jorm, 2004).

The second part of the workshop was focused on increasing participants' confidence and skills to have conversations in the workplace with people they are concerned about. This utilized case study scenarios to give participants the opportunity to put what they had learnt into practice. The standard NWP sessions were adapted for the project to include expanded coverage of job stress to highlight the links between job stress, workplace mental health and mental health literacy. The manager sessions also covered important legal/regulatory aspects under OH&S, anti-discrimination and employment law.

. Site-specific activities as detailed in action plans; . Periodic communications between site contacts and the researchers regarding action plan implementation

How is integration defined:

In order to achieve the greatest population mental health benefits, workplace mental health promotion should integrate intervention on work-related risk factors with programs to improve mental health literacy and early detection

Study Design:

Intervention effectiveness was evaluated using an uncontrolled design, with organization wide census employee surveys of working conditions and mental health literacy pre-intervention, followed by action planning and intervention (up to 1 year), and a post intervention survey 1 year after the baseline survey.

Approximately 6 months into the intervention period, the lead researchers conducted telephone or in-person interviews with site contacts to discuss progress with beyondblue training and the implementation of action plans generated in the Future Inquiry workshops

Participants

The location of the study sites was a small territory that includes the Australian national capital of Canberra. Worksites were recruited to the project through advertisements in the most prominent Canberra-area newspaper (The Canberra Times), the Canberra Chamber of Commerce & Industry newsletter and Australian Public Service networks in February 2008. Over 30 organizations expressed interest or made enquiries about participating in the study, and 24 responded formally to the advertisement. Ten were selected for inclusion in April 2008 based on criteria specified by the funder for workplace size and sector: 3 government sector organizations of 200–300 employees, 3 non-government organizations of 200–300 employees and 3–4 small service sector organizations of 100 employees.

All employees, regardless of full time, part time, short-term contract or casual/temporary status, in each participating worksite were invited to complete an anonymous survey which included questions on the main targets of the intervention [mental health literacy and psychosocial working conditions (or job stressors)], workplace descriptors and respondent socio-demographics. Surveys were self-administered on paper and returned in postage-paid envelopes directly to the researchers so as to clearly demonstrate the confidentiality and anonymity of the surveys (no individual-level data were shared with employers, and no identifying information was collected)

A total of 719 workers from 10 worksites completed the baseline survey (44% response rate), and 640 workers across 9 worksites completed the follow-up survey (37% response rate). One worksite discontinued participation early in the intervention period following the Future Inquiry workshop. There were no significant differences (data not shown) in the baseline and final socio-demographics and employment characteristics measured

Participation in intervention activities varied considerably across sites. Of the 640 final survey respondents, 31% (n ¼ 199) reported attending one or more project intervention activity, with the greatest number reporting participation in beyondblue's mental health literacy training (n ¼ 125). Participation in one or more intervention activity (per respondent, as reported in final survey) ranged from a high of 73% in one site to a low of 17% in another.

Intervention Setting:

Across all sites, a total of 28 mental health literacy training sessions were provided. Most sites ran a single, 2-hour general staff training session and a single 3-hour managers' training session. Larger sites tended to offer more training sessions (one site offered four sessions for general staff and two for managers) and one site did not offer any mental health literacy training, despite repeated offers. The Future Inquiry workshops yielded site-specific action plans detailing priorities for job stress and mental health promotion intervention.

Outcome Measures:

Outcome Measure	Standardized Measure/New	Category	Results
Mental Health Literacy (these item groups correspond crudely to knowledge, attitudes, behavioral intentions and self-efficacy)	Mental health literacy was assessed using survey items developed by beyondblue (Highet, Hickie, & Davenport, 2002; Pierce & Shann, 2012) • Knowledge of depression (three items), Attitudes towards people with depression (eight items) • Knowledge of helping behaviors that could be helpful to someone with a mental health problem (four items) • Likelihood to enact helping behaviors (six items) • Confidence with respect to enacting certain helping behaviors (six items)	Intermediate	Comparison of baseline to final mental health literacy outcomes showed significant improvement in only two of the seven knowledge and attitude items (e.g. that stressful jobs can increase the risk of depression, and that going out for a few drinks may not be helpful). However, there were a greater number of significant improvements in the higher-order helping behavior outcomes.
Psychosocial working conditions Psychological demand score were computed as the sum of the three items multiplied by two, and job control was computed as an equally weighted scale combining SD and DA as follows: [total SD þ 2 (total DA)]. The social support at work domain was the sum of two subscales: support from colleagues (two items)	Likert-scaled items from a brief version of Karasek and Theorell's demand-control model (Karasek, 1979; Mausner-Dorsch & Eaton, 2000 • Psychological demand (three items), • Skill discretion (six items) • Decision authority (three items) • Supervisor and co-worker support (two items each).	Intermediate	No significant improvements or negative changes in the measured working conditions (job control, job demand and social support) from before to after the intervention were observed.

and support from supervisors (two items)			

Confounders:
N/A

Results: see table

Please describe if there are alternative methods that could have improved the study: -
Stronger health protection intervention

Other Comments:

Total Worker Health® Research Methodology Workshop
Case Study - 3

A *Total Worker Health* approach is defined as policies, programs, and practices that integrate protection from work-related safety and health hazards with promotion of injury and illness–prevention efforts to advance worker well-being.

Citation:
Lambert EV, Kolbe-Alexander TL. Innovative strategies targeting obesity and non-communicable disease in South Africa: what can we learn from the private healthcare sector. Obesity reviews 2013; 14 (supppl 2):141-9.

Goal of the study:
This is a review of several studies examining the health impact of the Vitality Program from Discovery Health Plan in South Africa.

Description of Intervention:

- **Content of the intervention including:**
  - **Protection from work-related safety and health hazards (OSH)**
  - **Promotion of injury and illness prevention efforts (WHP)**
- **Delivery format**
- **Duration and follow-up**

Vitality is a multi-pronged employee wellness intervention to promote healthy eating, active living and general wellbeing. It is provided as a value-add to members of the Discovery Health Plan, the largest private insurance company in South Africa.

The program includes assessment and screening, healthy food choices through a national discount program, health knowledge, and fitness-related activities (including subsidized gym membership). Participants also earn rewards through a point system associated with the various activities.

Unclear when the program first began, but new features have been introduced in a staggered manner. Recent observational findings have been reported with at least 5+ years of follow-up.

How is integration defined:
Not specifically defined, but in this case, it would seem that Vitality integrates behavior economics, incentives/contingency management, case management, health education, social marketing, mobile health technology, and business partnerships (e.g., big supermarket chains) to influence members' participation and health behaviors.

Study Design: Several cross-sectional longitudinal studies have been performed.

Participants

- **Inclusion/exclusion criteria**
- **Number of groups**
- **Sample size**
- **Recruitment**

Members of the Discovery Health Plan. About 1M participants to date. Some studies (e.g., HealthFood benefits) have compared benefit adopters against non-adopters. Have not located any RCTs related to this program but will inquire.

Intervention Setting:

Diverse organizations that contract with Discovery South Africa as provider of health insurance. Given this is private insurance, presumably beneficiaries are mostly white-collar professionals in South Africa.

Outcome Measures:

- Please list all outcome measures described in the study, indicate if it is a standardized scale and the results. Please categorize each outcome measure into one of the following categories: health and safety outcomes, utilization outcomes, occupational injury and illness surveillance outcomes and intermediate outcomes[1]

Outcome Measure	**Standardized Measure/New**	**Category (health and safety; utilization outcomes; occupational injury/illness surveillance outcomes; intermediate outcomes)**[1]	**Results**
Medical claims	Std	Utilization	In-patient claims decreased over 3 years
Hospital admissions and length of stay	std	Utilization	Reduced probability of hospital admission over 3 years
Fitness activity	std	Intermediate	Reduction of inactive members, increased participation in gym memberships over a 5-year period

Diet	std	Intermediate	Improved intake of fruits/veg, whole grains; lower intake of foods high in salt and sugar, fried and processed, fast foods associated with adopters of the HealthyFood benefit
BMI	Std	Intermediate	Reduced odds of obesity associated with 25% discount on healthy foods

[1] Outcome measure categories include:

Health and safety outcomes (e.g., mortality, incidence of injuries, cardiovascular disease or cancer; morbidity related to injuries, illness or chronic disease; depression or anxiety; validated measures of functional status; QOL; stress or distress)

Utilization outcomes (e.g., hospitalizations, ED visits, outpatient clinic visits)

Occupational injury and illness surveillance outcomes (e.g., WC claims, injury or illness surveillance outcomes)

Intermediate outcomes (e.g., Tobacco, alcohol or other drug use; weight or BMI; blood pressure; cholesterol; exercise frequency; healthy eating behavior; hazardous work exposures; near misses)

Confounders:

There is probably selection bias in who chose to participate/activate a specific benefit. Members who are motivated likely benefited the most.

Results:

Overall there are some promising trends of Vitality to improve health behaviors and thus reduce health costs. However, only a minority of eligible members take part in many of the physical activity/healthy food benefits, suggesting that other strategies are needed beyond incentives to motivate more people to participate.

Please describe if there are alternative methods that could have improved the study:

Comparative effectiveness trials, step-wedge trials

Other Comments:

Would be useful to dig into this program further. There may be unpublished findings. I can do a quick follow-up with study authors.

Total Worker Health® Research Methodology Workshop
Case Study - 4

A *Total Worker Health* approach is defined as policies, programs, and practices that integrate protection from work-related safety and health hazards with promotion of injury and illness–prevention efforts to advance worker well-being.

Citation: Carr LJ, Leonhard C, Tucker S, Fethke N, Benzo R, Gerr F. Total Worker Health intervention increases activity of sedentary workers. Am J Prev Med. 2016;50:9-17.

Goal of the study:

The objective of this study was to test the effect of an integrated health promotion/health protection worksite intervention (HP/HP) against a health protection–only intervention (HPO) on occupational physical activity, cardiometabolic biomarkers, musculoskeletal discomfort, and work productivity among a sample of adults working in full-time sedentary occupations.

Description of Intervention:

- **Content of the intervention including:**
    - **Protection from work-related safety and health hazards (OSH)**
      HPO participants received an ergonomic workstation optimization intervention and three e-mails/week promoting rest breaks and posture variation.
    - **Promotion of injury and illness prevention efforts (WHP)**
      HP/HP participants received the HPO intervention plus access to a seated activity permissive workstation.

- **Delivery format**
  Face-to-face ergonomic consultation, e-mail reminders, seated activity permissive workstation (HP/HP group only)
- **Duration and follow-up**
  16 weeks

How is integration defined:
The integrated intervention included both health protection and health promotion components, whereas the control group only received the health protection component.

Study Design:
RCT

Participants

- **Inclusion/exclusion criteria**
  Participants of all races and ethnic backgrounds

  Exclusionary criteria were:

1. limitations with or contraindications to physical activity
2. self-reported acute illness or injury;
3. any self-reported cognitive impairments, psychosis, or other diagnosed psychological illness (with the exception of depression and anxiety);
4. self-reported diagnosis of a chronic condition such as heart failure or cancer;
5. medications contraindicated with physical activity;
6. having a height-adjustable workstation;
7. BMI <25.0 kg/m2; or
8. reporting sitting <75% of a typical work day.

- **Number of groups:** 2
- **Sample size:** 30 randomized to each group, 27 in each group completed study
- **Recruitment:** electronic advertisement placed on the company's wellness website.

Intervention Setting:
large private company (1,200 employees) in the Midwest

Outcome Measures:

- Please list all outcome measures described in the study, indicate if it is a standardized scale and the results. Please categorize each outcome measure into one of the following categories: health and safety outcomes, utilization outcomes, occupational injury and illness surveillance outcomes and intermediate outcomes[1]

Outcome Measure	**Standardized Measure/New**	**Category (health and safety; utilization outcomes; occupational injury/illness surveillance outcomes; intermediate outcomes)[1]**	**Results**
% of occupational time spent sedentary and physically active (Primary outcome)	measured objectively via an ankle-worn accelerometer	Intermediate outcome	A significant intervention effect favoring the HP/HP group was observed for percentage of occupational time spent in light-intensity physical

			activity (p=0.04, Cohen's d=0.38). An intervention effect for percentage of occupational time spent sedentary was not observed but trended toward significance (p=0.08, Cohen's d=0.26).
Cardiometabolic Biomarkers: weight, fat mass, lean mass, waist circumference, estimated $V0_{2,}$ resting systolic blood pressure, resting diastolic blood pressure resting heart rate	Yes	Intermediate outcome	No intervention effects were observed for any of the secondary outcomes
Musculoskeletal discomfort	Yes, Standardized Nordic Musculoskeletal Symptom Questionnaire	Health and safety outcome	"
Work productivity	Yes, Health and Work Performance Questionnaire	Other?	"

[1] Outcome measure categories include:

Health and safety outcomes (e.g., mortality, incidence of injuries, cardiovascular disease or cancer; morbidity related to injuries, illness or chronic disease; depression or anxiety; validated measures of functional status; QOL; stress or distress)

Utilization outcomes (e.g., hospitalizations, ED visits, outpatient clinic visits)

Occupational injury and illness surveillance outcomes (e.g., WC claims, injury or illness surveillance outcomes)

Intermediate outcomes (e.g., Tobacco, alcohol or other drug use; weight or BMI; blood pressure; cholesterol; exercise frequency; healthy eating behavior; hazardous work exposures; near misses)

Confounders:

age, gender, physical activity were included in the model

Results:
The primary findings of this study indicate that an integrated HP/HP intervention significantly increased occupational light-intensity physical activity when compared with a non-integrated HPO group. The HP/HP group significantly increased total occupational physical activity from baseline to post-intervention by 11.5%, consistent with the percentage of work time spent using the activity permissive workstations (50.2 minutes/day = 10.2% of work day).

Please describe if there are alternative methods that could have improved the study:
I would like to see additional results after longer follow-up and comparisons with other types of active work stations. It would also be interesting to see if these results could be replicated in different work settings, perhaps with larger samples.

Other Comments:

Total Worker Health® Research Methodology Workshop
Case Study - 5

A *Total Worker Health* approach is defined as policies, programs, and practices that integrate protection from work-related safety and health hazards with promotion of injury and illness–prevention efforts to advance worker well-being.

Citation:

Goetzel, R. Z., Tabrizi, M., Henke, R. M., Benevent, R., Brockbank, C. A. V. S., Stinson, K., et al. (2014). Estimating the Return on Investment From a Health Risk Management Program Offered to Small Colorado-Based Employers. *Journal of Occupational and Environmental Medicine*, *56*(5), 554–560.

Newman, L. S., Stinson, K. E., Metcalf, D., Fang, H., Brockbank, C. V., Jinnett, K., et al. (2015). Implementation of a Worksite Wellness Program Targeting Small Businesses: The Pinnacol Assurance Health Risk Management Study. *Journal of Occupational and Environmental Medicine*, *57*(1), 14–21.

Schwatka, N. V., Atherly, A., Dally, M. J., Fang, H., vS Brockbank, C., Tenney, L., et al. (under review). Impact of Worksite wellness programs varies by size of business: A 3-year longitudinal study of participation, health benefits, and productivity. *Occupational and Environmental Medicine*.

Schwatka, N. V., Atherly, A., Dally, M. J., Fang, H., vS Brockbank, C., Tenney, L., et al. (2017). Health risk factors as predictors of workers' compensation claim occurrence and cost. *Occupational and Environmental Medicine*, *74*(1), 14–23.

Jinnett, K., Schwatka, N., Tenney, L., Brockbank, C. A. V. S., & Newman, L. S. (2017). Chronic Conditions, Workplace Safety, And Job Demands Contribute To Absenteeism And Job Performance. *Health Affairs*, *36*(2), 237–244.

Goal of the study:

The **Health Risk Management (HRM) study** examined 1) the health and safety of small business employees, 2) how employee health and safety impacted workers' compensation claim occurrence and cost, productivity at work, and healthcare costs, and 3) if employee health improved after participating in a worksite wellness program. This project initially aimed to examine the worksite wellness program's return on investment; however, our collaborative research led us to study the value on investment.

Description of Intervention:

- The intervention centers around Pinnacol Assurance's, a workers' compensation insurer's, worksite wellness program offered from May 2010 to December 2014. Pinnacol had a decades long history of safety services, and they were interested in the additional benefit of worksite wellness services. The worksite wellness program consisted of an annual health risk assessment (HRA), coaching and online resources for employees. Employers received on-going feedback and support.
- **Delivery format**
    - Employees accessed the program via an online portal. Employee health coaching occurred telephonically.
    - Employers received in-person, online and telephonic feedback and support.
- **Duration and follow-up**

- Each business and their employees could participate for up to 4 years
- Employees took an annual HRA that took 20-30 minutes to complete
- Employee access to telephonic coaching and online resources were unlimited throughout the year after they completed their HRA
- Businesses could engage in the feedback and support process with Pinnacol Assurance's worksite wellness team as much as needed

How is integration defined:

- Pinnacol Assurance is a workers' compensation insurer. Thus, historically, their focus has been on providing safety consultation services to help policyholders improve their safety program. In 2010, they initiated an external evaluation of their worksite wellness program to determine if this additional service can provide additional value to their policyholders.

Study Design:

- The studies that represent HRM research had various study designs, including cross-sectional, prospective, and repeated measures designs.

Participants

- **Inclusion/exclusion criteria**
  - Inclusion
    - Pinnacol Assurance policyholders
    - Capped at 300 businesses at any given time
- **Number of groups**
  - N/A
- **Sample size**
  - 314 businesses representing 16,926 employees who took at least 1 HRA
- **Recruitment**
  - Businesses were actively recruited by insurance agents and by training sessions. Businesses could also self-enroll.

Intervention Setting:

- The intervention took place in multiple settings. Employees engaged in an online portal to take their HRA and access health-related resources. Employees also engaged telephonically with a health coach. Employers engaged in the online portal and received in-person, virtual and telephonic feedback and assistance.

Outcome Measures:

Outcome Measure	**Standardized Measure/New**	**Category (health and safety; utilization outcomes; occupational injury/illness surveillance outcomes; intermediate outcomes)**[1]	**Results**
Health	Validated health risk assessment containing questions about employee psychosocial health risks, lifestyle	Intermediate	(N/A)

Outcome Measure	Standardized Measure/New	Category (health and safety; utilization outcomes; occupational injury/illness surveillance outcomes; intermediate outcomes)[1]	Results
	health risks, and chronic health conditions.		
Injury	Workers' compensation claims	Surveillance	(N/A)

[1] Outcome measure categories include:
Health and safety outcomes (e.g., mortality, incidence of injuries, cardiovascular disease or cancer; morbidity related to injuries, illness or chronic disease; depression or anxiety; validated measures of functional status; QOL; stress or distress)
Utilization outcomes (e.g., hospitalizations, ED visits, outpatient clinic visits)
Occupational injury and illness surveillance outcomes (e.g., WC claims, injury or illness surveillance outcomes)
Intermediate outcomes (e.g., Tobacco, alcohol or other drug use; weight or BMI; blood pressure; cholesterol; exercise frequency; healthy eating behavior; hazardous work exposures; near misses)

Confounders:

- Work organization (e.g., full time/part time)
- Demographics (e.g., age)

Results:

- The HRM program was initially focused on demonstrating ROI in terms of workers' compensation costs and claims occurrence as a consequence of introducing a wellness program through a workers' compensation insurer. However, the construction of a database with matched businesses *in* and *not in* the worksite wellness program was not successful with the matching variables that we had access to. This led us to evaluate the value on investment (VOI) for this program. In other words, why is *this* worksite wellness program valuable for employers and employees to participate in?
- We demonstrated a clear need for worksite wellness services among small businesses, as they have a significant number of modifiable health risks (Newman et al. 2015). These health risks were found to be significantly related to workers' compensation claims (Schwatka et al. 2017).
- If worksite wellness is offered to small businesses by a workers' compensation insurer, businesses and their workers will participate (Newman et al. 2015).
- Small business employees stand to gain the most from this worksite wellness program offered by a workers' compensation insurer. Compared to employees from large businesses (>500 employees), small business employees (<500 employees) had significant improvement in many health outcomes, including psychosocial and lifestyle health outcomes (Schwatka et al. under review).
- While we did not have the database needed to understand the ROI on workers' compensation costs, we could demonstrate healthcare and productivity ROI. We found a significant amount of lost-productivity costs among workers with chronic health conditions, prior workers' compensation claim(s) and difficulty performing work tasks (Jinnett et al. 2017). For every $1 invested in the program, employers could expect to receive $2 back in *healthcare and lost-productivity costs* (Goetzel et al. 2014).
- These combined findings suggest a high program VOI in terms of program participation, health risk reduction and demonstrated healthcare and lost-productivity savings.

Please describe if there are alternative methods that could have improved the study:

Other Comments:

Total Worker Health® Research Methodology Workshop
Case Study - 6

A *Total Worker Health* approach is defined as policies, programs, and practices that integrate protection from work-related safety and health hazards with promotion of injury and illness–prevention efforts to advance worker well-being.

Citation:
None yet.

Goal of the study:
The **Small+Safe+Well (SSWell) study** examines 1) what small organizations are doing to support the health, safety, and well-being of their workforce, 2) how employees perceive their workplace safety and health climates and whether these perceptions are consistent with their level of TWH programming, and 3) the impact of TWH programming and climate on safety and health outcomes. This project aims to examine the fundamental question of mechanism: How do successful TWH interventions improve organizational behavior and do those changes result in improved worker outcomes?

Description of Intervention:
- The intervention centers around Health Links (https://www.healthlinkscertified.org). Health Links is a community-based organization that provides certification and advising to enable TWH program adoption and implementation. An additional dose of the intervention, TWH leadership training for small business owners/senior managers, will be tested.
- **Delivery format**
  - The Health Links business assessment is an evidence-based online tool that one individual at the business takes to ascertain certification level. Certification level is based on how well the businesses policies and procedures meet the 6 Health Links Benchmarks.
  - The advising sessions happen locally in their own community by a trained advisor.
  - The TWH leadership training will be held amongst peer groups. Participants will participate in pre-course work, an in-person course and post-course virtual sessions to discuss progress.
- **Duration and follow-up**
  - Each business and their employees will participate in the study for up to 4 years
  - Annual Health Links Business Assessment and Employee Health and Safety Culture Survey
  - Two (optional) one-hour advising sessions
  - One TWH leadership training for owner/senior manager

How is integration defined:
- Integration is defined within the Organizational Supports Health Links Benchmark. Businesses with integrated programs are doing three things: linking program goals and objectives, integrating actual program components, and integrating data used for comprehensive program evaluation. The leadership training component of the intervention teaches an integrated, comprehensive approach to health promotion and health protection leadership.

Study Design:
- Prospective, switching replications study design

- Business are randomly assigned into one of two doses: early TWH leadership training or lagged TWH leadership training.

Participants

- **Inclusion/exclusion criteria**
  - Inclusion
    - Small businesses (less than 500 employees)
    - New to Health Links as of October 2016
- **Number of groups**
  - Early intervention group: Receives TWH leadership training first
  - Lagged intervention group: Receives TWH leadership training after early group
- **Sample size**
  - 214 small businesses and their employees
- **Recruitment**
  - Small businesses will be selected via existing contacts with strategic partners including the Colorado Small Business Administration, the Colorado Small Business Development Centers Network, local chambers of commerce, economic development centers, workforce centers and the Colorado Society for Human Resource Managers. These partners will help recruit participant companies through member communications, networking events and direct outreach. We will also leverage existing collaborations with local public health agencies to recruit through health and wellness coalitions and safety groups. We will work with Pinnacol Assurance, the state-based workers' compensation insurer, to recruit policyholders that are participants in Pinnacol's worksite wellness program. We have established direct referral pathways with Pinnacol to encourage policyholders to apply for Health Links certification. Health Links is also included as a partner resource program in the risk and recommendation reports that high-risk clients receive from Pinnacol Assurance's safety consultants after a safety audit.

Intervention Setting:

- The intervention takes place in multiple settings. The online component consists of the Health Links Business Assessment and the Employee Health and Safety Culture Survey. In person components of the intervention include Health Links Advising sessions as well as the TWH Leadership training course.

Outcome Measures:

Outcome Measure	**Standardized Measure/New**	**Category (health and safety; utilization outcomes; occupational injury/illness surveillance outcomes; intermediate outcomes)**[1]	**Results**
Organizational climate	Validated safety and health climate measures	Health and safety	(N/A)
Motivation	Validated motivation measures adapted to reflect safety and health motivation, separately	Health and safety	(N/A)

Outcome Measure	Standardized Measure/New	Category (health and safety; utilization outcomes; occupational injury/illness surveillance outcomes; intermediate outcomes)[1]	Results
Behavior	Validated safety behavior measures adapted to reflect both safety and health behavior, separately	Health and safety	(N/A)
Leadership / Organizational commitment and support	Combination of new and validated measures	Health and safety	(N/A)
Health	Validated health risk assessment	Intermediate	(N/A)
Injury	Workers' compensation claims	Surveillance	(N/A)

[1] Outcome measure categories include:

Health and safety outcomes (e.g., mortality, incidence of injuries, cardiovascular disease or cancer; morbidity related to injuries, illness or chronic disease; depression or anxiety; validated measures of functional status; QOL; stress or distress)

Utilization outcomes (e.g., hospitalizations, ED visits, outpatient clinic visits)

Occupational injury and illness surveillance outcomes (e.g., WC claims, injury or illness surveillance outcomes)

Intermediate outcomes (e.g., Tobacco, alcohol or other drug use; weight or BMI; blood pressure; cholesterol; exercise frequency; healthy eating behavior; hazardous work exposures; near misses)

Confounders:

- Industry/hazard level
- Region
- Participation in other TWH-related interventions (e.g., Pinnacol Assurance's worksite wellness program)

Results:

- Data collection and analysis is currently underway.

Please describe if there are alternative methods that could have improved the study:

Other Comments:

Total Worker Health® Research Methodology Workshop
Case Study - 7

A *Total Worker Health* approach is defined as policies, programs, and practices that integrate protection from work-related safety and health hazards with promotion of injury and illness–prevention efforts to advance worker well-being.

Citation:

Ozminkowski RJ, Mark TL, Goetzel RZ, Blank D, Walsh JM, Cangianelli L. Relationships between urinalysis testing for substance use, medical expenditures, and the occurrence of injuries at a large manufacturing firm. The American Journal of Drug and Alcohol Abuse, 2003;29(1):151-167.

Goal of the study:

Employment-related drug testing is controversial and its cost-effectiveness is still largely unknown. The goal of this study was to use data and empirical analyses, rather than relying on supposition or political considerations, to estimate the utility of drug testing at one manufacturing firm.

Description of Intervention:

- **Content of the intervention including:**
  - **Protection from work-related safety and health hazards (OSH)**
  - **Promotion of injury and illness prevention efforts (WHP)**
- **Delivery format**
- **Duration and follow-up**

Drug testing was required for pre-employment, reasonable cause, or post-accident scenarios. Random testing also occurred. Drug testing was done via urinalysis by a third-party firm, both on-site and off-site. Positive results were sent for confirmation to a laboratory that was certified by the Dept. of Health and Human Services. A fully qualified medical review officer reviewed each case as part of the confirmation process.

Employees who tested positive for drugs of abuse (including amphetamines, opiates, cocaine, marijuana, and PCP) were discharged if they had no legal explanation or prescription for use of those drugs.

However, employees who self-disclosed their use of these drugs prior to testing would not be fired if they completed a substance abuse treatment program and agreed to random testing for 2 years after completing that program.

When treatment for substance abuse was received in inpatient/confined settings, requiring the employee to be on medical leave of absence, the employee was eligible for disability pay.

Employees who returned to illegal drug use following treatment were fired.

How is integration defined:

The study merged data from the urinalysis tests with medical claims and OSHA-reportable injuries occurring at the worksite.

Study Design:

A quasi-experimental study, using a panel data design, was conducted to estimate the relationships between the number of urinalysis tests received over a four-year period (from Jan 1, 1996 – Dec 31, 1999) and total medical expenditures and injury rates.

Multiple observations of medical expenditures (obtained monthly), injuries, and drug testing were available for 1,791 employees, who contributed 44,885 person-months of data.

Participants

- **Inclusion/exclusion criteria** – active employees at a manufacturing firm, age 18-64.
- **Number of groups**
- **Sample size** – 1,791 employees at 15 company sites, contributing 44,885 person-months of data
- **Recruitment** – Mandatory participation for reasons noted above.

Intervention Setting:

A large manufacturing firm

Outcome Measures:

- Please list all outcome measures described in the study, indicate if it is a standardized scale and the results. Please categorize each outcome measure into one of the following categories: health and safety outcomes, utilization outcomes, occupational injury and illness surveillance outcomes and intermediate outcomes[1]

Outcome Measure	**Standardized Measure/New**	**Category (health and safety; utilization outcomes; occupational injury/illness surveillance outcomes;**	**Results** See below

		intermediate outcomes)[1]	
Binary (yes or no) indicator of whether any medical expenditures occurred during the person-month	Standardized and quite common in the health economics literature	Health – primary outcome	See below
Natural log of medical expenditures in months when any such expenditures were observed	Standardized and quite common in the health economics literature (but note that more recent studies often use exponential models that do not require log transforms)	Health – primary outcome	See below
An indicator for whether any substance-abuse-related medical expenditures were incurred in the person-month	New	Secondary outcome	It turned out that very few people had any substance-abuse-related medical expenditures so this outcome was not studied in detail.
An indicator for whether any work-related injury was incurred in the person-month	New	Primary outcome - safety	See below

[1] Outcome measure categories include:

Health and safety outcomes (e.g., mortality, incidence of injuries, cardiovascular disease or cancer; morbidity related to injuries, illness or chronic disease; depression or anxiety; validated measures of functional status; QOL; stress or distress)

Utilization outcomes (e.g., hospitalizations, ED visits, outpatient clinic visits)

Occupational injury and illness surveillance outcomes (e.g., WC claims, injury or illness surveillance outcomes)

Intermediate outcomes (e.g., Tobacco, alcohol or other drug use; weight or BMI; blood pressure; cholesterol; exercise frequency; healthy eating behavior; hazardous work exposures; near misses)

Confounders:

The analyses controlled for age, gender, race, job type, number of years with the company, and number of different underlying medical conditions.

Results:

We found a U-shaped relationship between number of urinalysis tests and total medical expenditures. The U-shape implies that there must be an optimal number of tests that should be applied in order to minimize medical expenditures. Results indicated that testing people an average of 1.68 times a year (e.g., test everyone at least once and 68% at least twice) would likely minimize medical expenditures.

Results also indicated that doubling the testing rate would be associated with cutting the injury rate in half. However, injury rates were already very low, so the impact on accident rates associated with more testing would have been negligible.

Please describe if there are alternative methods that could have improved the study:

More recent modeling approaches, such as the use of exponential expenditure models would have been useful.

It would have been better if we had additional information on productivity at work, because the literature suggests that drug use has more impact on productivity than other outcomes.

Other Comments:

I chose this paper for a case study because it describes analyses of medical expenditures and a safety metric and it is hard to find evaluation studies that do this. The analyses were designed to account for the nature of the cost data (i.e., lots of months with zero dollars of expenditures) and the fact that each subject contributed multiple months of data. (Generalized estimating equations – GEE – models were used to avoid bias that would have occurred without accounting for multiple observations.) Calculus was applied to the regression results to find the cost-minimized level of testing, which is cool.

Total Worker Health® Research Methodology Workshop
Case Study - 8

A *Total Worker Health* approach is defined as policies, programs, and practices that integrate protection from work-related safety and health hazards with promotion of injury and illness–prevention efforts to advance worker well-being.

Citation: Pronk NP, Lagerstrom D, Haws J. *LifeWorks@TURCK*: A best practice case study on workplace well-being program design. ACSM's Health & Fitness Journal. 2015;19(3):43-48.

(Some data coming from: Pronk NP, McLellan DL, McGrail MP, Olson SM, McKinney ZJ, Katz JN, Wagner GR, and Sorensen G. Measurement tools for integrated worker health protection and promotion: Lessons learned from the SafeWEll Project. J Occup Environ Med. 2016;58(7):651-658.)

Goal of the study: To document how one specific company designed its program according to best practice principles and to describe the results this program generated over the course of 10 years.

Description of Intervention:

- **Content of the intervention including:** 10 years of iterative, progressive, and sustained implementation of policies, programs, and practices. Leadership training (multi-level) and development including executive accountability for the program. Adequate resourcing and integration with the benefits plan.
    - **Protection from work-related safety and health hazards (OSH)**
        - Combined safety, well-being and continues quality improvement committee
        - Safety walk-throughs conducted by safety officer
        - Employee self-reported safety issues into online safety monitoring and improvement system designed to address and resolve issues with feedback to stakeholders
        - Safety seminars
        - Strategic integrated (safety and HWB) multi-year strategic planning
    - **Promotion of injury and illness prevention efforts (WHP)**
        - Comprehensive HWB program
        - Supportive physical work environments and organizational policies
        - Supportive psychosocial work environments and organizational policies
        - Assessment of health risks with feedback (health assessments, biometric screenings)
        - Organizational environmental and policy assessment
        - Integration of programs and vendors (linkages to EAP, work-life balance, disease management, case management, return-to-work, FMLA, occupational safety and health, occupational medicine, ergonomics, etc.)

• Awareness and education programs
• Behavior change programs
• Multilevel programming (individual, group, management/organizational, environmental, policy

- **Delivery format**
    - Operations work plan
    - Implementation management system
    - Population triage, segmentation
    - Targeted outreach
    - Dedicated on-site staff
- **Duration and follow-up**
    - 10-year journey
    - Follow-up analyses conducted at various time points throughout the 10 years
    - Overall impact considered over the course of 10 years from health and well-being, company cultural, cost savings, and marketplace performance perspectives.

How is integration defined: Integration was operationally defined as the coming together of a healthy work environment, worker safety and protection, and worker well-being (career, social, physical, financial, and community) efforts into a single platform to support a safe, healthy, and well workforce

Study Design: Case study organized according to adherence to best practice design principles over the course of a 10 year period

Participants: Entire workforce in the Twin Cities

- **Inclusion/exclusion criteria** all active employees in the Minneapolis/Saint Paul locations
- **Number of groups** Single group in 2 locations
- **Sample size** N=500
- **Recruitment** NA

Intervention Setting: Workplace, community

Outcome Measures:

- Please list all outcome measures described in the study, indicate if it is a standardized scale and the results. Please categorize each outcome measure into one of the following categories: health and safety outcomes, utilization outcomes, occupational injury and illness surveillance outcomes and intermediate outcomes[1]

Outcome Measure	**Standardized Measure/New**	**Category (health and safety; utilization outcomes; occupational injury/illness surveillance outcomes; intermediate outcomes)**[1]	**Results**
Culture/climate - Employee engagement	Engagement survey (standardized tool from consultant vendor)	Climate of well-being	• 75% survey participation • 93% gives their best efforts each day • 91% puts in extra time and effort as needed • 89% intends and would like to stay at TURCK for a year or longer • 88% strives to exceed expectation for those they impact each day • 87% is committed to TURCK's core purpose and values
Financial	Employee turnover	Financial	4% annual turnover in 2010, 2% in 2011, 1% in 2012 (compared with 13% industry average)
Financial	Financial business performance indicator – standardized aka	Financial	''strong and sustained financial performance of the platform has moved from a breakeven

	EBITDA - income from operations or earnings before interest and tax (Essentially, it's a way to evaluate a company's performance without having to factor in financing decisions, accounting decisions or tax environments, sometimes referred to as ‘‘operating earnings’’ or ‘‘income from operations’’)		trend between 2003 and 2008 to approximately 7% to 8% income from operations during each of the past 5 years.’’— CEO Quote
Utilization	EMR records, claims data, behavioral health data	Utilization	• External medical office visits declining at a rate of 5.2% year-over-year • Since 2008, a 27% annual increase in on-site clinic visits • On-site clinic net cost savings increased from $46,000 in 2008 to $491,000 in 2012 • Compared with health plan trend, TURCK avoided $4.7 million in health care costs between 2008 and 2013 Since 2009, a 69% reduction in behavioral health visits (from a rate of 480/1,000 to 150/1,000)
Occupational injury and illness	WC records	Occupational injury and illness	Sustained decrease in worker’s

surveillance outcomes		surveillance outcomes	compensation and FMLA claims since 2003
Occupational injury and illness surveillance outcomes	Safety walkthrough assessment tool (new) ; Hazards and risk potential in the work environment	Occupational injury and illness surveillance outcomes	Moved all hazards from categories >1 (more than low risk) to low risk category
Health and safety outcomes	Self-rated safety system –based on OSHA Form 33	Health and safety outcomes	Improved from 88% at baseline to 90% at follow-up
Health and safety outcomes	CDC Scorecard – organizational support, physical activity, and nutrition modules only	Health and safety outcomes	Org. support and PA stayed the same and nutrition improved form 73% at baseline to 95% at follow-up
Health and safety outcomes	Health assessment including health and safety questions	Health and safety outcomes	Health and well-being indicators tended to improve; self-perceived ratings of HWB culture improved from 89% to 92% while safety culture declined from 90% to 88%; back pain reduced from 36% to 33%

[1] Outcome measure categories include:

Health and safety outcomes (e.g., mortality, incidence of injuries, cardiovascular disease or cancer; morbidity related to injuries, illness or chronic disease; depression or anxiety; validated measures of functional status; QOL; stress or distress)

Utilization outcomes (e.g., hospitalizations, ED visits, outpatient clinic visits)

Occupational injury and illness surveillance outcomes (e.g., WC claims, injury or illness surveillance outcomes)

Intermediate outcomes (e.g., Tobacco, alcohol or other drug use; weight or BMI; blood pressure; cholesterol; exercise frequency; healthy eating behavior; hazardous work exposures; near misses)

Confounders:

- No comparison or control
- No randomization
- Biases caused by study design limitations

- Difficult to tease out the iterative and progressive nature of the program over time—no specific starting point for a full intervention; rather an increasingly comprehensive and sophisticated intervention

Results: The integrated approach at TURCK brings together environmental health and safety, a climate of well-being, and continuous improvement that results in sustainable health, well-being, and growth for the company and its employees.

Please describe if there are alternative methods that could have improved the study:

A stronger alternative method would have been an interrupted time series with control group. This design would have provided trustworthy effects.

Alternatively, a single interrupted time series would have been desirable as it would have controlled for trends, but no comparison group, thereby providing sometimes trustworthy effects (depending upon the effect size).

Other Comments:

Strengths of the case study method include the longitudinal nature of the assessment (10-years), the wide variety of indicators, and the ability to consider trend.

Total Worker Health® Research Methodology Workshop
Case Study - 9

A *Total Worker Health* approach is defined as policies, programs, and practices that integrate protection from work-related safety and health hazards with promotion of injury and illness–prevention efforts to advance worker well-being.

Citation:
Leslie B. Hammer, Donald M. Truxillo, Todd Bodner, Jennifer Rineer, Amy C. Pytlovany, and Amy Richman, "Effects of a Workplace Intervention Targeting Psychosocial Risk Factors on Safety and Health Outcomes," BioMed Research International, vol. 2015, Article ID 836967, 12 pages, 2015. doi:10.1155/2015/836967

Goal of the study:
To test the effectiveness of a TWH-based work-family and safety support intervention—Safety and Health Improvement Program (SHIP)—that targets work-life stress and safety-related psychosocial risk factors on health and safety outcomes among construction workers employed in a municipal department. The study tested whether SHIP increased workplace support and decreased stress, thus improving employees' safety, health, and well-being. Authors hypothesized that "SHIP will lead to improvements in worker safety (H1—safety participation, safety compliance) and health (H2—self-reported general health, blood pressure) over time" (p. 4).

Description of Intervention:

- **Content and delivery of the intervention:**
    - Supervisors
        - Computer training (cTRAIN platform), 1 hour
            - Family supportive behaviors
            - Safety-supportive behaviors
        - Behavior tracking
            - 2 weeks after computer training
            - Self-set goals based on training—chose training-related behaviors to track
            - Definitions and videos of learning behaviors; iPod Touch (HabiTrak software) used for tracking
    - Employees (i.e., work group members)
        - Team effectiveness process (TEP)—2 months
            - 4-hour facilitated team session
            - Pre-session questionnaires
            - Planning and problem-solving supportive behaviors
            - Team action plans on steps to improve safety and work-family management behaviors
        - TEP check-ins

- Teams met with supervisors to review principles, progress, and plan updates.
- 30-, 60-, and 90-day post-TEP

- **Duration and follow-up:**
  - Prior to intervention, surveys and health assessments administered
  - December 2012: Supervisor training, then . . .
  - December 2012: Behavior tracking (2 weeks)
  - January-February 2012: Team effectiveness process (TEP)
  - Check-ins: 30 days, 60 days, and 90 days after TEP
  - After 12 months, surveys and health assessments re-administered

How is integration defined:

- Development of SHIP being grounded in theory from several disciplines
- Utilization of work teams in the current study design
- SHIP combines both work and family dimensions

Study Design:

Randomized control trial design of a sample of construction workers

Participants

- **Inclusion/exclusion criteria:** Construction and utility workers in a municipal public works department
- **Number of groups:** Organized into 8 divisions which were divided further into a total of 21 functional workgroups; randomly assigned to one of these groups:
  - SHIP intervention: 11 groups (*N* = 167)
  - Control group: 10 groups (*N* = 125)
- **Sample size:** 264 construction workers
  - 90% male
  - 79% white; 2% Hispanic/Latino
  - 97% complete high school; 54% college experience
  - Mean age = 45.13
  - 60% married; 12% living with significant other
  - 55% children at home; 33% caring for adult relative
  - Mean years at current job = 11.4
  - 80% working 40 hours/week
  - 8.3% supervisor; 13.4% crew leader; 70.5% crew member; 5.1% other
- **Recruitment:** Employees were invited to participate and told participation would take place during company time at the work site. Were told about a research study examining employees' safety, health, and work experiences. Participation was voluntary, and a $25 gift card was given for completing each data collection session. Participants were given unique identification codes based on a roster provided by the company.

Intervention Setting:

Intervention was done with construction workers and their supervisors in an urban municipal department. Supervisors took computer-based training onsite, and then carried iPod Touch devices for behavior tracking. Employees assigned to the intervention group participated in workgroup exercises onsite.

Outcome Measures:

Outcome Measure	**Standardized Measure/New**	**Category**[1]	**Results**
Blood pressure	Machine w/ arm cuff; 3 consecutive readings w/ overall average recorded	Intermediate	Scores at 12-month assessment period higher in intervention groups than in control groups
Self-reported general health	Physical health composite score from SF-12 [Ware et al. 1996]	intermediate	No significant differences among intervention and control groups at 12-month assessment period
Safety participation behavior	3 Likert-type items [Neal et al. 2000]	Intermediate	No significant differences in intervention group across both assessment periods
Safety compliance behavior	3 Likert-type items [Neal et al. 2000]	intermediate	No significant differences in intervention group across both assessment periods

Confounders:
None identified by the authors.

Results:

- *No significant differences* across intervention conditions for baseline blood pressure, self-reported general health (physical composite) scores, safety participation, and safety compliance.
- Blood pressure: Scores at 12-month assessment period *significantly higher* in intervention groups than in control groups controlling for baseline blood pressure scores, age, and use of blood pressure medication.
- Self-reported general health: *No significant differences* among intervention and control groups at 12-month assessment period (self-reported general health), controlling for baseline blood pressure scores, age, and use of blood pressure medication.
- Safety participation: *No significant differences* in intervention group across both assessment periods
- Safety compliance: *No significant differences* in intervention group across both assessment periods

Please describe if there are alternative methods that could have improved the study

- Separate out the effects of the top-down and bottom-up approaches
- Include other risk factors (besides blood pressure) as health outcomes
- Do more to ensure greater participation at *both* baseline and 12-month follow-up assessment periods
- Examine in more detail the processes of how SHIP operates and incorporate those processes into the study design.

Other Comments:

"A limitation of the integrated intervention . . . is that the two intervention components (supervisor training and TEP), while reinforcing one another, cannot be teased apart as to whether the intervention effects are due to the supervisor training component, the team-based component, or both" (p. 9).

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[1] Outcome measure categories include:

Health and safety outcomes (e.g., mortality, incidence of injuries, cardiovascular disease or cancer; morbidity related to injuries, illness or chronic disease; depression or anxiety; validated measures of functional status; QOL; stress or distress)

Utilization outcomes (e.g., hospitalizations, ED visits, outpatient clinic visits)

Occupational injury and illness surveillance outcomes (e.g., WC claims, injury or illness surveillance outcomes)

Intermediate outcomes (e.g., Tobacco, alcohol or other drug use; weight or BMI; blood pressure; cholesterol; exercise frequency; healthy eating behavior; hazardous work exposures; near misses)

Total Worker Health® Research Methodology Workshop
Case Study - 10

A *Total Worker Health* approach is defined as policies, programs, and practices that integrate protection from work-related safety and health hazards with promotion of injury and illness–prevention efforts to advance worker well-being.

Citation:
Sorensen G, Stoddard A, LaMontagne A, Emmons K, Hunt MK, Youngstrom R, McLellan D, Christiani D. A comprehensive worksite cancer prevention intervention: Behavior change results from a randomized controlled trial (United States). Cancer Causes Control 2002; 13(6): 493-502. Reprinted in J Health Policy 2003; 24(1): 5-25.

With additional input from:

- LaMontagne AD, Stoddard AM, Youngstrom RA, Lewiton M, Klar JM, Sorensen G. Improving the prevention and control of hazardous substance exposures: A randomized controlled trial in manufacturing worksites. Am J Ind Med 2005; 48(4): 282-292.
- LaMontagne AD, Youngstrom RA, Lewiton M, Stoddard AM, McLellan D, Wallace LM, Barbeau E, Sorensen G. Assessing and intervening on occupational health and safety programs: Effective evaluation of the WellWorks-2 intervention in fifteen manufacturing worksites. Occup Environ Med 2004; 61: 651-660.
- Hunt MK, Lederman R, Stoddard AM, LaMontagne AD, McLellan D, Combe C, Barbeau E, Sorensen G. Process evaluation of an integrated health promotion/occupational health model in WellWorks-2. Health Ed Behav 2005; 32(1): 10-26.

Goal of the study:
This study assessed whether an intervention integrating health promotion with occupational health and safety results in significant and meaningful increases in smoking cessation and consumption of fruits and vegetables, compared to a standard health promotion intervention, for workers overall and for blue-collar workers in particular. The study also examined the extent to which this integrated intervention resulted in greater improvements in exposure protection and occupational safety and health (OSH) program indicators. The study was a cluster randomized design in which 15 worksites were randomly assigned to one of two groups: Health Promotion only or Health Promotion plus OSH.

Description of Intervention:

- **Content of the intervention including:**
  - **Protection from work-related safety and health hazards (OSH)**
  - **Promotion of injury and illness prevention efforts (WHP)**
- **Delivery format**

In order to avoid confounding due to the introduction of between-group differences unrelated to the incorporation of occupational health and safety, the interventions for

both conditions were based on the same two key theoretical constructs: (1) principles of community organization, operationalized in this study as joint worker–management participation, and (2) a socio- ecological model, with interventions at the individual, organizational, and environmental levels of influence. Intervention delivery was guided by process objectives that specified tested behavior change and worker-centered educational strategies and intervention activities, and structured a relatively equivalent ''dose'' of intervention across the two conditions. The intervention included:

- Joint worker–management participation: In both conditions Employee Advisory Boards (EABs) were formed to serve as channels for worker–manage input into WellWorks programs. EABs included representation from workers, management, and various departments, and met for approximately one hour each month. EABs in the HP/OHS condition also included health and safety representation, and in some cases their efforts were incorporated into the health and safety committee.

- Interventions targeting the worksite organization and environment: The HP condition provided consultation to management on tobacco control policies, food catering, and cafeteria policies. The HP/OHS condition additionally recommended changes to reduce workers' exposures to hazardous substances used in work processes. These recommendations were based on baseline walk-through assessments of exposures and occupational health and safety programs, conducted by the program's industrial hygienist, using the Occupational Hazards Assessment. These contacts included one-to-one consultation and technical assistance, group educational sessions, and educational communication with written materials. The management intervention for occupational health and safety was based on industrial hygiene principles that delineate a hierarchy of controls for the reduction of workplace hazards.

- Interventions for individual workers: In the HP condition the individual interventions focused on nutrition and tobacco use. In the HP/OHS condition each intervention activity addressed both occupational health and safety (exposure to hazardous substances) and at least one health behavior (smoking and/or nutrition). For example, as a means of addressing worker concerns regarding exposure to occupational hazards, worksite tobacco control programs incorporated messages concerning occupational health and safety, and occupational health and safety programs incorporated messages concerning smoking or nutrition.

Duration and follow-up: 16-month intervention period, with two years between the baseline and final surveys.

How is integration defined: In this study, the integrated approach used a hierarchy of controls framework. Integration was defined as more than the simple sum of HP and OSH. Rather, in this study it was recognized that an integrated approach qualitatively changes the nature of the intervention, whether from an HP or OSH perspective, understanding that health behaviors and exposure protection are interrelated. The model used a multi-level, participatory approach. With the hierarchy of controls perspective, managers were seen as the primary drivers for

changes in the work environment; interventions with managers were aimed at reducing exposure potential as well as improving policies and practices to promote health and wellbeing. Interventions for individual workers incorporated integrated messages that place health behavior changes in the work context, recognizing potential work-related exposures and communicating improvements in policies and practices instituted by management.

Study Design: Cluster randomized controlled trial. Work sites were randomized within blocks: unionized versus nonunionized, single versus multiple buildings, and three work sites that were part of a single large company.

Participants

- **Inclusion/exclusion criteria**

Work-site eligibility criteria included the following: (a) employ between 400 and 2,000 workers in manufacturing workplaces, (b) probable use of hazardous chemicals, and (c) turnover rate < 20% (to prevent excessive loss to follow-up). In addition, work sites agreed to (a) be randomly assigned to intervention condition, (b) allow completion of worker surveys on work time, and (c) participate in the Occupational Hazards Assessment at the time of the baseline and final surveys. Workers were eligible to participate in the surveys if they were noncontractual workers employed on a permanent basis for 15 hours per week or more and worked on-site.

- **Number of groups** – 2

- **Sample size:**

15 worksites defined as eligible were recruited to the study. All workers were eligible to participate in the intervention. Workers were eligible to participate in the surveys if they were noncontractual workers employed on a permanent basis for 15 hours per week or more and worked on-site. The response rate was 80% at baseline (range 64–92%; total n=9019) and 65% at final (range 31–89%; total n= 7327). A total of 5156 subjects responded to both the baseline and final surveys. This subgroup constituted an embedded cohort of respondents.

- **Recruitment**

Sites were identified using Dun and Bradstreet listings of manufacturing businesses within eastern Massachusetts. A total of 89 worksites was contacted; 41 were assessed to be eligible for the study. Of 41 eligible worksites, 15 agreed to participate in the full study.

The types of manufacturing conducted at the recruited worksites included adhesives, food, technology, jewelry, motor controls, paper products, newspaper, abrasives, automobile parts, and metal fabrication.

Intervention Setting: Manufacturing worksites

Outcome Measures:

- Please list all outcome measures described in the study, indicate if it is a standardized scale and the results. Please categorize each outcome measure into one of the following

categories: health and safety outcomes, utilization outcomes, occupational injury and illness surveillance outcomes and intermediate outcomes[1]

Outcome Measure	Standardized Measure/New	Category (health and safety; utilization outcomes; occupational injury/illness surveillance outcomes; intermediate outcomes)[1]	Results
Smoking quit rates	Standardized measure: Current smokers were defined as individuals who had smoked at least 100 cigarettes in their lives and defined themselves as current smokers. Smoking quit rates were measured among the cohort of baseline smokers who responded to the final survey. Quit rates were assessed by self-reported abstinence for the six months prior to the survey.	Intermediate outcomes	Smoking quit rates among hourly workers in the HP/OHS condition more than doubled relative to those in the HP condition (11.8% vs 5.9%; p ¼ 0.04), and were comparable to quit rates of salaried workers. No differences in quit rates between groups for salaried workers, or for the sample overall.
Fruit and vegetable consumption	Standardized: Fruit and vegetable intake was measured using a seven-item fruit and vegetable screener developed by the National Cancer Institute.	Intermediate outcomes	Only small and statistically non-significant changes were observed in the embedded cohort overall. No differences by job type
Exposure protection	New: Exposure protection was measured in a brief walk-through conducted by an industrial hygienist and following a hierarchy of controls approach to assess	Intermediate outcomes	Greater improvements but NS in the HP/OSH condition; patterns of improvement in the integrated

	exposure potential and protection related to materials, process and human interface.		condition were upstream/source-focused, compared with worker-focused in the HP only group.
OSH program score	Adapted: OSH programs were assessed using an instrument adapted from the OSHA's 1995 Program Evaluation Profile, grouped under OSHA's four program ''Essential Elements'' of: management commitment and employee participation, workplace analysis, hazard prevention and control, and education and training.	Intermediate outcomes	Significant improvements in management commitment and employee participation in the HP/OSH condition, and overall trend of greater improvements in the integrated intervention.

[1] Outcome measure categories include:

Health and safety outcomes (e.g., mortality, incidence of injuries, cardiovascular disease or cancer; morbidity related to injuries, illness or chronic disease; depression or anxiety; validated measures of functional status; QOL; stress or distress)

Utilization outcomes (e.g., hospitalizations, ED visits, outpatient clinic visits)

Occupational injury and illness surveillance outcomes (e.g., WC claims, injury or illness surveillance outcomes)

Intermediate outcomes (e.g., Tobacco, alcohol or other drug use; weight or BMI; blood pressure; cholesterol; exercise frequency; healthy eating behavior; hazardous work exposures; near misses)

Confounders/ potential limitations:

- The study was powered to detect statistically significant and meaningful changes in the targeted health behaviors. However, it was not powered to detect worksite-level changes in OSH programs or exposure protection related to occupational hazards.
- Focus on manufacturing worksites limits generalizability.
- This study focused specifically on the physical work environment; it was outside the scope of the study to incorporate interventions to address the organization of work.

Results: This study demonstrated that an intervention addressing both health promotion and occupational health and safety resulted in a quit rate among blue-collar workers comparable to that observed among white-collar workers, a rate that was over double that

observed among blue-collar workers in the health promotion only group. Compared to the HP condition, the integrated intervention resulted in larger, although non-significant, improvements exposure protection, and these improvements were more likely to be source-focused rather than worker focused. The study highlighted the need for and feasibility of the management intervention, which resulted in improvements in the OSH program in the integrated condition. In addition, based on the process evaluation, there were higher levels of both worker and manager participation in the HP/OHS condition compared to the health promotion only group.

Please describe if there are alternative methods that could have improved the study:
Greater statistical power would improve the ability to assess improvements in worksite-level indicators, such as exposure protection.

Other Comments:

Total Worker Health® Research Methodology Workshop
Case Study - 11

A *Total Worker Health* approach is defined as policies, programs, and practices that integrate protection from work-related safety and health hazards with promotion of injury and illness–prevention efforts to advance worker well-being.

Citation:
Dalton, B. A., & Harris, J. S. (1991). A comprehensive approach to corporate health management. Journal of Occupational Medicine, 33, 338–347.

Goal of the study:
Evaluate impact of six initiatives designed to reduce medical costs and workers comp claims

Description of Intervention:

- **Content of the intervention including:**

Health Enhancement program focused on health promotion, primary prevention, self-care, and disability management.

- **Protection from work-related safety and health hazards (OSH)**

• Initiative 1: Health promotion
- Healthy food provided in cafeteria and vending machines
- Cigarette vending machines removed
• Initiative 2: Intensified safety and industrial hygiene program
- procedures developed and placed in company procedure manual
- organizational surveys, participant-directed task realignment, job redesign, safety, and quality improvements
• Initiative 5: Management of medically-related disability

- **Promotion of injury and illness prevention efforts (WHP)**

• Initiative 1: Health promotion
- Smoking prohibited in company buildings and vehicles
• Initiative 2: Intensified safety and industrial hygiene program
- management targets for accident frequency
- divisional competition to improve in safety
• Initiative 3: On-site primary care – screening, chronic disease monitoring, counseling
• Initiative 4: Incentives to join HMOs
• Initiative 6: Utilization management of self-funded insurance program

- **Delivery format**

Policy changes, benefits changes, environment/equipment changes, job assessment and design, procedural changes, goal setting, training, incentives, newsletters

- **Duration and follow-up**

4-5 years, depending on initiative;
Pilot study results at 2 years into program.
Permanent companywide program:
Measures were taken or collected from existing data for a pilot study in 1984-1986 as the program was being rolled out; for the company-wide program, baseline data from 1984 were compared to data collected from in 1988 (~4 years since the program began).

How is integration defined:

NA

Study Design:
One-group longitudinal design: preprogram/post-program with measures at multiple time points (although the preprogram measures were in 1984 the same year the various programs were implemented so the "pre" condition may be considered to be weak)

Participants

- **Inclusion/exclusion criteria**

None other than employment at site "Northern Telecom Inc."

- **Number of groups**
- One, but different samples were used to evaluate different components

- **Sample size**
- N: ~6000 for companywide health and safety results;
- N = ~600 for random 10% survey sample to evaluate the HP initiative;
- N = 231 for pilot study survey to evaluate health promotion initiative

- **Recruitment**

A variety of formats in company communications and invitations. Much of the evaluation data did not require recruitment.

Intervention Setting:

"Northern Telecom Inc."

Outcome Measures:

- Please list all outcome measures described in the study, indicate if it is a standardized scale and the results. Please categorize each outcome measure into one of the following categories: health and safety outcomes, utilization outcomes, occupational injury and illness surveillance outcomes and intermediate outcomes[1]

Outcome Measure	Standardized Measure/New	Category (health and safety; utilization	Results

		outcomes; occupational injury/illness surveillance outcomes; intermediate outcomes)[1]	
See results below			

[1] Outcome measure categories include:

Health and safety outcomes (e.g., mortality, incidence of injuries, cardiovascular disease or cancer; morbidity related to injuries, illness or chronic disease; depression or anxiety; validated measures of functional status; QOL; stress or distress)

Utilization outcomes (e.g., hospitalizations, ED visits, outpatient clinic visits)

Occupational injury and illness surveillance outcomes (e.g., WC claims, injury or illness surveillance outcomes)

Intermediate outcomes (e.g., Tobacco, alcohol or other drug use; weight or BMI; blood pressure; cholesterol; exercise frequency; healthy eating behavior; hazardous work exposures; near misses)

Confounders:

Time, multiple components implemented simultaneously

Results:

S=survey, O=organizational metrics

Pilot results (pre to post): Health

Reduced

- heavy drinking (S): -1 risk stratum
- days absent (S): -2/year
- physician visits (O): -1/year
- hospital admissions (O): -0.5/year
- health-related expenses (S): -$297/year
- systolic blood pressure (O): -6mm Hg
- body fat (O): -3%

Improved

- VO2max (O): +5ml/min
- Health status (S): “Good” improved to “very good”

Measures Not Significant

Fitness improvement (S)

Company-wide results: Health

Reduced

- % alcohol (> 1drink/day) (S): -11% (23%>12%)
- prevalence of uncontrolled hypertension (S?): -11%
- reporting uncontrolled work stress (15%>4%)
- % overweight (S): +17% overweight (22%>39%); believed due to awareness
- % smoking (S): -8% smokers (33%>25%)
- % with 'great' work stress ('great') (S): -7% reporting stress (40% > 33%)
- number of hospital admissions (O): -22.9/1000 admissions (95.9/1000>73.0/1000)
- Length of hospital stay (O): -6.7% days in hospital
- Costs per claimant for health conditions (O): -18% (relative to 1984 ratio=1.0, cost/case ratio decreased to 0.78 in 1988)

Measures Not Significant

- elevated diastolic blood pressure (>140/90) (O)
- elevated cholesterol (> 220 mg/dL) (O)
- sedentary lifestyle (S)
- 'great' home stress (S)

Pilot results (pre to post): Safety

Improved

- seat belt use (S): + 28% use seat belts all or most of time (67%>95%)

Company wide results:

Improved

- % using seat belts all or most of time (S): +61% (20% >81%)

Measures Not Tested for Significance

- OSHA recordable injuries (O): -40%
- lost work per recordable injury (O): -43%
- workers' compensation cost/employee (O): relative to 1984 ratio =1.0, 1988 cost ratio was 0.5-0.6

Please describe if there are alternative methods that could have improved the study:

Control conditions or multiple baseline design; random assignment of divisions/groups to conditions or timing of conditions; perhaps measures of factors such as safety climate (was new concept and not well known in 80s), and other psychosocial factors, and social validity of program components (leader and employee eval of acceptability of goals, procedures, and outcomes).

Other Comments:

The study highlights importance of consideration for levels of intervention and evaluation relevant to each level, such as:

- Environment/engineering changes
- Process, Job, work design
- Policy
- Level involved in component (Top level leaders, mid-management, line employees)
- Systems/permanent changes, programs, and events

Total Worker Health® Research Methodology Workshop
Case Study - 12

A *Total Worker Health* approach is defined as policies, programs, and practices that integrate protection from work-related safety and health hazards with promotion of injury and illness–prevention efforts to advance worker well-being.

Citation:

Russell J, Berney L, Stansfeld S, Lanz D, Kerry S, Chandola T, Bhui K. The role of qualitative research in adding value to a randomized controlled trial: lessons from a pilot study of a guided e-learning intervention for managers to improve employee wellbeing and reduce sickness absence. Trials. 2016 Aug 9;17(1):396. doi: 10.1186/s13063-016-1497-8.

Stansfeld SA, Kerry S, Chandola T, Russell J, Berney L, Hounsome N, Lanz D, Costelloe C, Smuk M, Bhui K. Pilot student of a cluter randomized trial of a guided e-learning health promotion intervention for managers based on management standards for the improvement of employee well-being and reduction of sickness absence: GEM study. BMJ Open 2015; 5: e007981. Doi:10.1136/bmjopen-2015-007981

Goal of the study:

To investigate the feasibility of recruitment, adherence and likely effectiveness of an e-learning intervention for managers to improve employees' well-being and reduce sickness absence.

Description of Intervention: Employees were recruited from four mental health services prior to randomizing three services to the intervention and one to no-intervention control. Intervention managers received a facilitated e-learning programm on work-related stress

Content of the intervention including: e-learning training for managers addressing organizational changes to reduce stress. Anderson Peak Performance e-learning package ' Managing Employee Pressure at Work' , an established e-learning health promotion programme for managers with a focus on the six management standards domains: Change, Control, Demands, Relationship, Role and Support (http://www. andersonpeakperformance.co.uk).

Protection from work-related safety and health hazards (OSH): Workplace stress at organizational level

Promotion of injury and illness prevention efforts (WHP): Workplace stress at organizational level

- **Delivery format:** online/e-learning – modules delivered every 1-2 weeks over 3 month period. Managers in control received no intervention.
- Employees completed questionnaires at baseline and 3 months later.
- Absence and sick leave data was collected
- **Qualitative data**:

- 14 in-depth interviews with key informants from the trust, the steering committee and people with expertise in work-related stress
- In depth interviews with managers from control and intervention groups
- Observed during meetings involving managers and employees
- **Duration and follow-up:**

How is integration defined: Not defined

Study Design:
The GEM Study (guided e-learning for managers) was a mixed methods pilot cluster randomized trial. Clusters were services as part of National Health Service in the UK. Managers participated.

Participants
Inclusion/exclusion criteria: Inclusion criteria were (1) the organisation' s ability to provide data on sickness absence and (2) managers allowed internet access at work. Employees who would not remain in the organization during the study because of long-term sickness, notified pregnancies or fixed-term contracts were excluded.
Number of groups: 2 groups (intervention and control)
Sample size: N=350 employees at baseline; 291 at follow up (649 initially contacted, 424 invited); 3 workplaces assigned to intervention (N=49 managers) and 1 to control (N= 11 Managers); 36 key informant interviews; observation of meetings
Recruitment: Six workplace services were considered for inclusion; two were rejected because of insuffi cient employment data and dissimilar work. Employees gave informed consent to participate in the study prior to randomisation. After randomization managers from the intervention clusters were invited to take part in the intervention. A parallel qualitative investigation of key informants, managers and employees was carried out.

Intervention Setting: workplaces (services) in the National Health Services in the UK

Outcome Measures:
- Please list all outcome measures described in the study, indicate if it is a standardized scale and the results. Please categorize each outcome measure into one of the following categories: health and safety outcomes, utilization outcomes, occupational injury and illness surveillance outcomes and intermediate outcomes[1]

Outcome Measure	**Standardized Measure/New**	**Category (health and safety; utilization outcomes; occupational injury/illness surveillance outcomes;**	**Results**

		intermediate outcomes)[1]	
Employee well-being	Warwick Edinburgh Mental Wellbeing Scale (WEMWBS),29 a 14-item scale assessing positive mental health	Health and safety	Decline from pre to post in both groups
Sickness absence	Existing reporting system	Occupational injury/illness surveillance outcomes	No difference
Sickness absence (self-report)		Health and Safety?	No difference
Psychological distress	12 item General Health Questionnaire	Health and Safety	No difference
Self-reported psychosocial work characteristics	Job Content Questionnaire	Health and safety	No difference
Knowledge of managers from training	Quizzes in e-learning	Process outcome	Only 51% met minimum requirement of compliance/adherence – completing 3 of 6 training modules
Interviews	Key informant interviews	Process outcome?	Recommendations for intervention format; managers were also employees and experiencing stress; lack of senior management buy in

[1] Outcome measure categories include:

Health and safety outcomes (e.g., mortality, incidence of injuries, cardiovascular disease or cancer; morbidity related to injuries, illness or chronic disease; depression or anxiety; validated measures of functional status; QOL; stress or distress)

Utilization outcomes (e.g., hospitalizations, ED visits, outpatient clinic visits)

Occupational injury and illness surveillance outcomes (e.g., WC claims, injury or illness surveillance outcomes)

Intermediate outcomes (e.g., Tobacco, alcohol or other drug use; weight or BMI; blood pressure; cholesterol; exercise frequency; healthy eating behavior; hazardous work exposures; near misses)

Results: The results of the pilot trial showed little positive effect on employee wellbeing and sickness absence. In fact, employee wellbeing decreased over the trial period, although it decreased marginally less in the intervention clusters than the control cluster. Sickness absence data showed no evidence of effect.

The qualitative data highlighted the ways in which the intervention enabled participants to access domains of learning that were additional to knowledge acquisition, but these were unanticipated aspects of the learning process and not measured by the trial. Methods were also able to identify that adherence (defined as completing a module) may have been different, e.g., some managers did not complete activities of participate in facilitated meetings.

Qualitative findings indicated it is both personal and workplace stress impacting health and performance.

Please describe if there are alternative methods that could have improved the study:

The research team noted how the qualitative findings suggested ways in which the design of a full trial might be modified, for example, the need to include a measure of manager stress, the need for the trial to include a measure of the active learning elements of the educational intervention, and to do more to embed the intervention into organisational processes

One helpful modification, for example, might have been to begin the study with some preliminary qualitative research to inform the design and help set the agenda for the quantitative work

Other Comments:

This trial was occurring during a transition within the NHS – which may have impacted outcomes, but that is real world research. Also managers were also employees and were experiencing stress – again real world research.

Include information about qualitative and quantitative outcomes in the articles and reports from the study.

Total Worker Health® Research Methodology Workshop
Case Study - 13

A *Total Worker Health* approach is defined as policies, programs, and practices that integrate protection from work-related safety and health hazards with promotion of injury and illness–prevention efforts to advance worker well-being.

Citation:

Nobrega S., Kernan L., Plaku-Alakbarova B., et al. Field tests of a participatory ergonomics toolkit for Total Worker Health. Applied Ergonomics 2017; 60: 366-379.

Goal of the study:

To describe and evaluate a set of evidence-based practical guidelines for engaging workers in comprehensive efforts to protect workers from occupational hazards and simultaneously enhance the health-promoting features of the work environment. The guidelines (Healthy Workplace Participatory Program (HWPP) Toolkit) enable workplace practitioners to implement their own participatory TWH program.

The process evaluation was conducted according to the RE-AIM criteria.

Description of Intervention:

- **Content of the intervention including:**
  - **Protection from work-related safety and health hazards (OSH)**
  - **Promotion of injury and illness prevention efforts (WHP)**

  The intervention is a process that a) obtains opinions from front-line workers, middle and upper-level managers about the causes of unsafe work, poor health, and/or lack of well-being within the workforce; and engages people from the same three levels in a collaboration to remedy the root causes.

  Because it is a participatory process, the content varies among workplaces and over time. In these four case study sites (see "Intervention Setting" below), the content of the specific activities initiated during the program included:

  1. Education of apartment renters to reduce unnecessary work orders; better wireless phone service to reduce missed calls; and better management of work orders – *to reduce stress from high workload and poor communication*
  2. Uniforms made of looser, more breathable fabric – *to reduce overheating and physical discomfort during physical exertion*
  3. Procurement policy to support purchasing of ergonomic equipment; provision of computer workstation adjustment information; training of ergonomic champions; and walking breaks – *to reduce physical discomfort and associated stress*

4. Health fair with information responding to staff health concerns – *to address sleep disorders, overweight, mental health, and injury risks*

- **Delivery format**

  Each study site selected/designated an internal champion to coordinate activities; a "Design Team" (DT) of front-line employees to develop intervention proposals; and a "Steering Committee" of middle and senior managers to select which DT proposals would be implemented and to provide overall program oversight and resources.

  The research team provided a dedicated program facilitator to lead the program implementation in each site.

- **Duration and follow-up**

  Program implementation lasted two years.

  Process evaluation was conducted on an on-going basis throughout that same time period, so the follow-up period covered within this article is also two years.

How is integration defined:

Integration means that when workers in the DT discussed desired health improvements, they were encouraged to consider relevant exposures and obstacles in both domains when analyzing root causes of problems and brainstorming solutions. Similarly, interventions selected by the SC were expected to include attention to both domains.

Note: Health and safety outcomes were not distinguished on the basis of being work-attributable or non-work-attributable. Each outcome is recognized as having potential causes both from within the work environment and from outside the workplace.

Study Design:

Case study of field tests in four employer organizations

Participants

- **Inclusion/exclusion criteria**
  Employers were recruited from a group of organizations that had already completed a state-sponsored worksite wellness capacity-building program. The HWPP was marketed as an opportunity to expand the scope and sustainability, by addressing root causes of health issues including work organization factors.

- **Number of groups**
  Two employers selected specific work units within the organizations; two implemented the program for the entire workforce. Three of four organizations had work units in multiple locations.

- **Sample size**
  About 25 key managers were interviewed; about 30 workers participated as DT members across the four sites. Total workforce size ranged from 160 to 24,000 employees. A total of 950 employees was specifically targeted by the program.

- **Recruitment**
  This was an organization-level intervention; there was no recruitment of individuals to participate or not in specific activities.

Intervention Setting:

The four organizations were a real estate management firm; a human services non-profit agency; a state government human resources office; and a public sector correctional institution.

Outcome Measures:

- Please list all outcome measures described in the study, indicate if it is a standardized scale and the results. Please categorize each outcome measure into one of the following categories: health and safety outcomes, utilization outcomes, occupational injury and illness surveillance outcomes and intermediate outcomes[1]

This case study reports on a process evaluation; we do not yet have outcome data in the form requested. As enumerated above under "Content of the intervention," desired health goals selected by the DT and SC members in the four participating organizations encompassed a wide range of outcomes. These are re-stated here under the appropriate outcome measure categories.

Because the process itself entails identifying relevant features in the work environment, a large number of those were highlighted across the four sites. Thus they are listed in a separate group.

Many, although not all, of the health and intermediate outcomes listed were assessed using the CPH-NEW HWPP Toolkit "All-Employee Survey" (https://www.uml.edu/Research/CPH-NEW/Healthy-Work-Participatory-Program/identify-priorities/Survey-Manual.aspx) which includes items derived from a variety of standardized, public-access instruments.

Health and safety outcomes:

Mental health, stress, distress
Heat strain
Musculoskeletal strain and discomfort (e.g., back pain)
Sleep disorders
Acute injury

Intermediate outcomes:

Overweight
Exercise frequency

Eating behavior
Smoking
Alcohol consumption
Fatigue
Hazardous work exposures

- **Physical**: heavy lifting, prolonged sitting, uncomfortable workstations
- **Environmental**: heat / lack of temperature control, poor lighting, poor air quality
- **Organizational**: conflicting demands, inability to be off-duty, timing of lunch breaks, workload
- **Psychosocial**: low decision-making, poor communication, emotional demands, co-worker relationships, poor work-life balance
- **Other**: lack of healthy food options in vending machines

Confounders:

Does not apply

Results:

All four sites were able to implement the HWPP process. The goal of identifying both occupational and non-occupational risk factors was readily adapted by most DT and SC members. Thus the "integration" concept - which is the key feature of TWH - was successfully presented and taken up as definitional of program scope.

The highest fidelity of program implementation was found in the two sites that maintained the DT/SC structure throughout the study. The other two sites, for two different reasons, decided to utilize a mixed level DT (both front-line workers and managers in one team).

All four sites completed the process through implementation of an intervention. One site (with separate DT and SC) completed two intervention cycles. However, the funded study period was not long enough to complete quantitative evaluation at any site.

Nevertheless, the HWPP Toolkit was effective for engaging front-line employees in participatory design of integrated interventions that addressed both work environment features and relevant aspects of individual behavior.

Multiple benefits were reported by site participants, especially development of a more organized understanding of causes and outcomes, the ability to identify root causes, and the comparison of multiple solutions to find the best fit for a specific organization's workforce, company culture, and budget. Other benefits included improved communication among personnel at different levels of the organization and their ability to develop a common understanding of workplace obstacles to health, safety, and well-being.

Facilitators of program success (at baseline) included an established priority on health and safety, a strong culture of quality and continuous improvement, relatively good communication channels, and consistent upper management support.

Challenges to program success included the time required to accomplish the entire process, especially the first time through the cycle. (The research team responded during the study by reducing the start-up timeline and other measures to facilitate a faster intervention process.) Other factors that impeded timely progress were cited as: change-resistant management, highly bureaucratic decision/approval processes, and high staff turnover (including layoffs and retirements).

Please describe if there are alternative methods that could have improved the study:

Other Comments: