

Attachment E1

EFFECT OF WELLNESS GRANT ON WORKER HEALTH AND SAFETY

Overall Study Description

Background

The proposed data collection is an important but relatively smaller effort nested within this larger study, Effect of Wellness Grant on Worker Health and Safety. Overall, the study primarily consists of secondary analysis of data collected by our research partner, the Ohio Bureau of Workers' Compensation (OHBWC). This document describes the background, purpose and planned methods for the entire study.

Work-related injuries and illnesses are common among US workers and result in pain, disability, and substantial cost to workers and employers. A recent, comprehensive analysis of the economic burden of work-related injuries and illnesses estimated that in 2007 alone medical and indirect costs for work-related injuries and illnesses were \$250 billion. According to the Bureau of Labor Statistics there were 4,609 occupational fatalities in 2011 and approximately 2 million work-related injuries and illnesses that involved some lost work in 2010.

Workers' health is affected not only by workplace safety and health hazards but also workers' own health behaviors. Reflecting this, two different yet complementary approaches exist in the workplace: OSH programs and wellness programs. Both types of programs aim to improve worker health and reduce costs to employers, workers' compensation (WC) insurers, and society. Since 2004, NIOSH has advocated an approach that coordinates wellness programs with OSH programs because emerging evidence suggests that integrating these two fields may have a synergistic effect on worker safety and health.

NIOSH has established an intramural program for protecting and promoting Total Worker Health™. The NIOSH Total Worker Health™ Cross-Sector Program promotes the integration of health and safety protection with health and wellness promotion through research, interventions, partnerships, and capacity building to meet the needs of the 21st century workforce. This project addresses three priority goals of the NIOSH Total Worker Health™ Program: (1) investigate the costs/benefits associated with comprehensive, coordinated work-based health protection/health promotion interventions, (2) improve the understanding of how the work environment influences the effectiveness of health programs and identify opportunities for workplace interventions to prevent, control, recognize and manage common chronic conditions, and (3) conduct scientific research that more holistically investigates organizational and worker health and safety outcomes associated with emerging issues and addresses gaps in knowledge in the health protection/health promotion field.

There is a need for research to demonstrate a 'business case' for both wellness programs and integrated OSH-wellness programs and identify OSH organizational and management policies, programs and practices that effectively reduce work-related injuries, illnesses, disabilities and WC costs. To date small employers have been largely ignored in these areas and many studies

have focused on the manufacturing industry. Real-world examples of effective interventions that apply to employers of all sizes and industries will ultimately improve workers' health and safety.

These needs are expressed in a number of NIOSH Strategic Goals (Attachment C1 & C2). This project is part of the mission of CDC-NIOSH to conduct rigorous scientific intervention effectiveness research to support the evidenced based prevention of occupational injuries and illnesses. Additional information on how this project integrates into CDC's broader research agenda is provided in Attachment F.

For the current study, NIOSH and OHBWC are collaborating on a project to determine the effectiveness and economic return of OHBWC's Workplace Wellness Grant Program (WWGP) and to understand the impact of integrating of wellness with traditional OSH programs. In early 2012 OHBWC took steps to integrate wellness and OSH programs by launching the WWGP, in which an estimated 400 (currently 321) employers and 13,000 employees will be provided a total of up to \$4 million in funds over four years to implement wellness programs.

In summary, there is limited knowledge on the impact of OSH and wellness programs on work-related injuries and illnesses, the economic benefits of either program on WC costs, and the merit of integrating OSH and wellness programs. The proposed project addresses these research gaps through an ongoing collaboration with the OHBWC.

Since 2010, NIOSH and OHBWC have a formal agreement (Attachment D) to collaborate on a number of common research goals, including descriptive WC data analyses, evaluation of prior OHBWC-sponsored programs, and prospective intervention research. As one of only four state-run WC insurance programs nationwide, OHBWC insures approximately two-thirds of Ohio workers. Larger employers (> 500 employees) are allowed to self-insure.

OHBWC has many strengths as a potential research partner, including its size (approximately 250,000 insured establishments), diversity of industry that is largely representative of the larger US in both industry classification [based on general 2-digit North American Industry Classification System (NAICS)] and establishment size distribution, geographical proximity to the Cincinnati, OH and Morgantown, WV locations of NIOSH, and perhaps most importantly, their active engagement in intervention research. OHBWC represents an ideal translational research partner. OHBWC is an extremely pro-active WC insurance carrier; each year OHBWC spends millions of dollars supporting many programs to encourage insured companies to improve their primary through tertiary OSH prevention programs. For example, in 1999 OHBWC initiated a program known as "Safety Grants" to provide matching funds to insured employers to put into place OSH controls and measure effectiveness. From 1999 to 2009, this was a 3-1 (OHBWC to employer) matching with up to \$40,000 per grant. Over the history of the program, OHBWC has provided over 1800 Safety Grants. In 2014, the program provided \$15 million to 535 employers and previously they provided about \$3 million per year in matching funds.

In early 2012 OHBWC took steps to integrate wellness and OSH programs by launching a four year, \$4 million Workplace Wellness Grant Program (WWGP). This project provides a unique opportunity to leverage the OHBWC-NIOSH partnership to determine the effectiveness and economic return of the WWGP and to understand the impact of integrating wellness with traditional OSH programs. If the WWGP is effective at improving worker health, reducing WC claims and demonstrating a positive economic return, then other employers and insurance carriers may develop similar programs and drive the optimization of integrated OSH-wellness approaches.

In summary, OHBWC has years of experience in developing, implementing, evaluating, and disseminating OSH programs with clients. Although OHBWC has actively engaged in prevention research, the organization is dedicated to demonstrating the effectiveness of their various programs using the most scientifically rigorous methods possible. For this reason, OHBWC has been eager to collaborate with NIOSH on a number of research projects including this research study. In this way, evidence based practices can be shared with the greatest audience possible.

For this study, the specific aims are:

1. Measure effectiveness of the WWGP implementation by comparing data from pre- post-implementation of a wellness program on the following outcomes: **a)** WC claim, severity (days lost per claim), and cost rates, **b)** aggregate health metrics for participant employees by employer [health risk assessment data (e.g. percentage of smokers, percentage of participants with > 4 specific health risk factors) and biometric data (e.g. percentage of participants with high blood pressure)], **c)** absenteeism rates, **d)** turnover rates, and **e)** health care cost per employee
2. Determine the relationship between WC claim rates and changes in yearly pre- and post-intervention measures for **a)** OSH program elements, **b)** wellness program elements, and **c)** OSH-wellness program integration measures
3. Determine the total costs, savings, and savings (benefits) to cost ratios associated with grant-supported wellness programs from the perspective of OHBWC and the participating employers.

Methods

Most of the data analyses for this study will be based on secondary analyses of data collected by OHBWC for managing the WWGP or other programs, WC claims management.

Available Data: As requirements for the WWGP, employers must submit at baseline and annually: total number of employees (both participating and non-participating), participant employee names and work hours, an OSH and wellness program self-assessment survey, aggregated participant employee biometric data, aggregated participant employee HRA data, non-WC related aggregated employee health care cost data, aggregated participant employee absenteeism and participant employer turnover data. Employers must submit an annual narrative

case study to assess safety, wellness, and claims management activities and to assist with establishing best practices for the implementation of workplace wellness programs. OHBWC will provide NIOSH with grant program records, including the employer’s wellness program vendor invoices and any other expenses supported by the grant funding. Employers must allow the OHBWC to inspect original employer WWGP records upon demand and on site in the event that questions arise regarding the participation in the WWGP. In addition to the employer-provided data, NIOSH will obtain other OHBWC data for all employers: WC claims, claim severity, and cost data for all OHBWC-insured employers, data that details employer participation in other OHBWC programs (safety grants, safety council memberships, drug-free safety programs etc.), North American Industry Classification System (NAICS) codes, and employer size category (1-10, 11-49, 50-250, 250-500, 501+ employees), and the number and hours of OHBWC onsite consultations. Annual OSH and wellness program self-assessment data are available for approximately 9,000 employers who fill out the OHBWC safety management self-assessment survey (SH-26) as part of their participation in other OHBWC programs (e.g. Industry Specific Safety Program, Drug-Free Safety Program). A summary of available timeseries data is provided in Table 1 below.

Table 1. Summary of available timeseries data for WWGP Employers and non-WWGP Employers.

Employer Group	Affected Group	Description	Time Periods		
			Pre-Intervention	Post-Intervention	
WWGP Employers	All Employees	WC outcomes ^a	4 years	4 years	
		Health care cost per employee	4 years, reported by employer at baseline	3 years (reported by employer for Years 1,2,3)	
		OSH program elements survey (self-assessment on SH-26)	1 year of baseline data, completed by employer		
		Wellness program survey (self-assessment on SH-26)			
		Narrative case study	n/a		
	OSH-wellness integration survey				
	Turnover rate	4 years	4 years		
	WC outcomes ^a				
	Absenteeism rate			4 years, reported by employer at	3 years (reported by employer for Years
	Participating Employees				

Non- WWGP Employers	Non-Participating Employees		baseline	1,2,3) 3 year of data, reported by employer within 1st 3 months of each year of follow-up (Years 2,3,4) 4 years
		Turnover rate	n/a	
		Aggregate health risk appraisal data ^b	1 year of baseline data, reported by employer within 1st 3 months in Year 1	
		Aggregate biometric data ^c		
	All Employers	WC outcomes ^a	4 years	Yearly
	Employers who participate in other OHBWC programs	WC outcomes ^a	Yearly data available (for ~ 9,000 employers)	Yearly
		OSHA program elements survey (self-assessment on SH-26)		
	Employers who participate in other OHBWC programs <u>and</u> have minimal self-reported wellness programs	Wellness program survey (self-assessment on SH-26)	Yearly	Yearly
WC outcomes ^a				

- a. WC outcomes: WC claim rate per 100 employees, mean days lost per WC claim, WC claim cost rate per 100 employees, and WC mean cost per claim.
- b. Health risk appraisal variables include: percentage of participating employees 1) with >2 risk factors, 2) with > 4 risk factors, 3) with sedentary/poor physical activity level, 4) with fair physical activity level, 5) with excellent/good physical activity level, 6) that are current smokers, 7) with sedentary/poor nutritional habits, 8) with fair nutritional habits, 9) with excellent/good nutritional habits, 10) with high/very high stress levels, 11) with low/moderate stress levels, 12) with little or no stress.
- c. Aggregate biometric variables include: percentage of participating employees 1) with BMI > 25 (overweight & obese), 2) with BMI > 30 (obese), 3) with BMI < 25 (normal & underweight), 4) with elevated (121-139/81-89) or high (> 140/90) blood pressure , 5) with elevated (101-125) or high (>125) blood glucose, 6) with high (>125) blood glucose, 7) with elevated/high total cholesterol (200+), 8) with high (>240)total cholesterol, 9) with elevated/high (>129) LDL cholesterol, 8) with optimal/good (<130) LDL cholesterol, 9) with low (<40 men, <50 women) HDL cholesterol, 10) with good/optimal (50+) HDL cholesterol, 11) with elevated/high (150+) triglycerides, 12) high (>200) triglycerides. NIOSH is currently exploring ways for the wellness vendors to share raw, de-identified data directly.

WC claim outcomes: As stated in Table 1, for the three WC outcome measures (WC claim rates, claim severity rates, claim cost rates, and mean cost per claim) NIOSH will compile data among

allowed claims for (1) the expected 321 WWGP employers, (2) participating employees within these 321 WWGP employers, (3) non-participating employees among the 321 WWGP employers, and (4) two comparison groups of non-WWGP employers (all employers and employers with minimal self-reported wellness programs). Claim cost data will include values for paid medical treatments, paid indemnity (lost wages), and reserved costs for the claim. Claim costs will be calculated using the “30-Month” method, which values claims 30 months after January 1 of the calendar year in which the claim occurred.

Statistical Analysis Methods

Specific Aim 1

Measure effectiveness of WWGP implementation: Slightly different a priori analysis plans have been developed for each outcome as described below. The primary outcomes are **1a**: participant employee and employer WC claims, claim severity and claim cost. Secondary outcomes include: **1b**) participant employee health [HRAs, biometrics including blood pressure (BP), blood cholesterol (BC), body mass index (BMI)], **1c**) participant employee absenteeism, **1d**) participant employee turnover, and **1e**) participant employee health care costs. All analyses will be conducted using SAS version 9.3 (SAS Institute, Inc., Cary, NC).

For all analyses, summary statistics will be calculated for each metric pre-intervention and post-intervention and compared. However, this will not control for general trends in time regardless of any intervention. For example, WC claim rates as a whole are known to be decreasing over time and this needs to be considered in any further analysis. Covariates in the analyses will include employer participation in other OHBWC programs (safety grants, safety council memberships, drug-free safety programs etc.), North American Industry Classification System (NAICS) codes, and employer size category (1-10, 11-49, 50-250, 250-500, 501+ employees), and the number and hours of OHBWC onsite consultations.

Aim 1a: Participant employee and employer WC claims: To control for decreases in rates and trends over time, various comparison/control groups (described in more detail below in sections Aim1a-Analysis 1, Aim 1a- Analysis 2 and Aim 1a- Analysis 3) will be collected and compared in the analysis. In all WC analyses, Poisson regression with repeated measures will be performed. WC claim frequency and severity rates analyses will be conducted initially for all industry sectors combined and then separately for specific sectors (manufacturing, construction, etc.) based on NAICS codes.

For cost per claim and cost per employee analyses, two regression models with repeated measures will be used. The first model assumes constant/linear cost trends over time while the second model does not restrict costs to a yearly trend, and instead uses dummy variables for each year to allow background changes in costs to vary independently by year. For the WC cost per claim analysis, cost data will be skewed and will be transformed using the natural log before modeling. Specific planned analyses are described below.

Aim 1a — Analysis 1: Compare WWGP Employer Total WC rates to Non-WWGP Employer Total WC Rate: This analysis measures the effect of employer participation in the OHBWC WWGP, recognizing that many of the non WWGP employers also have some form of wellness program. The focus here is on whether the OHBWC WWGP is able both to increase the number

of employers with wellness programs and also to increase their quality over what it would otherwise have been. To investigate this possibility, the WC outcomes of WWGP participating employers will be compared to industry peer employers [matched for industry type (3-digit NAICS) and employer size] that do not participate in the WWGP. The general null hypothesis is that there will be no difference between WC outcomes in WWGP versus non-WWGP employers during the same pre- and post-intervention period. Data will be analyzed at the employer level and will control for covariates. Our analysis will have sufficient power to detect a 10% change in WC rates. **The power calculations for Analysis 1a-1 are provided in an Appendix at the end of this document.**

Aim 1a — Analysis 2: Compare WWGP Employer Total WC rate to Non-WWGP Employer with Minimal Wellness Programs Total WC Rate: This analysis focuses on measuring the impact of wellness programs themselves, rather than the impact of the Ohio WWGP. In an attempt to isolate “control” employers, NIOSH will identify a subset of non-WWGP employers that reported minimal wellness program activity according to the SH-26 (survey is administered yearly to ~9000 other employers that participate in certain OHBWC programs). The WC outcomes of these non-WWGP employers will then be compared to WC outcomes among WWGP employers matched for industry type (3-digit NAICS) and employer size. The general null hypothesis is that there will be no difference between WC outcomes in WWGP versus non-WWGP employers (with minimal wellness programs) during the same pre- and post-intervention period after controlling for covariates. Data will be analyzed at the employer level. Our analysis will have sufficient power to detect a 10% change in WC rates. **The power calculations for Analysis 1a-2 are provided in an Appendix at the end of this document.**

Aim 1a — Analysis 3: Compare the pre-post WC changes for participating employees with the pre-post WC changes for non-participating employees within WWGP employers: The goal of this analysis is to compare participating employees to non-participating employees in a given company. The general null hypothesis is that there will be no difference in the pre-post changes of participating and non-participating employees after controlling for covariates. A simple form of this analysis will compare the overall post period average with the overall pre period average of each group. This analysis will assume that participating and non-participating employees may have different job exposures and WC claim rates, but that a change in the ratio of the claim rates of these two groups will indicate an impact of the wellness programs. A more detailed version of the analysis will compare the *trends* in WC claims pre and post intervention, and determine whether the intervention is associated with a change in the relationship between the trends of the participating and non-participating employee groups. The effect of the intervention will then be determined by measuring the relative change in trend between these two groups. In separate, supplementary analyses, pre-post changes in the participating employee groups may also be compared to the pre-post changes in non WWGP employers. A limitation of this approach is that the actual employees participating in the program may change each year as some employees drop from the program and others are added. Adjustments will be made for turnover in the participant group where possible. Another limitation is that we cannot be certain that the decision of participants to take part in the program may also signal other coincident changes in willingness or ability to change behaviors that were independent of the wellness program.

Aim 1b: Participant employee health metrics: For the participant employee health metrics, a quasi-experimental prospective design will be used as each group of participating employees at each employer will serve as its own control before the intervention occurred. Where possible, the

aggregate participant employee health metrics will also be compared to national data for the working populations as measured by the National Health Interview Survey to investigate whether participants are different from the general population for the same time period of the study. The impact, post-intervention, will then be compared with the baseline data. Proportions of employees in certain categories of the health metrics will be calculated pre- and post-intervention and the differences will be tested, after controlling for covariates using generalized linear models with repeated measures. Specifically, since the outcome variable will have multiple levels, multinomial regression will be performed to model probability/proportion of employees falling into each specific category. Certain categories may be collapsed to dichotomize the variables. Data will be analyzed at the employer level for the participating employees. There are two limitations of the participant employee health metrics data. First, the actual employees participating in the program may change each year as some employees drop from the program and others are added. Adjustments will be made for turnover in the participant group where possible. Second, categorical data from the HRA are not standardized so some misclassification is to be expected. However, these outcomes are secondary analyses and the error would not be differentially distributed across pre- and post-intervention time periods. Therefore results would be biased toward the null hypothesis. NIOSH is currently exploring ways for the wellness vendors to share raw, de-identified data directly with NIOSH, which would alleviate this source of error. The general null hypothesis is that there will be no difference between participant employee health metrics outcomes pre- and post-intervention.

Aim 1c: Participant employee absenteeism: Participant absenteeism rates will be calculated pre- and post-intervention and the differences will be tested, after controlling for covariates, using generalized linear models with repeated measures. Specifically, Poisson regression will be performed to model the absenteeism rate per employee. Where possible, the participant absenteeism rates will also be compared to national data for the same period using the Current Population Survey to investigate whether absenteeism for participants are different from the general population for the same time period of the study. Data will be analyzed at the affected employee level at each employer. A main limitation of the participant absenteeism data is that the actual employees participating in the program may change each year as some employees drop from the program and others are added. Adjustments will be made for turnover in the participant group where possible. The general null hypothesis is that there will be no difference between participant employee absenteeism rates pre- and post-intervention.

Aim 1d) Participant employer turnover: Poisson regression will be performed to model the turnover rates post-intervention. Data will be analyzed at the participant employer level at each employer. The general null hypothesis is that there will be no change over time in post-intervention turnover rates. Turnover rates among WWGP employers will be compared to nation turnover trends as measured by the Bureau of Labor Statistics survey on job openings and labor turnover.

Aim 1e) Participant employer health care costs: It is theorized that the WWGP may affect both participants and non-participants at a given employer because the program may indirectly increase health awareness in all employees. To investigate this possibility, the participant employer health care costs rates will be calculated pre- and post-intervention and the differences will be tested, after controlling for covariates using generalized linear models with repeated measures. Cost data will also be adjusted for inflation prior to analysis. Data will be analyzed at the participant employer level at each employer. A limitation of the participant employer health

care costs data is that it represents data for all employees at the given WWGP employer, not just participating employees. The general null hypothesis is that there will be no difference between health care costs outcomes pre- and post-intervention. Where possible, the participant employer health care costs rates will also be compared to national and Ohio data for the same period to investigate whether participant employers are different from the general population for the same time period of the study.

Specific Aim 2 Analysis Plans:

Specific Aim 2: Determine the relationship between WC claim rates and changes in yearly pre- and post-intervention measures for a) wellness program elements, b) OSH program elements, and c) OSH-wellness program integration measures

This aim of the research involves an employer-level survey of a series of organizational safety, health, wellness, and OSH-wellness program integration metrics. Individuals at each employer will complete surveys to evaluate organizational metrics related to their employer's OSH program. Individuals will also complete a yearly 10-item OSH-wellness integration survey module (beginning after the employer has been in the study one year). The contents of the surveys are summarized below.

Data sources

SH-26 (see Appendix B, page 13-15). This OHBWC-developed instrument was designed for employers to self-rate their OSH programs and aid OHBWC in developing loss prevention service plans. The SH-26 is currently being collected yearly for ~ 9,000 employers as a required component of several OHBWC programs. There are four scales: 1. Safety/ health controls [Management commitment (3 questions), Accountability (3 questions), Employee participation (3 questions), Safety culture (3 questions), Hazard prevention and control (3 questions), Safety and health training and education (3 questions), Accident analysis (3 questions)], 2. Safety/ health exposure [Hazard Identification (32 yes/ no check-boxes)], 3. Claims and disability management [Worker's compensation claims management (3 questions), Return-to-work practices (3 questions)], and 4. Employee health promotion-wellness (3 questions).

OSH-Wellness Integration Module (10 questions): This module is currently being developed by OHBWC and will first be collected by OHBWC after the employer has been in the study one year. Since each WWGP employer will work with an external vendor to develop the wellness approach, this module will focus on measuring the degree to which the employer worked with the vendor to tailor the program to their specific worksite. The module will also focus on quantifying the degree to which OSH and wellness activities have been coordinated at the given site. Integration questions will be adapted where possible from existing sources (e.g., Safewell SIMS checklist).

Surveys will be self-administered using hard-copy forms. Survey respondents will generally be the main OHBWC contact at the employer and the person most knowledgeable about OSH and wellness at the employer. The employer-level survey data will be linked to four years of retrospective WC claims data and four years of prospective WC claims to determine which organizational metrics are related to employer-level WC claim rates. Three different WWGP Employer Total WC rates will be used as dependent variables: WC claim rate per 100 employees, WC claim cost rate per 100 employees, and WC mean cost per claim.

Data Analysis

In preliminary analysis, the data will be examined for missing values and a merged de-identified data set will be created. All analyses will be conducted using SAS version 9.3 (SAS Institute, Inc., Cary, NC). Specific subsequent analyses are described below.

Survey reliability and validity: Cronbach's alpha and the corrected item total correlation (ITC) will be used to assess proposed scale internal consistency³⁷ for the SH-26 and the OSH-Wellness Integration Module using data from the 321 employers participating in the WWGP. For the SH-26, a separate analysis will be conducted, if feasible, using data collected from the ~9,000 employers completing the survey yearly as part of other OHBWC programs. An ITC of each item with its theoretical subscale should be at least 0.40³⁸ while Cronbach's alphas should be >0.6 to maintain items in proposed scales. The properties of the survey scales (SH-26 and Integration Module) will be further examined using confirmatory factor analysis (CFA) before the final scales are determined. Information collected from the annual case study verification telephone interviews will be an additional element used to examine the validity of the survey questions, especially the questions about integration.

Relationship of OSH, wellness, and OSH-wellness integration to WC claims: The goal is to identify key safety/ health, wellness, and integration practices that are most associated with reduced WC outcomes among participating WWGP employers. To determine the relationship between OSH, wellness, and OSH-wellness integration program elements and WC outcomes after controlling for covariates, multivariable Poisson regression will be used. The change in final survey scales over the four year study period will be compared to the change in WC claim rates for the same time period for each employer. The mean final survey scale values will also be compared to the mean WC claim rates for the same period.

The null hypothesis is that there will be no relationship between the survey-assessed wellness, OSH and OSH-wellness integration scales and WC claims. Covariates will include employer size, industry, prior loss experience, number and hours of OHBWC onsite consultation and participation in other OHBWC structured safety incentive programs (Safety Grants, Safety Council memberships, Drug-Free Safety Programs etc.). Significance will be assessed with tests of coefficients (t-tests) and overall model fit.

Qualitative Case Study Review: To further understand the level of OSH-wellness integration at the WWGP employers and to assist with establishing best practices for the implementation of workplace wellness programs, NIOSH will review the annual narrative case studies that are completed by employers to assess wellness, OSH, OSH-wellness integration, and claims management activities. NIOSH will randomly assign the narrative case studies to a series of expert raters who will be blinded to any WC outcomes for the employers. The raters will use a structured evaluation scale to rate the level of evidence for OSH-wellness integration demonstrated in the case study. The raters will also assign a confidence level to their integration assessment. A sample of case studies will be evaluated by multiple raters to assess inter-rater reliability. The relationship between the expert ratings of OSH-wellness integration for each WWGP employer will then be compared to WC outcomes for those employers over the study period after controlling for covariates, using multivariable Poisson regression. The null hypothesis is that there will be no relationship between the expert rated degree of OSH-wellness integration and WC outcomes.

Specific Aim 3 Analysis Plans:

Specific Aim 3: Determine the total costs, savings, and savings (benefits) to cost ratios associated with grant-supported wellness programs from the perspective of OHBWC and the participating employers.

Costs: Grant program records and reports from employers will provide information in each of the four years on the cost of each employer's wellness program vendor and the shares of this cost paid by the employer and by the grant from OHBWC. OHBWC will also be able to provide estimates of its own cost of planning and administering the program. However, there are additional costs to the employers that will have to be gathered by other means.

NIOSH is conducting in-depth, structured interviews with at least nine and up to 25 participating employers, pending OMB approval. The focus of the interviews is described in detail elsewhere in this document. The results of these interview-supplemented case studies will be used to estimate the proportion by which total employer costs exceed the cost of the primary wellness program vendor, as well the proportion of these costs attributable to establishing the program in the first year versus operating the program in subsequent years. These estimates will be applied to generate total employer costs for all of the WWGP recipients, with sensitivity analysis based on the observed variability of employer costs in the case studies.

Savings: Savings will be calculated in the categories of WC costs, health care costs, and absenteeism costs. Reductions in turnover will also be calculated, but will not be converted to dollars, because the cost of turnover depends upon a variety of employer and job-specific factors, and the detailed information needed is impractical for employers to provide. The savings in WC costs as viewed by OHBWC are the total cost of claims averted, including administration costs. Reductions in total claim costs will be estimated as described above under Specific Aim #1. The cost of claims that occur during the 4-year study period will be measured at least 30 months post injury, as is standard practice for analysis of claims costs. This means that the full WC claim cost saving analysis will occur in approximately FY18.

The savings in WC costs as viewed by non-self-insured employers is the reduction in WC insurance premiums. Estimates of reductions in claims per 100 employees and claim costs per 100 employees associated with wellness programs, as described above, will be used to estimate reductions in premiums as given by the standard experience rating formula. Because this formula is based on claims experience over several years, the premium savings will also be realized over a period of several years following the averted injuries and so will also be discounted at appropriate discount rates. Depending upon the claims record, industry, size, and other factors, employers may also experience premium reductions due to qualifying for group discounts, and the potential for these savings will also be characterized.

Employers will provide four years of past health care costs data and health care costs in each of the four years of the study period (subject to availability). Declines (or increases) in these costs attributable to the wellness program will be estimated, following the methods described above under Specific Aim #1. For non-self-insured employers who provide or contribute to health insurance policy for their employees, their share of health care costs is borne indirectly through payment of insurance premiums and with a time lag. It is beyond the scope of this project to collect specific information from employers to determine the impact of health care costs on insurance premiums. However, illustrative calculations can be done based on inquiries with insurance carriers about their rating practices, and taking cognizance of Ohio rating restrictions that apply to employers with 50 or fewer employees. The cost of insurance as a ratio to the cost

of claims, as well as the average share of premiums paid by employers can be ascertained for employers nationally from published research based on the Medical Expenditure Panel Survey, the annual employer survey of the Health Insurance Association of American (HIAA), the National Compensation Survey, and other sources³⁹.

Absenteeism savings calculations will be based on the estimated change in days of absence per employee per year as estimated by methods described under Specific Aim #1. Days of absence can be converted to dollar values, by valuing lost time with the daily cost of employee compensation. Compensation per day is available from OHBWC which uses this information on WC claimants in order to calculate their indemnity benefits. Research has found that the cost of absence is somewhat greater, on average, than the cost of compensation, because unplanned absence can be disruptive of work teams under pressure to meet delivery schedules, so findings from this research will be used to estimate this additional component of cost as a proportion of compensation⁴⁰.

Discounting

Calculation of Present Values of Costs and Savings: Wellness program expenditures do not generally create tangible assets, but they do, in part, represent an investment in at least two senses. First, the effort of planning and initiating a program is expected to bear fruit not just in the first year, but in subsequent years as well, as the workplace health culture and the routines of health program activities are institutionalized. Second, the health behavior improvements of each year cumulate to create future health benefits. Thus, total costs and total savings need to be viewed not just year-by-year, but over the entire four years encompassed by this project. Because costs and savings of future years are not valued as highly as those of the present year, discounting future costs and savings is necessary for a proper valuation. This is especially important, since costs may be higher in the first year, but savings may be higher in later years, as impacts on health and injury rates build on gains in previous years.

This study will follow the framework suggested by the CDC for developing a cost/benefit analysis. Both costs and benefits (savings) will be discounted to yield the present values of each. The relationship between savings and costs can then be expressed as a ratio that is useful for comparing results across employers and wellness programs of different sizes. Ratios will be computed separately for each component of savings, and for aggregate savings. The difference between discounted costs and savings, or net present value (NPV) can also be computed. This will be a partial cost/benefit analysis, since not all savings will be estimated. For this study, a discount rate of 7% will be used, since that is the standard discount rate recommended by the Office of Management and Budget for evaluating government investments (OMB). However, because investments in public health are often discounted at 3%⁴¹ and private employer investments are often discounted at rates higher than 7%, calculations with alternative discount rates will be performed. Separate analyses of costs, savings, and benefit/cost ratios for wellness programs will be performed from the perspective of employers and OHBWC. The data collected during the in-depth, semi-structured economic interviews is vital to conducting the cost-benefit analyses from the perspective of the insured employers. Information gathered from key informants about program costs and time spent running the program can be combined with other information that we know about other employers to help estimate employer costs not covered by the WWGP. Analyses will be done based on actual share of program costs, but can also illustrate how costs and their relationship with savings could change with different formulas for cost sharing between OHBWC and employers.

Appendix - Power Calculations, Analyses 1a-1 and 1a-2

Power Calculations: For the proposed Analyses 1a-1 and 1a-2, power calculations were used to estimate the number of subjects needed to detect significant differences between groups if differences are present. CDC has developed a free software (EpiInfo, see <http://wwwn.cdc.gov/epiinfo/>) to conduct various analyses, including power calculations (with the StatCalc function). There are a number of options and assumptions using these models, so results should be viewed with caution. Since NIOSH does not have OBWC data readily available yet, NIOSH used BLS data to estimate private industry average from BLS Table SNR01 shown below.

BLS TABLE SNR01. The incidence rates represent the number of injuries and illnesses per 100 full-time workers					Average Referent Rate
	2009	2008	2007	2006	(estimate for Average Non-Grant Employer Total WC Rate)
All Industries including State and local government	3.9	4.2	4.2	4.4	4.2

Statcalc
 EpiInfo Version 6 Statcalc November 1993

Unmatched Cohort and Cross-Sectional Studies (Exposed and Nonexposed)
 Sample Sizes for 4.20 % Disease in Unexposed Group

Conf.	Power	Unex:Exp	Disease in Exposed	Risk Ratio	Odds Ratio	Unexp. Sample Size	Exposed Sample Size	Total
95.00 %	80.00 %	1:1	3.78 %	0.90	0.90	34,563	34,563	69,126
90.00 %	"	"				27,326	27,326	54,652
95.00 %	"	"				34,563	34,563	69,126
99.00 %	"	"				51,199	51,199	102,398
99.90 %	"	"				74,634	74,634	149,268
95.00 %	80.00 %	"				34,563	34,563	69,126
"	90.00 %	"				46,110	46,110	92,220
"	95.00 %	"				56,912	56,912	113,824
"	99.00 %	"				80,268	80,268	160,536
"	80.00 %	4:1				87,420	21,855	109,275
"	"	3:1				69,804	23,268	93,072
"	"	2:1				52,184	26,092	78,276
"	"	1:2				25,750	51,499	77,249
"	"	1:3				22,810	68,430	91,240
"	"	1:4				21,340	85,360	106,700

Change values for inputs as desired, then press F4 to recalculate.

F1-Help F5-Print F6-Open File F10-Done

A summary of Statcalc inputs and results is summarized below:

- **Type of study:** Unmatched cohort or cross sectional
- **Power** (Ability of the study to detect a significant difference if present): 80%
- **Expected Difference between groups:** a range of 10-50% reduction was run
 - 10%, for example a rate of 4.2 per 100 in control group vs. 3.78 per 100 in the WGP
 - 50%, for example a rate of 4.2 per 100 in control group vs. 2.1 per 100 in the WGP
- **Confidence Interval:** 95%
- **Results:** To detect a 10% change in rate, approximately 34,563 full time equivalents (FTE) are required in the WGP intervention group and 34,563 FTE in the referent control group. This power calculation assumes the study design is without major clustering (such as comparing intervention and control in different types of industries) or repeated measures on the same people over time. To reach this sample size by repeating the intervention every year for 4 years requires approximately 8,641 people each year for four years. Since OBWC is projecting 13,000 participating employees every year for 4 years, the sample size requirement is met at least for a simple comparison. To detect 50% change in rates, approximately 1,178 FTE are required in the WGP intervention group and 1,178 FTE in the referent group. The more rare the outcome, the more participants are needed. Therefore this study does not likely have enough power to detect a 10% change in lost time rates.
- **Conclusion:** For WC outcomes, the study has sufficient power to detect down to a 10% change between WGP group and control group. There are many assumptions with this estimate, so it should be viewed with caution.