

Original Article

The Impact of Worksite Wellness Programs by Size of Business: A 3-Year Longitudinal Study of Participation, Health Benefits, Absenteeism, and Presenteeism

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Submitted 15 November 2017; revised 18 May 2018; editorial decision 22 May, 2018; revised version accepted 26 May 2018.

Abstract

Objective: Worksite wellness programs (WWP) may positively impact employee health, medical expenditures, absenteeism, and presenteeism. However, there has been little research to assess the benefits of WWP in small businesses. The purpose of this study is to prospectively evaluate changes in health, absenteeism, and presenteeism for employees who participated in a WWP.

Methods: We conducted an observational, 3-year cohort study of 5766 employees from 314 businesses of differing sizes. We followed two cohorts of employees, who completed at least two annual health risk assessments (HRA) between May 2010 and December 2014. Changes from baseline to the first and second follow-up periods were assessed for chronic and non-chronic health conditions, absenteeism, and presenteeism.

Results: Small business employees were more likely to participate in the WWP than were employees from large businesses. Changes in chronic and non-chronic health conditions varied by size of

business, with small business employees showing improvements in stress, overall health, depression, smoking status, vegetable and fruit consumption, and physical activity, and in their perceptions of job health culture. In contrast, large business employees experienced improvements in stress, vegetable consumption, and alcohol use. No changes in absenteeism or presenteeism were observed.

Conclusions: Small businesses achieve higher employee participation rates and more health improvements when compared to employees from large employers. Findings suggest that small businesses may gain the most from a WWP.

Keywords: health promotion; total worker health; intervention; workers' compensation

Introduction

In 2013, 56.8 million U.S. workers, representing 48% of the workforce, were employed by small businesses, defined by the Small Business Administration as having fewer than 500 employees. The vast majority (98%) of these businesses had fewer than 100 employees (United States Small Business Administration, 2018). While small businesses may benefit from worksite wellness programs (WWPs) (Newman *et al.*, 2015), they often do not have them (Wilson *et al.*, 1999; Tremblay *et al.*, 2013; Taylor *et al.*, 2016) and may lack the 'know how' to implement them (McCoy *et al.*, 2014). Furthermore, there is a dearth of research conducted on small businesses offering WWP, and the small body of relevant research has limited generalizability (Sorensen *et al.*, 2005; Merrill *et al.*, 2011; Merrill, 2013). Small business worksite wellness research has focused on a limited number of industries, few health outcomes, and for short periods of follow-up. Also, this research has not explored program impacts on the large segment of small enterprises that have fewer than 20 (17%) and between 21 and 99 (17%) employees (United States Small Business Administration, 2018).

In 2010, Pinnacol Assurance was the first U.S. workers' compensation (WC) insurer to offer WWP to policyholders. Pinnacol had established a 40-year history of providing occupational health and safety services to businesses (policyholders) in Colorado and hypothesized that worksite wellness services would provide an important and needed addition to those services. The need to offer these services to small employers was strategically important to the insurer because 94% of its businesses are classified as small businesses having fewer than 50 employees.

The purpose of this study is to describe the yearly change in health and work-related outcomes, absenteeism, and presenteeism, for employees who participated in a WWP, comparing the impacts on large versus small employers. Instead of combining all small businesses into one category (<500 employees), we examined employees in four sub categories: <50, 50–99, 100–499, and 500+, based on lines of evidence that organizational behavior varies among

small enterprises based on size as well as other factors, some of which are related to size (Sinclair *et al.*, 2013).

Applying the diffusion of innovations theory (Rogers, 1962), we hypothesized that greater impacts would be achieved among employees of smaller-sized businesses than employees of larger businesses. This theory states that innovations spread via the process of communication through various channels to populations over time. Spread depends on factors such as the advantages of the innovation, interpersonal communication with peers, and the rate of adoption by early adopters. It also depends on the social structure that the innovation is diffusing through, such as the interconnectedness or ease with which ideas flow through social networks. In the context of small business, as a social unit, smaller businesses have smaller people networks where interaction takes place more frequently. Within this environment, encouragement to participate may be more meaningful and compelling. Further, access to other forms of health insurance is more limited in smaller businesses, possibly increasing the value of a wellness offering. Thus, increased participation in WWPs should result in greater change in health and work-related outcomes.

We hypothesized that a greater number of non-chronic health-related and work-related outcomes would improve significantly over time among employees of smaller sized businesses than among employees of larger sized businesses. However, given the latency between health behavior changes and measurable change in most of the chronic health conditions that behavior changes are thought to improve, we hypothesized that the incidence of chronic health conditions would not change among employees, regardless of business size.

Methods

Background

The present study draws upon a cohort of Colorado employees who participated in a prospective longitudinal study. The details of the WWP intervention were described previously (Newman *et al.*, 2015). In brief, participating businesses were encouraged to administer

annual health risk assessments (HRAs) to their employees along with unlimited telephonic coaching, and access to educational resources. Participating businesses received organizational level feedback reports and action plans for improving their wellness programs. Employers with 50+ participating employees received company-specific annual recommendations for improving workers' health. These included analyses of employee needs, ongoing feedback on participation and progress, educational content to distribute to employees, and advice on program enhancements. If employers had fewer than 50 employees, they were given an aggregated report based on their industry's average health risk profile.

Study design and sample

We conducted an observational, prospective, 3-year cohort study of employees from 314 businesses who completed at least two annual HRA anytime during the study period from May 1, 2010 to December 31, 2014. We assessed changes in outcomes from baseline (first HRA) to first follow-up (second HRA) and from first follow-up to second follow-up (third HRA) to determine if change occurred after 1 year and to determine if change was sustained after 2 years. Of the 16 926 employees who participated in the WWP by completing at least one HRA, 5766 employees (34.1%) completed two HRAs and 2261 (13.4%) completed three HRAs. We evaluated the effect of combining data from employees who completed two HRAs with those who took three HRAs via stratified models. The two cohorts' results were similar, which indicated that the data could be acceptably combined.

Measures

An online, self-administered, English, and Spanish Wellsource HRA provided by Trotter Wellness and certified by the National Committee for Quality Assurance, was offered to employees of participating businesses. In addition to health risk factors, the survey included a shortened version of the World Health Organization's Health and Work Performance Questionnaire (HPQ) (Kessler *et al.*, 2003) called the HPQ Select (Wang *et al.*, 2003). The HRA data were transferred from the wellness vendor to the Integrated Benefits Institute for de-identification and delivery to the Center for Health, Work and Environment at the Colorado School of Public Health for analysis. A description of study outcomes can be viewed in the online supplementary material. The Colorado Multiple Institutional Review Board determined the study to be exempt from human subjects research.

Outcomes

We examined various health risks such as body mass index (BMI), lifestyle behaviors, psychosocial factors, chronic health conditions, and measures of self-reported work-outcomes, including absenteeism (sick time) and presenteeism (job performance rating). All non-chronic, chronic, absenteeism, and presenteeism variables were coded to reflect best to worst status. The variables and operational definitions can be found in Table 1 in the online [Supplementary Material](#).

Statistical analysis

We used regression analyses to test whether the outcomes changed significantly, comparing the prevalence of the health, absenteeism, and presenteeism variables at baseline versus first follow-up, and first follow-up versus second follow-up. The dependent variables were either continuous (e.g. BMI), binary (e.g. currently a smoker, yes or no), or ordered multinomial (e.g. number of alcoholic drinks). Thus, the regression models reflected the appropriate distribution for continuous (distribution = normal, link = identity), binary (distribution = binomial, link = logit), and multinomial (distribution = multinomial, link = clogit) variables. However, for the purposes of description, the variables were dichotomized to display the prevalence of all outcome variables at baseline, first follow-up and second follow-up.

We ran a series of contrast tests to generate the mean difference and odds ratios (OR), depending on the type of variable, between health, absenteeism, and presenteeism measures at first follow-up versus baseline and second follow-up versus first follow-up. For the continuous outcome (BMI), the coefficients were interpreted as the mean difference in BMI for first follow-up or second follow-up minus baseline or first follow-up (e.g. BMI at second HRA – BMI at first HRA), respectively. For this continuous model, if the mean difference comparing BMI at first follow-up versus baseline and second follow-up versus first follow-up was greater than 0, respectively, BMI increased. For the binary outcomes, the OR were interpreted as the odds of the outcome being present at first follow-up or second follow-up compared to baseline or first follow-up (e.g. OR of second HRA divided by OR of first HRA). For the multinomial outcomes, the OR were interpreted as the odds of the outcome at first follow-up or second follow-up being in a lower (i.e. worse) category than the odds of the outcome at baseline or first follow-up. For each of the binary and multinomial model outcomes, OR comparing first follow-up versus baseline and second follow-up versus first follow-up greater than 1.0 were viewed as negative changes in the health outcome.

Table 1. Characteristics of the study sample at baseline, stratified by size of business.

Variable	Small <50	Small/medium 50–99	Medium 100–499	Large 500 +
	<i>n</i> = 842	<i>n</i> = 1093	<i>n</i> = 2151	<i>n</i> = 1680
	<i>n</i> (%) / M (SD)			
Gender				
Male	473 (56.2)	624 (57.1)	1382 (64.3)	1282 (76.3)
Female	369 (43.8)	469 (42.9)	769 (35.8)	398 (23.8)
Age	41.9 (12.4)	42.7 (12.6)	42.8 (12.1)	43.3 (10.9)
Race/ethnicity				
White	694 (83.9)	944 (87.4)	1862 (87.5)	1485 (89.9)
Black	12 (1.5)	12 (1.1)	18 (0.9)	4 (0.2)
Hispanic/Latino	89 (10.8)	93 (8.6)	191 (8.9)	125 (7.6)
Other	32 (3.9)	31 (2.9)	57 (2.7)	38 (2.3)
Education				
At least a 4-year college degree	417 (49.5)	536 (49.0)	1019 (47.4)	1121 (66.7)
Some college or 2-year degree	270 (32.1)	375 (34.3)	694 (32.3)	364 (21.7)
High school diploma or GED	127 (15.1)	127 (11.6)	331 (15.4)	123 (7.3)
Did not complete high school	28 (3.3)	55 (5.0)	107 (4.9)	72 (4.3)
Employment type				
Full-time	755 (91.1)	976 (92.2)	1903 (90.6)	1521 (93.3)
Part-time	68 (8.2)	79 (7.5)	181 (8.6)	99 (6.1)
Other	6 (0.7)	4 (0.4)	16 (0.8)	10 (0.6)
Pay scheme				
Salary	501 (60.6)	608 (57.9)	1082 (52.2)	908 (56.4)
Hourly	326 (39.4)	441 (42.0)	991 (47.8)	703 (43.6)
Industry				
Agriculture	13 (1.5)	4 (0.4)	—	—
Mining/construction	135 (16.0)	41 (3.8)	327 (15.2)	—
Manufacturing	15 (1.8)	122 (11.2)	61 (2.8)	—
Transport/communication/ electric/gas/sanitation	40 (4.8)	2 (0.2)	64 (2.9)	—
Wholesale trade	47 (5.6)	34 (3.1)	19 (0.9)	—
Retail trade	1 (0.1)	111 (10.2)	230 (10.7)	16 (0.9)
Finance	237 (28.5)	155 (14.2)	116 (5.4)	—
Services	317 (37.7)	476 (43.6)	1002 (46.6)	1379 (82.1)
Public administration	37 (4.4)	148 (13.5)	332 (15.4)	285 (16.9)
Occupation				
Executive	190 (22.9)	200 (18.9)	370 (17.8)	143 (8.8)
Professional	235 (28.4)	305 (28.9)	677 (32.5)	954 (58.7)
Technical support	17 (2.1)	35 (3.3)	62 (2.9)	46 (2.8)
Sales	76 (9.2)	82 (7.8)	121 (5.8)	3 (0.2)
Clerical and administrative support	160 (19.3)	194 (18.4)	354 (17.0)	230 (14.2)
Service occupation	67 (8.1)	140 (13.3)	256 (12.3)	175 (10.8)
Precision production and crafts worker	12 (1.5)	12 (1.1)	76 (3.7)	8 (0.5)
Chemical/production operator	1 (0.1)	17 (1.6)	8 (0.4)	4 (0.3)
Laborer	70 (8.5)	69 (6.6)	158 (7.6)	61 (3.8)

Table 1. Continued

Variable	Small	Small/medium	Medium	Large
	<50	50–99	100–499	500 +
	<i>n</i> = 842	<i>n</i> = 1093	<i>n</i> = 2151	<i>n</i> = 1680
	<i>n</i> (%) / M (SD)			
Annual income (in dollars)				
<10 000	69 (8.2)	95 (8.7)	251 (11.7)	166 (9.9)
10 000–14 999	22 (2.6)	28 (2.6)	96 (4.5)	46 (2.7)
15 000–19 999	20 (2.4)	24 (2.2)	87 (4.0)	61 (3.6)
20 000–24 999	45 (5.3)	84 (7.9)	161 (7.5)	105 (6.3)
25 000–34 999	152 (18.1)	220 (20.1)	324 (15.1)	198 (11.8)
35 000–49 000	211 (25.1)	249 (22.8)	533 (24.8)	548 (32.6)
50 000–74 999	172 (20.4)	228 (20.9)	419 (19.5)	393 (23.4)
75 000+	151 (17.9)	165 (15.1)	280 (13.0)	163 (9.70)

The final regression models were adjusted for age and gender at baseline, whether the employee completed consecutive HRAs (>6 months–<1.5 years apart), and number of times the employee completed an HRA (2–5 times). For all analyses, the data were stratified by size of business at baseline. In addition, we assumed missing responses in the dataset were unrelated to the missing information and that data were missing at random. Thus, complete case analyses were conducted. All analyses were run in SAS version 9.4 using Proc Genmod.

Results

Description of study sample

Compared to employees at large businesses, a greater percentage of employees in small businesses were female, non-white, and had high school degree or less (see Table 1). Small business employees were more commonly employed in finance, construction/mining, and manufacturing industries and more commonly worked in executive, sales, administrative, or laborer roles. Compared to employees from large businesses, employees from all other business sizes generally tended to display worse overall health at baseline (see Table 2). Small business employees rated their overall health as being worse than did employees in large enterprises, with seven percent of small company employees rating their health as fair or poor. A greater proportion of small business employees drank more than eight alcoholic drinks per week (14.7 versus 8.0%), smoked (13.0 versus 3.3%), exercised for less than 3 days per week (39.2 versus 31.1%), ate fewer fruits (81.6 versus 67.7%) and vegetables (71.1 versus 62.1%), and took sick time in the past month (15.6 versus 12.3%).

Participation and retention

At the business level, we observed an inverse relationship between average employee participation rates at each HRA and business size (see Figure 1). At the employee level, employees in large businesses were less likely to continue to complete HRAs at the second follow-up (see sample sizes in Table 2).

Trends in non-chronic health outcomes over time

The stratified multivariate regression models demonstrated that change in the non-chronic health-outcomes varied by size of business during the 3-year study period (see Table 2; Figure 2). This supports our first hypothesis.

Small businesses (<50)

Employees in small business exhibited significant improvement in eight non-chronic health outcomes from baseline to first follow-up, and in two health conditions from the first to the second follow-up. For example, the proportion of small business employees reporting excellent or good job health culture increased from 83.9% at baseline to 86.7 and 90.9% at first and second follow-up, respectively. This change was statistically significant from baseline to first follow-up as the odds of an employee being in a worse job health culture category during the first follow-up was 0.70 times the odds of an employee being in a worse job health culture category at baseline (OR = 0.70, 95% CI = 0.58–0.85).

Small/medium businesses (50–99)

Employees in small/medium businesses exhibited significant improvement in five non-chronic health-outcomes from baseline to first follow-up, while no health conditions significantly improved from the first to the second

Table 2. Comparison of lifestyle and psychosocial health risks, absenteeism, presenteeism, and workers' compensation claims of the study sample at baseline, stratified by size of business

Variable	Small (<50)			Small/medium (50–99)			Medium (100–499)			Large (500+) ^a		
	Baseline n = 842 %/M (SD)	First follow-up n = 835 %/M (SD)	Second follow-up n = 361 %/M (SD)	Baseline n = 1093 %/M (SD)	First follow-up n = 1000 %/M (SD)	Second follow-up n = 487 %/M (SD)	Baseline n = 2151 %/M (SD)	First follow-up n = 2092 %/M (SD)	Second follow-up n = 984 %/M (SD)	Baseline n = 1680 %/M (SD)	First follow-up n = 1839 %/M (SD)	Second follow-up n = 429 %/M (SD)
Overall health rating	92.9%	94.4%	95.3%	92.1%	92.7%	94.0%	93.3%	94.0%	95.5%	95.4%	95.6%	95.1%
Excellent, very good, good	7.1%	5.6%	4.7%	7.9%	7.3%	6.0%	6.7%	6.0%	4.5%	4.7%	4.4%	4.9%
Fair, poor	26.7 (5.5)	26.6 (5.5)	27.7 (6.7)	27.3 (5.8)	27.2 (5.7)	27.1 (5.5)	27.3 (6.0)	27.1 (5.9)	26.8 (6.0)	26.2 (5.3)	26.6 (5.5)	26.4 (5.6)
BMI	13.0%	10.1%	7.8%	10.5%	9.4%	6.6%	10.6%	9.4%	5.1%	3.3%	4.1%	3.0%
Smoking, currently (Ref no)	85.3%	88.0%	88.4%	85.8%	90.5%	88.3%	90.2%	91.9%	92.5%	92.0%	92.5%	93.2%
Alcohol drinks per week	14.7%	12.0%	11.6%	14.2%	9.5%	11.7%	9.8%	8.1%	7.5%	8.0%	7.6%	6.8%
Vegetable consumption, cups per day	22.9%	30.8%	36.3%	25.3%	32.2%	31.6%	26.8%	34.8%	42.9%	37.9%	40.9%	45.2%
2.5+	77.1%	69.2%	63.7%	74.7%	67.8%	68.4%	73.2%	65.2%	57.1%	62.1%	59.1%	54.8%
<2.5	Fruit consumption, cups per day											
2.5+	18.4%	24.2%	27.2%	21.9%	27.3%	28.5%	22.9%	30.4%	36.4%	33.3%	35.1%	39.9%
<2.5	81.6%	75.8%	72.9%	78.1%	72.7%	71.5%	77.1%	69.6%	63.6%	66.7%	64.9%	60.1%
Physical activity days per week												
3+	60.8%	69.6%	75.1%	63.1%	66.1%	69.6%	61.7%	68.3%	73.3%	68.9%	73.6%	72.3%
<3	39.2%	30.4%	24.9%	36.9%	33.9%	30.4%	38.3%	31.7%	26.7%	31.1%	26.4%	27.7%
Physical activity time per week												
≥2–3 h, or run up to 6–10 miles	53.9%	65.2%	67.9%	58.4%	62.3%	66.5%	55.4%	62.3%	69.5%	64.8%	67.7%	66.0%
≤1 h, or run up to 5 miles or less	46.1%	34.9%	32.1%	41.6%	37.7%	33.5%	44.6%	37.7%	30.5%	35.2%	32.4%	34.0%
Job health culture												
Excellent or good	83.9%	86.7%	90.9%	84.9%	84.9%	88.1%	83.8%	85.4%	89.8%	83.3%	84.5%	81.4%
Fair or poor	16.2%	13.3%	9.1%	15.1%	15.1%	11.9%	16.2%	14.6%	10.2%	16.7%	15.6%	18.7%

Table 2. Continued

Variable	Small (<50)			Small/medium (50–99)			Medium (100–499)			Large (500+) ^a		
	Baseline <i>n</i> = 842 %/M (SD)	First follow-up <i>n</i> = 835 %/M (SD)	Second follow-up <i>n</i> = 361 %/M (SD)	Baseline <i>n</i> = 1093 %/M (SD)	First follow-up <i>n</i> = 1000 %/M (SD)	Second follow-up <i>n</i> = 487 %/M (SD)	Baseline <i>n</i> = 2151 %/M (SD)	First follow-up <i>n</i> = 2092 %/M (SD)	Second follow-up <i>n</i> = 984 %/M (SD)	Baseline <i>n</i> = 1680 %/M (SD)	First follow-up <i>n</i> = 1839 %/M (SD)	Second follow-up <i>n</i> = 429 %/M (SD)
Stress at home												
Never or sometimes	83.3%	86.1%	87.0%	81.1%	83.1%	83.8%	80.5%	83.8%	85.8%	86.1%	87.7%	89.0%
Often or permanent or continual stress	16.8%	13.9%	13.0%	18.9%	16.9%	16.2%	19.5%	16.2%	14.2%	13.9%	12.3%	11.0%
Stress at work												
Never or sometimes	69.1%	70.4%	71.7%	70.1%	69.7%	69.2%	69.1%	69.6%	73.7%	68.8%	69.9%	67.1%
Often or permanent or continual stress	30.9%	29.6%	28.3%	29.9%	30.3%	30.8%	30.9%	30.5%	26.3%	31.2%	30.1%	32.9%
Stress over finances												
Little or none	35.9%	43.2%	47.4%	37.2%	41.3%	43.3%	35.8%	41.7%	47.1%	39.8%	44.5%	47.3%
Moderate or high or severe	64.1%	56.8%	52.6%	62.8%	58.7%	56.7%	64.2%	58.3%	52.9%	60.2%	55.5%	52.7%
Absenteeism, at least 1 h of sick time taken in the past 4 weeks (Ref none)	15.6%	12.6%	11.9%	14.0%	16.5%	13.6%	14.2%	13.3%	11.8%	12.3%	12.2%	11.0%
Presenteeism, 1–10 rating best to worst												
0—Best performance	20.0%	19.6%	21.1%	19.7%	18.9%	17.9%	20.1%	19.9%	20.0%	21.6%	22.5%	19.5%
1+—Anything less than the best	80.1%	80.4%	78.9%	80.3%	81.1%	82.1%	80.0%	80.1%	80.0%	78.5%	77.5%	80.5%

Health, absenteeism, and presenteeism outcome variables were dichotomized only for descriptive purposes. The final multivariable regression models analyzed the variables in their original form. One company moved from a medium to a large company from baseline to first follow-up, which resulted in a larger sample size at first follow-up.

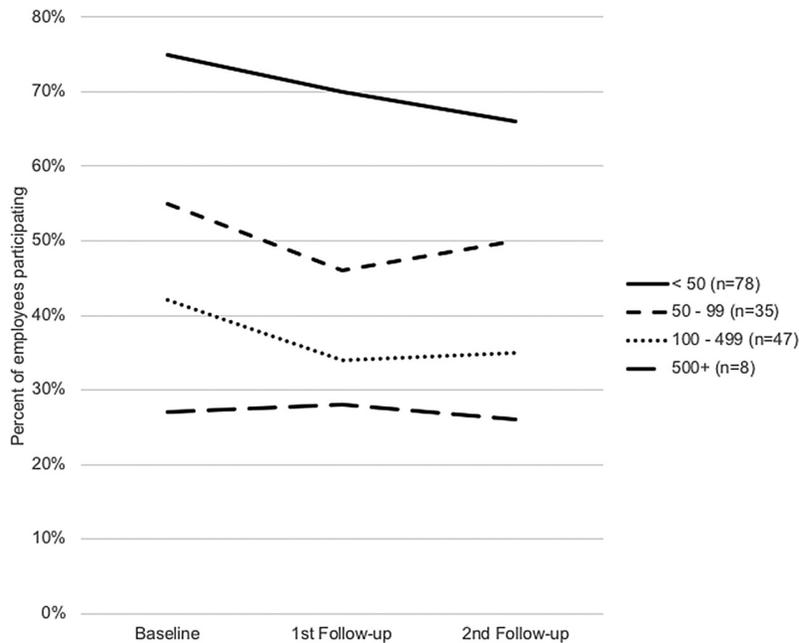


Figure 1. Business level employee participation rates by HRA and business size (number of employees).

follow-up. For example, the proportion of small/medium business employees reporting little or no stress at home increased from 81.1% at baseline to 83.1 and 83.8% at first and second follow-up, respectively. This change was statistically significant from baseline to first follow-up but not from first follow-up to second follow-up. The odds of an employee reporting worse stress at home at the time of their first follow-up was 0.79 the odds of an employee reporting worse stress at home at baseline (OR = 0.79, 95% CI = 0.67–0.93). There was change in the odds of an employee reporting worse stress at home between first and second follow-up (OR = 1.07, 95% CI = 0.87–1.32). While not significant, BMI was on average 0.15 lower at the first follow-up compared to baseline (95% CI = -0.42 to 0.12) and 0.04 lower at the second follow-up compared to first follow-up (95% CI = -0.39 to 0.31).

Medium-sized businesses (100–499)

Employees in medium businesses exhibited the most number of improvements in non-chronic health outcomes. Nine outcomes improved significantly from baseline to first follow-up, seven of them continued to improve from the first to second follow-up. Smoking only improved from first to second follow-up (OR = 0.73, 95% CI = 0.56–0.94). The proportion of medium business employees reporting smoking went from 10.6% at baseline to 9.4 and 5.1% at first and second follow-up, respectively. While not statistically significant, BMI was on average 0.10 lower at the first follow-up compared to baseline (95% CI = -0.25 to 0.05)

and 0.10 lower at the second follow-up compared to first follow-up (95% CI = -0.33 to 0.15).

Large-sized businesses (500+)

Employees in large businesses did not exhibit significant improvement in most of the non-chronic health outcomes. The proportion of large business employees reporting moderate, high, or severe stress over finances fell from 60.2% at baseline to 55.5 and 52.7% at first to second follow-up, respectively. This change was statistically significant from the baseline to first follow-up (OR = 0.61, 95% CI = 0.43–0.88). While not significant, BMI was on average 0.05 higher at the first follow-up compared to baseline (95% CI = -0.47 to 0.57) and 0.24 lower at the second follow-up compared to first follow-up (95% CI = -0.64 to 0.5).

Trends in chronic health conditions

At baseline, regardless of business size, the most commonly reported chronic health condition was depression. Interestingly, it was the only chronic health condition that improved significantly over time. For example, among small business employees, the proportion of employees reporting depression fell from 20% at baseline to 17 and 15% at first and second follow-up, respectively (see Table 3). This was significant from baseline to first follow-up as the odds of an employee having depression during first follow-up was 0.71 times the odds of an employee having depression at baseline (OR = 0.71, 95% CI = 0.55–0.92).

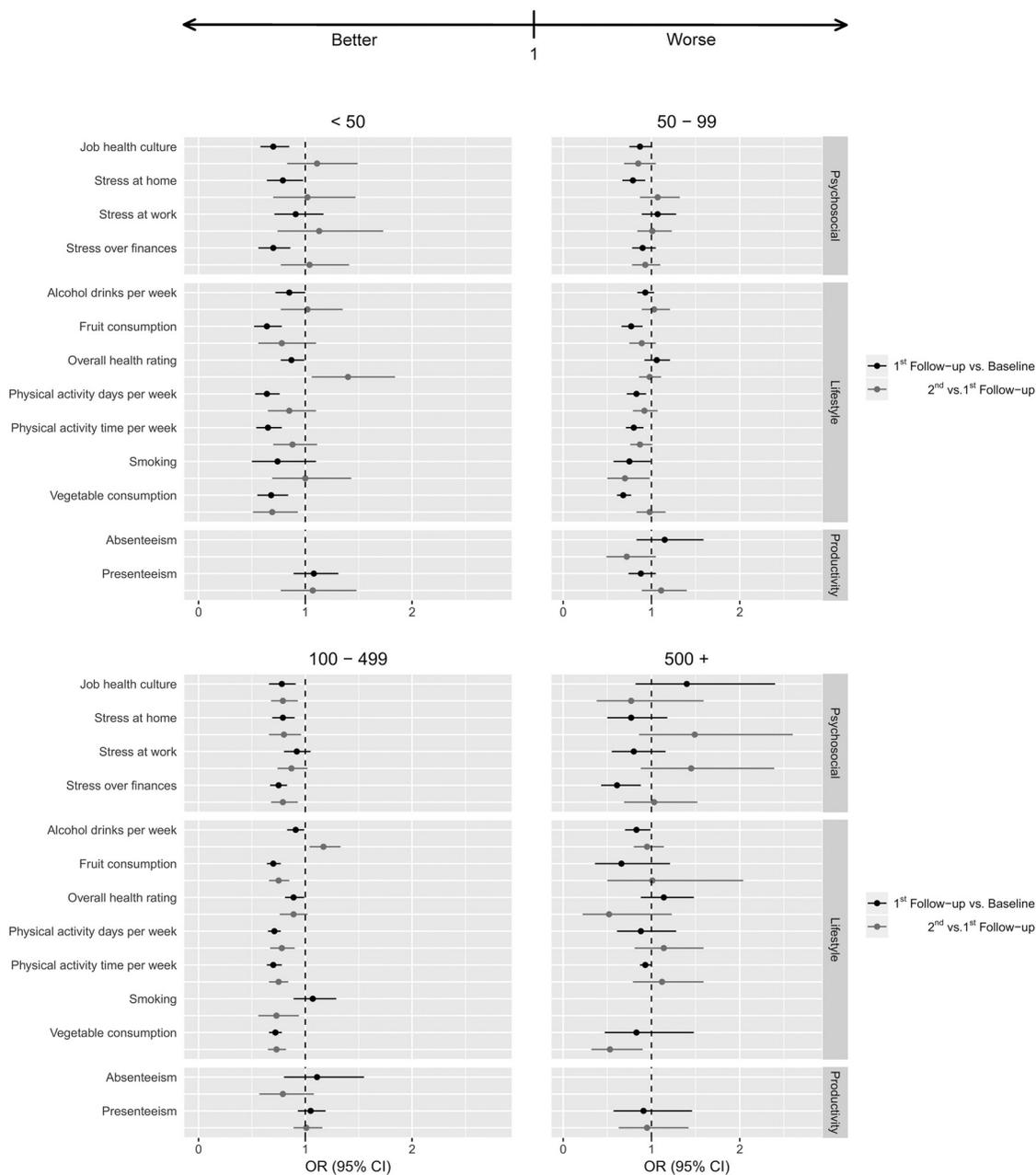


Figure 2. Odds ratios and 95% confidence intervals explaining the change in health and productivity outcomes between 1st follow-up and baseline and 2nd and 1st follow-up, stratified by size of business. Note. HRA responses are adjusted for age, gender, number of times employees took an HRA and whether the employee took consecutive HRAs. If information is missing, it is due to a model not converging.

Trends in absenteeism and presenteeism

Among employees in all sizes of business, we observed no significant change in absenteeism or presenteeism between baseline and first follow-up and from first follow-up to second follow-up.

Discussion

In a 3-year prospective, study of more than 300 employees, we demonstrate potential benefits of WHPs for organizations of all sizes. Most notably, small businesses saw the greatest levels of employee participation

Table 3. Comparison of chronic health conditions of the study sample by HRA response, stratified by size of business

Variable	Baseline	First follow-up	Adjusted odds ratio comparing first follow-up versus baseline		Second—follow-up	Adjusted odds ratio comparing second follow-up versus first follow-up	
	%	%	OR	95% CI	%	OR	95% CI
Small <50							
Depression	20.0	16.7	0.71	(0.55, 0.92)	15.0	1.00	(0.50, 2.02)
Diabetes	4.2	4.7	—		4.7	—	
Cholesterol	16.3	14.9	1.14	(0.70, 1.84)	13.8	0.81	(0.60, 1.11)
Blood pressure	15.0	15.2	0.87	(0.70, 1.07)	15.4	1.06	(0.74, 1.54)
Small/medium 50–99							
Depression	23.5	21.8	0.91	(0.73, 1.14)	19.2	0.80	(0.57, 1.11)
Diabetes	4.2	4.2	—		4.1	—	
Cholesterol	19.3	20.4	1.10	(0.88, 1.37)	24.6	1.07	(0.86, 1.33)
Blood pressure	15.6	15.6	0.99	(0.79, 1.23)	18.4	1.11	(0.88, 1.41)
Medium 100–499							
Depression	20.9	19.2	0.77	(0.61, 0.98)	18.6	0.94	(0.74, 1.20)
Diabetes	3.9	3.9	0.91	(0.78, 1.06)	4.1	1.08	(0.85, 1.38)
Cholesterol	17.0	15.9	0.89	(0.74, 1.06)	17.0	0.85	(0.65, 1.09)
Blood pressure	16.0	15.8	0.96	(0.82, 1.12)	15.6	0.86	(0.74, 1.00)
Large 500+							
Depression	16.8	14.4	—		11.1	—	
Diabetes	2.6	2.8	—		3.7	—	
Cholesterol	19.5	16.3	—		13.8	—	
Blood pressure	12.9	12.8	—		11.3	—	

Odds ratios comparing HRA responses are adjusted for age, gender, number of times employees took an HRA and whether the employee took consecutive HRAs—model did not converge due to sample size limitations.

and improvements in health risk reduction and perceived job health culture. Although there were significant indications of improved health risk behaviors, we did not observe much progress in health outcomes or improvements in either absenteeism or presenteeism in the participating businesses. This may be due to a relatively short follow-up timeframe. These findings are encouraging from the standpoint of small enterprises that may be considering the merits of having a WWP to promote health behavior change. They also highlight the novel, but potentially important role that WC insurers can play in helping small employers adopt and implement programs aimed at improving worker health and well-being.

Unlike prior research (Soler *et al.*, 2010), employees from large businesses in our study did not exhibit many changes in health. Baseline descriptive and health information demonstrate that the employees from businesses with over and under 500 employees are somewhat different both demographically and in terms of their initial health status. This has two important implications. First,

the WWP offered by the WC insurer may have attracted different types of employees depending on business size. It is possible that the employees from large employers had been previously engaged in other WWPs, had previously offered HRAs to employees, and possibly had already achieved positive health changes. If this is the case, then the static health findings in the present study are still encouraging, in that their stability could be interpreted as positive health maintenance. Conversely, for employees of small businesses that participated, this program may have been their first opportunity to participate in a WWP. Anecdotally, we noted that most of the small businesses that enrolled had not had access to a WWP previously. At the time of enrollment, we had to create materials to explain what a WWP and HRA were. Thus, it is likely that these businesses, and the employees, did not have access to these services previously, and that the WWP helped jumpstart their efforts. Future research should seek to understand why employee engagement and health behavior change differs depending on business size during an WWP like this.

Very few studies have evaluated WPPs among small businesses, and none compared their results by different small business definitions. In a review of six small business health promotion programs that were evaluated using group- or cluster-randomized designs, [Harris et al. \(2014\)](#) reported that all but one of the studies found a significant change in eating, physical activity, or body weight. Of these six studies, one study investigated businesses with 49–1700 employees ([Biener et al., 1999](#)), another with 50–350 employees ([Beresford et al., 2010](#)), but all others did not report the size of business ([French et al., 2010](#); [Lemon et al., 2010](#); [Meenan et al., 2010](#); [Siegel et al., 2010](#)). [Sorensen et al.'s \(2005\)](#) randomized control trial study demonstrated changes in healthy food consumption and physical activity at follow-up among 26 small manufacturing businesses with 50–150 employees. [Merrill et al.'s \(2011\)](#) separate non-control group longitudinal studies with five small businesses and one medium business, all with fewer than 1000 employees, found positive change at follow-up in exercise, healthy food consumption, sleep, life/job satisfaction, and overall health perceptions ([Merrill, 2013](#)) as well as blood pressure, flexibility, and obesity/body weight (men only).

The positive effect of WPPs on health risk behaviors among smaller business employees in the present study may be due to higher employee participation rates compared to large business. This finding may be because knowledge of, and motivation for, WPPs within small businesses may be transmitted faster due to the fewer number of people within their network ([Rogers, 1962](#)). While [Hall et al. \(2014\)](#) found employee engagement is a common barrier to WPP effectiveness regardless of business size, our findings suggest that employee engagement may be less of a problem in small businesses given the right program support and an organizational culture that encourages participation.

Although our study ran for 3-year period, this may still be a relatively short follow-up time in which to observe significant changes in incidence of chronic health conditions. However, given the significant change in many of the non-chronic health outcomes, we would expect to see eventual changes in these chronic health outcomes. For example, [Pronk et al. \(2010\)](#) found employees who had optimal lifestyles (physical activity, alcohol, smoking, fruit, and vegetable consumption) had a lower 2-year risk of chronic health outcome development. Future research should take into account the expected biological latency between a change in health behavior (e.g. diet) and health outcome (improvement in diabetes).

Based on our past research ([Jinnett et al., 2017](#)), we had hypothesized that we would observe improvements

in work-related outcomes, although we note that the literature shows mixed evidence for the impact of WPP on absenteeism and presenteeism at work. Much of the previous research has focused on absenteeism, and two reviews of the literature found mixed evidence of whether absenteeism declines during WPPs ([Parks and Steelman, 2008](#); [Soler et al., 2010](#)). Subsequent studies, also found little or no relationship ([Meenan et al., 2010](#); [Christensen et al., 2013](#); [Hafner et al., 2015](#)). In terms of presenteeism, one study did observe change after their intervention ([Christensen et al., 2013](#)), but another did not ([Meenan et al., 2010](#)). It is possible that, if our cohort were to be followed beyond 3 years, work-related outcome gains may eventually be observed. We did observe health risk reduction, and prior studies have linked health behavior changes to absenteeism and presenteeism improvements ([Goetzel et al., 2009](#); [VanWormer et al., 2015](#)). Future health and work-related outcomes research is needed to better understand the mechanisms and time lag that should be expected.

Limitations

This longitudinal cohort study design captured data on participating employees and did not afford us the opportunity to survey non-participants. Thus, our ability to demonstrate that the WPP caused the observed changes in health in this study is limited. However, we were able to compare the changes we observed in our sample to the United States population expected change without a program in an earlier study with our preliminary sample of 121 businesses ([Goetzel et al., 2014](#)). A related limitation is that the employers and employees in the program may represent a population that may be more motivated to engage in behavior change. However, our sample was not as healthy as the general Colorado population ([Newman et al., 2015](#)). Additionally, we were unable to account for correlation at both the employee and employer level since our sample size, however large, was not able to estimate the more complex, and more realistic, variance structure. When trying to cluster employees within employers the majority of models failed to converge. This is thought to be attributed to a combination of the large number of employers ($N = 168$) and the fact that 46% of these businesses had less than 50 employees, with even fewer responding to the survey. Finally, our analytical strategy may be limited by the self-report nature of the health questions as well as an inability to control for potential unmeasured environmental factors associated with employers.

An additional limitation is that changes in the WPP contributed to a decline in participation between the first

follow-up and the second follow-up. The WWP was initially offered as a 5-year health improvement program. However, before the end of the third year, Pinnacol Assurance announced that the study would be terminated 1 year early due to the compelling results, with a new program to be rolled out within a year. Because the largest initial enrollment came during the second year of the program, the majority of second follow-up would have occurred during the fourth year of the study. Participants were thus aware that there would be a new program coming shortly and may have opted not to engage in the activities entailed for their second follow-up year. Pinnacol Assurance did not actively encourage or discourage participation; in the past, renewal was actively encouraged. These programmatic changes were applied to all of the businesses that participated in our study, thus mitigating any risk of differential access to the intervention.

Conclusions

Our findings suggest that there is an important need and opportunity to engage small businesses in health promotion. The addition of worksite wellness services to existing WC insurer safety services represents an effort to integrate more comprehensive workplace health, as well as safety, practices, and programs, consistent with the precepts of Total Worker Health® (Schill and Chosewood, 2013). Our study results suggest that such efforts were successful in fostering job health culture as well as worker engagement and health behavior change among small businesses.

Supplementary data

Supplementary data are available at *Annals of Work Exposures and Health* online.

Funding

This study was funded by Pinnacol Assurance. It was also supported in part by Cooperative Agreement 1 U19 OH 011227, funded by the Centers for Disease Control and Prevention. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the Centers for Disease Control and Prevention or the Department of Health and Human Services.

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