

The Long-Term Impact of Johnson & Johnson's Health & Wellness Program on Employee Health Risks

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To be viewed as successful, corporate health promotion and disease prevention programs must demonstrate that they can improve the risk profile of employees as a whole, and, in particular, those employees at highest risk. This study reports the effectiveness of Johnson & Johnson's newly configured Health & Wellness Program in reducing the health risks of 4586 employees who participated in two serial health screening programs, with a minimum of 1 year between screenings. The study also examines the impact of participation in a high-risk intervention program called Pathways to Change® on health risk factors. McNemar chi-squared and z-test statistics were used to evaluate changes in health risks over time. Results indicate significant risk reduction in 8 of 13 risk categories examined for all employees who participated in two health risk assessments over an average of 2¾ years. When comparing Pathways to Change participants with non-participants, participants outperformed their non-participant counterparts in six categories but performed worse in five other categories that were not specifically targeted by the high-risk program. In two categories, no differences were found. The study underscores the ability of large-scale, well-attended, and comprehensive corporate health and productivity management programs to positively impact the health and well-being of workers. (J Occup Environ Med. 2002;44:417-424)

Johnson & Johnson introduced its LIVE FOR LIFE® Program in 1979 with the expressed purpose of making Johnson & Johnson employees “the healthiest in the world.”¹ By bringing together experts in health education, behavior change, disease management, marketing, and program evaluation, Johnson & Johnson embarked on a large-scale, multiyear program to improve the health of its workers and, consequently, save the corporation money by reducing benefit expenditures and increasing worker productivity. To support this effort, the company invested several million dollars in program design, a significant portion of which was earmarked for external program evaluation. A series of evaluation studies performed during the 1980s and early 1990s showed that the company's health promotion and disease prevention program was associated with improved employee health, reduced inpatient health care expenditures, decreased employee absenteeism, and better employee attitudes.¹⁻⁷ These studies, published in peer-reviewed journals, provided the impetus for broad application of the LIVE FOR LIFE program at all Johnson & Johnson companies, but with the expectation that the program would be subject to continuous quality improvement and ongoing rigorous evaluation.

Since its inception, the Johnson & Johnson health promotion and disease prevention program has undergone several transformations and adaptation to remain current and to respond to shifting business require-

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ments. Its latest transformation began in 1993, when Johnson & Johnson developed a “shared services” initiative integrating health, wellness, disability management, employee assistance, and occupational medicine programs. The corporation purchased its health and fitness services from one of its operating companies, Johnson & Johnson Health Care Systems, established by Johnson & Johnson to provide health promotion and disease prevention services to other corporations. Integrated benefit and health promotion services were subsequently recast as the Johnson & Johnson Health & Wellness Program (HWP) in April 1995.¹

The newly formed Johnson & Johnson HWP placed greater emphasis than previously on health promotion and disease prevention. To encourage participation in its HWP, the corporation offered financial incentives to employees who completed an initial health risk assessment (HRA), including a biometric screening, and enrolled in a high-risk intervention program, if appropriate. The HRA and high-risk intervention programs were delivered through the Johnson & Johnson Health Care Systems. More generally, on-site program managers sought to permeate a prevention message across all major corporate benefit programs and to integrate functions so that they ran more efficiently.

The HWP concentrated on reducing individual behavioral and psychosocial risk factors before these were transformed into disease and disability. This approach was expected to be more cost-effective than prior programs because of the integration of services and the widespread involvement of health and wellness professionals, in concert with physicians and nurses. The HWP staff used the latest behavior-change technologies directed at health habit improvements, early disease detection, and chronic disease management. The Johnson & Johnson HWP also emphasized aware-

ness-building among well employees through health education programs, prevention activities, and self-care. Because of financial incentives and a corporate culture that encouraged active engagement in health-promoting activities, approximately 90% of the domestic US employees participated in the program.

Continuing its long-standing tradition of measuring the impact of new program initiatives, Johnson & Johnson began a long-term evaluation of the HWP in June 2000. As reported elsewhere,⁸ a financial impact analysis of the newly structured HWP showed substantial cost savings attributable to the program. In addition to the financial impact studies, Johnson & Johnson sought to determine whether the new program also improved the health risk profile of Johnson & Johnson employees. This article reports the results of this latter investigation.

Literature Review

Corporate-sponsored health management programs have come under increasing scrutiny in the past several years.⁹ Although financial impact is generally of paramount concern to health and wellness program sponsors, there is often equal concern directed at establishing the program’s effect on the health and well-being of participants (Johnson & Johnson. Customer advisory board survey results. Unpublished manuscript; 1989).

As a result of several recent program evaluation studies, there is growing evidence that worksite health promotion programs can achieve long-term health improvements in an employee population.¹⁰ In a comprehensive literature review of close to 50 peer-reviewed studies spanning over 20 years, Heaney and Goetzel examined the effects of multicomponent worksite health promotion programs on employee health and productivity outcomes.¹¹ They concluded that worksite programs can be effective in changing employee health habits and reducing

health risk, over extended time periods, if the programs are well designed, properly implemented, and appropriately evaluated. Their review also noted that the most effective programs offer individualized risk-reduction counseling and behavior change support within the context of a comprehensive health awareness-building corporate culture.

Most recently, two large-scale health impact studies conducted by Ozminkowski et al¹² and Gold et al¹³ reported on the health outcomes from worksite-based health promotion programs. Using evaluation methods comparable with those described in this article, these researchers studied the effects of targeted health promotion interventions at Citibank¹² and across a group of employers.¹³ At Citibank, the evaluators documented health risk improvements in 8 of 10 risk categories, examined over a 2-year period, for employees completing serial HRAs as part of a comprehensive health improvement program. Participants in a high-risk program improved their risk profile even more so than general program participants. Similarly, Gold et al found that high-risk program participants were significantly more likely to reduce their risks in six of seven risk categories targeted by the intervention program. These recent findings reinforce the conclusions of the Heaney and Goetzel review that targeted and intensive health management initiatives can be powerful agents in influencing population health at the workplace.

Description of the Johnson & Johnson HWP

The newly formulated Johnson & Johnson HWP focused on providing appropriate intervention services before, during, and after major health-related events (eg, illness, accidents, or injuries) occur. Pre-event management consisted of seven major activities: (1) HRA through the Johnson & Johnson Health Care System® *Insight*® Health Risk Appraisal sur-

vey; (2) referral to high-risk intervention programs known as *Paths to Change*® (PTC), based on HRA responses; (3) preventive health services and screening programs; (4) a focus on health education and self-responsibility; (5) health and safety education/training; (6) ergonomics assessments/job conditioning; and (7) workplace drug and alcohol awareness training.

At-event management consisted of 10 major activities: (1) emergency care, (2) limited non-occupational care, (3) occupational injuries/illness care, (4) medical case management with a much stronger emphasis on managed care and increased Health Maintenance Organization enrollment, (5) alternate/modified duty assessment if necessary, (6) medical surveillance and regulatory compliance, (7) health risk management programs, (8) critical incident response, (9) counseling and referrals through the employee assistance program, and (10) substance abuse management and referrals.

Post-event management programs focused on five major activities: (1) functional assessments to monitor progress, (2) a return-to-wellness program, (3) substance abuse—post rehabilitation program monitoring, (4) critical incident debriefing, and (5) alternate/modified duty monitoring. Because of integrated programming, some activities and functions were performed at both at-event and post-event periods.

Together, the pre-, at-, and post-event management activities spanned and coordinated corporate services among preventive medicine, work-site safety, medical treatment, disability, return-to-work, employee assistance, wellness, and medical benefit programs. The aim of the integrated approach was to maximize employee functioning and rapid return to work. As noted above, one major outcome expected from these efforts was improvement in employee health and well-being and a subsequent cost saving resulting from health improvement efforts.

To engage employees in the program, Johnson & Johnson offered a \$500 medical benefit plan credit to program participants. Employees were invited to participate in a voluntary HRA, including biometric screening; if they accepted the invitation, they became eligible for the medical benefit credit. The screening determined if the employees were potentially at “high risk”; if so, they were then referred to the PTC “high risk” program.

To determine health risk, employees completed the *Insight* HRA, a four-page health assessment instrument covering the following risk areas: nutrition (fat and fiber intake), aerobic exercise, tobacco use (smoking, pipe, cigar, chewing tobacco), motor vehicle safety (seat belt use, drinking and driving), blood pressure (systolic and diastolic), blood cholesterol (total and high-density lipoprotein), body composition (high body weight/percent body fat), and diabetes risk. Referral to the PTC high-risk program was made if health risks were high in any of the following health risk areas: high serum cholesterol level (operationally defined as total cholesterol ≥ 240 mg/dL or high-density lipoprotein cholesterol ≤ 35 mg/dL), high blood pressure (values $\geq 140/90$ mm Hg), or smoking (self-identified as smoking cigarettes). If employees refused participation in the high-risk program, they ran the risk of losing their \$500 medical benefit credit. Participation in the program, not change in health risk status, was required to receive the medical benefit credit. Borderline-risk individuals received risk-specific mailings, whereas low-risk employees received general health education mailings.

To assess program impact on employee health, the responses of participants who completed the *Insight* HRA assessment at least twice, with an appropriate time interval between assessments, were examined as part of this evaluation. We also examined differences in health risk changes for participants in the high-risk PTC

program when compared with non-participants.

Methods

Sample

The Johnson & Johnson HWP *Insight* HRA was administered to approximately 43,000 US-based Johnson & Johnson employees (90% of those eligible to participate) between 1995, when the newly restructured program was first introduced, and 1999, the endpoint for the current investigation. Low-risk employees were subject to reassessment in 5-year intervals, whereas high-risk and borderline-risk employees were subject to more frequent reassessments. There were 4586 employees who participated in a second HRA assessment sooner than the standard 5-year interval between assessments, but with a minimum of 1 year between screenings. For those employees, the average time interval between the first and second HRA administration was 32.3 months, and the median time interval was 33 months (or about 2¾ years).

Data Sources

Three databases were integrated for the Johnson & Johnson HWP evaluation. Johnson & Johnson provided data on participation in the HWP and the *Insight* HRA. Participant risk data were recorded from the multiple HRA forms administered. In addition, data on health plan enrollment and medical utilization and costs were provided by Johnson & Johnson's data vendor, Corporate Health Strategies. These data were independently processed and merged for analysis.

Risk Assignment

“High risk” status was established in the following 13 risk factor categories assessed by the *Insight* HRA: aerobic exercise, cigarette smoking, cigar smoking, pipe smoking, use of smokeless tobacco, body weight, blood pressure, cholesterol level, drinking and driving, seat belt use,

TABLE 1
Operational Definitions of High-Risk Status for the INSIGHT Health Risk Assessment

Risk Category	Definition of High Risk
Poor aerobic exercise habits	Fewer than three periods of aerobic exercise per week lasting ≥ 20 minutes
Tobacco use	Any cigarette, cigar, or pipe smoking or use of smokeless tobacco (considered four separate risk factors)
High body weight	Body mass index >30
High blood pressure	Values $\geq 140/90$ mm Hg
High total cholesterol	Values ≥ 200 mg/dL
Poor seat belt use habits	Often fails to use seat belts
Drinking and driving	Consumes alcoholic beverages while driving or is driven by someone who is drinking alcohol
Poor nutrition	Inadequate fiber intake or excessive fat consumption (considered two risk factors)
Diabetes risk	Having high blood glucose (≥ 115 mg/dL) or gave birth to child weighing over 9 lbs (considered one risk factor)

fat intake, fiber intake, and diabetes risk. High risk was denoted if participants scored as “poor” or “need for help” in each of these risk areas using Johnson & Johnson’s *Insight* scoring criteria. Table 1 provides a description of the criteria used to determine risk status in each category.

Statistical Methods

Changes in the risk profile of employees as a result of participating in the HWP were assessed using a pre-test/post-test cohort group research design. Data from all HWP participants who completed at least two HRA surveys were examined before and after their involvement in the program. McNemar chi-squared tests were used to determine whether the proportion of individuals at high risk differed over time, for each of the 13 risk categories examined. Program effectiveness was inferred if the proportion of participants at high risk was significantly lower at the second HRA administration when compared with baseline.

The impact of the high-risk PTC program was assessed by comparing trends in risks over time for PTC participants with those of non-participants, for employees with two HRA records. Specifically, differences in the proportion of employees at high risk were recorded over time, allowing

trends to be discerned for the PTC and no-PTC groups. Differences in these trends were then assessed with a *z*-test. This test determined whether the change over time in the proportion of high-risk employees differed significantly for PTC participants versus non-participants.

Results

Sample Characteristics

Table 2 provides descriptive statistics for HWP participants included in this study. Of the 4586 subjects, approximately half ($n = 2301$) were enrolled in the high-risk PTC program. The average age of the sample was 42, and almost 45% were female. Most subjects (56%) were from the northeast census region, and most were enrolled in point of service (38%) or Health Maintenance Organization (28%) health plans. The mean number of risks recorded at the first HRA was 3.73.

Some differences in these characteristics were noted between PTC participants and non-participants. For example, Table 2 shows that PTC participants were less likely to be female (40%) compared with non-participants (51%). Some differences in location were noted as well, with slightly more participants (11%) in the north-central region (compared with 6% of non-participants) and

fewer participants in the south (23%, vs 30% for non-participants). PTC participants were slightly older (43.53 years, vs 41.19 years for non-participants), but there were no differences in the average number of risks recorded at the first HRA (3.74 for participants vs 3.71 for non-participants).

Changes Over Time in Health Risk for all HWP Participants

Table 3 shows changes in health risks over time for the entire study sample ($n = 4586$). As shown, changes were statistically significant, and in the expected direction (with risks declining over time), for 8 of 13 risk categories examined. Significant risk reduction was found in the following categories, organized from greatest to least risk reduction over time: high serum cholesterol (66% to 43%), low dietary fiber intake (50% to 41%), poor exercise habits (46% to 35%), cigarette smoking (33% to 24%), high blood pressure (10% to 1%), lack of seat belt use (5% to 3%), drinking and driving (4% to 3%), and snuff use (1% to $<1\%$). Four risk categories increased significantly (worsened) over time for the entire sample: high body weight (76% to 78%), risk for diabetes (49% to 52%), high dietary fat intake (22% to 25%), and cigar smoking (1% to 2%). Pipe smoking rates did not significantly change over time ($<1\%$ at both HRAs).

Changes Over Time in Health Risk for PTC Participants Versus Non-Participants

Table 4 shows the proportion of employees at high risk at each HRA administration, for all 13 risk factors. Data are presented separately for PTC participants and non-participants. As shown, risks among participants improved in seven risk categories. These included risks related to low fiber intake, poor aerobic exercise habits, high total cholesterol, high blood pressure, cigarette smoking, chewing tobacco or snuff

TABLE 2
Sample Characteristics^a

Variable	Whole Sample (n = 4586)		PTC Participants (n = 2301)		Non-Participants (n = 2285)	
	Mean or %	SD	Mean or %	SD	Mean or %	SD
Age	42.37	8.54	43.53	8.40	41.19	8.52
Female gender	45.44%	49.80%	39.63%	48.92%	51.29%	49.99%
PTC program participants	50.17%	50.01%	100.00%	–	0.00%	–
Number of risks identified at HRA time 1	3.73	1.63	3.74	1.60	3.71	1.66
Resides in:						
Northeast census region	56.17%	49.62%	56.67%	49.56%	55.67%	49.69%
North-central census region	8.46%	27.83%	10.52%	30.68%	6.39%	24.46%
South census region	26.25%	44.01%	23.03%	42.11%	29.50%	45.61%
West census region	9.11%	28.78%	9.78%	29.71%	8.45%	27.81%
Enrolled in:						
Indemnity plan	7.87%	26.93%	7.61%	26.51%	8.14%	27.35%
POS plan	38.01%	48.55%	38.59%	48.69%	37.42%	48.40%
PPO plan	8.77%	28.28%	9.78%	29.71%	7.75%	26.74%
HMO plan	27.67%	44.74%	28.60%	45.20%	26.74%	44.27%
Unknown	17.68%	38.16%	15.43%	36.13%	19.96%	39.98%

^a PTC, *Pathways to Change*; SD, standard deviation; HRA, health risk assessment; POS, point of service; PPO, preferred provider organization; HMO, Health Maintenance Organization.

TABLE 3
Percentage of Employees at High Risk at Time 1 Versus Time 2 (n = 4586)

Risk Category	% High Risk			McNemar χ^2 Test P Value
	Time 1	Time 2	Change	
Poor aerobic exercise habits	45.8	35.1	–10.7	<0.0001
Any tobacco use	39.2	27.6	–11.6	
Cigarette smoking	32.7	23.9	–8.8	<0.0001
Cigar smoking	1.3	1.8	+0.5	0.0423
Pipe smoking	.3	.2	0.1	0.7630
Smokeless tobacco/snuff	1.1	.5	–0.6	<0.0001
High body weight	75.7	77.8	+2.1	<0.0001
High blood pressure	9.7	1.3	–8.4	<0.0001
High total cholesterol	66.2	43.2	–23.0	<0.0001
Seat belt use	4.5	2.7	–1.8	<0.0001
Drinking and driving	3.5	2.9	–0.6	0.0295
Poor nutrition				
High fat intake	22.4	25.4	+3.0	<0.0001
Low fiber intake	49.6	41.0	–8.6	<0.0001
Diabetes risk	49.4	51.7	+2.3	0.0010

use, and failure to use seat belts. In all seven risk categories, the proportion of PTC participants at high risk declined significantly over time ($P < 0.05$, McNemar chi-squared test). A similar pattern was found for non-participants as well, with two exceptions. First, the decline in high blood pressure over time for non-participants was not statistically significant ($P = 0.7925$, McNemar chi-squared test). Second, the risk of drinking and driving declined significantly

over time among non-participants ($P = 0.0138$, McNemar chi-squared test), but there was no significant difference in drinking and driving rates over time for PTC participants.

For some categories, risks tended to increase over time. Among PTC participants, the proportion of employees with high fat intake increased significantly, although the increase was rather small (2.8%). Among non-participants, the proportion of employees at high risk in-

creased significantly over time in three categories: high fat intake (an increase of 3.6% over time), high body weight (3.4%), and having multiple risk factors for diabetes (2.9% over time).

The last three columns of Table 4 present information that can be used to estimate the impact of the PTC program, without adjusting for differences between the demographic or other characteristics of PTC participants and non-participants. Table 4 suggests that PTC participants outperformed non-participants with regard to risk change in six categories. These included high fat intake, high body weight, poor aerobic exercise habits, having risk factors for diabetes, high cholesterol, and high blood pressure. In these six categories, the trends in risk over time were significantly more favorable for PTC participants than for non-participants (z -test for differences between PTC participant and non-participant trends in high risk over time, $P < 0.05$). On the other hand, trends in risk over time were significantly less favorable for PTC participants for five risk categories. These included low fiber intake, cigarette smoking, pipe smoking, failure to use seat

TABLE 4
 Percentage of Respondents at High Risk at Each HRA, for PTC Participants and Non-Participants, and Unadjusted Impact of PTC Program^a
 PTC Participants (n = 2301) Non-Participants (n = 2285) Impact of PTC

Risk Factor	PTC Participants (n = 2301)			Non-Participants (n = 2285)			Impact of PTC				
	1st HRA	2nd HRA	Difference Over Time (1st HRA - 2nd HRA)	McNemar χ^2 Test P Value	1st HRA	2nd HRA	Difference Over Time (1st HRA - 2nd HRA)	McNemar χ^2 Test P Value	Net Difference ^b	z Statistic P Value for Net Difference Being Different From Zero	PTC Performance
High fat intake	25.8	28.6	-2.8	0.0019*	19.5	23.1	-3.6	<0.0001*	0.8	<0.0001**	Better
High body weight	81.1	81.5	-0.4	0.5356	72.0	75.4	-3.4	<0.0001*	3.0	<0.0001**	Better
Low fiber intake	45.8	36.9	8.9	<0.0001*	55.2	45.6	9.6	<0.0001*	-0.7	0.0193**	Worse
Too little aerobic exercise	43.2	31.3	11.9	<0.0001*	50.3	39.4	10.9	<0.0001*	1.0	0.0037**	Better
Diabetes risk	54.8	55.7	-0.9	0.3551	47.8	50.7	-2.9	0.0054*	2.0	<0.0001**	Better
High total cholesterol	93.1	57.3	35.8	<0.0001*	50.0	35.8	14.2	<0.0001*	21.6	<0.0001**	Better
High blood pressure	14.1	11.3	2.8	0.0003*	6.6	6.4	0.2	0.7925	2.6	<0.0001**	Better
Cigarette smoking	10.0	7.5	2.5	<0.0001*	61.0	44.2	16.8	<0.0001*	-14.3	<0.0001**	Worse
Pipe smoking	0.3	0.4	-0.1	0.6547	0.3	0.2	0.1	0.4142	-0.2	<0.0001**	Worse
Cigar smoking	1.0	1.4	-0.4	0.0956	1.9	2.4	-0.5	0.2320	0.1	0.1141	Equivocal
Chewing tobacco or snuff use	1.2	0.6	0.6	0.0011*	1.1	0.6	0.5	0.0067*	0.1	0.1971	Equivocal
Fails to use seat belts	3.7	2.3	1.4	0.0003*	5.5	3.2	2.3	<0.0001*	-0.9	<0.0001**	Worse
Drinking and driving	3.0	2.7	0.3	0.5360	4.0	2.8	1.2	0.0138*	-0.9	<0.0001**	Worse

^a For definition of abbreviations, see Table 2.

^b Difference over time for participants minus difference over time for non-participants.

* Difference between 1st and 2nd HRAs is statistically significant, $P \leq 0.05$, McNemar chi-squared test.

** High-risk trend over time for PTC participants is significantly different than the high-risk trend over time for non-participants (z-test P value < 0.05).

belts, and drinking and driving. For risks related to cigar smoking and chewing tobacco or snuff use, trends in risk over time showed no significant differences between PTC participants and non-participants.

Discussion

Corporate health promotion and disease prevention programs are under constant pressure to produce outcomes that support the company's business objectives. Over several decades, Johnson & Johnson staff have devoted considerable time, resources, and expertise toward developing and documenting their programs' impact. When the company decided to restructure its health and wellness programs, senior management decided to again measure the newly configured program's effects on financial and health outcomes.

Previous research examined the new HWP impact on medical expenditures. This article describes the program's effect on employee health outcomes. By examining changes in the risk profile of 4586 employees who participated in two health risk appraisals over a 2¾ year period, we found improvement in 8 of 13 risk categories for the sample as a whole. Risk reductions were shown in tobacco use (cigarette smoking and snuff use), aerobic exercise, high blood pressure, high cholesterol, dietary fiber intake, seat belt use, and drinking and driving habits. On the other hand, the program was not successful in reducing risk factors often associated with increased age: high body weight, risk for diabetes, high fat diet, and cigar and pipe smoking.

The analysis also found that participation in the PTC high-risk program resulted in better health outcomes for six risk factors, and worse outcomes for five other risk factors. As noted earlier, the PTC program was particularly targeted toward employees with high blood pressure and high cholesterol and toward those who smoked. Participation seems to have had a significant impact on

those with hypertension and hypercholesterolemia, and a significantly negative impact on smoking rates. In summary, it seems that both participants and non-participants were motivated to improve their behaviors and reduce their risks and that participation in the PTC program may have provided a slightly greater impetus for change.

Why are these findings important? First, they highlight the positive impact that large-scale corporate health promotion efforts can achieve on employee health. When positive health improvement results are coupled with results showing financial savings from medical benefit programs, these findings are very compelling and reassuring to program sponsors. Perhaps even more important is a demonstration of a large corporation's ability to efficiently implement a complex, large-scale, and far-reaching population health management program that achieves very high participation rates (ie, 90%). Achieving such high participation rates in a work setting is very rare, but as shown here, the positive impact on health and medical costs can be significant.

Health promotion program planners have always asserted that to be successful their programs must achieve high participation rates and be effective in modifying participants' behaviors, thus lowering their population's health risks. It is further assumed that if these outcomes are achieved, cost savings will follow. This study, one in a series of evaluations directed at Johnson & Johnson's health promotion and disease prevention programs, seems to support assumptions about corporate initiatives aimed at improving the risk profile of the workforce. As reported earlier,⁸ the Johnson & Johnson HWP achieved significant cost savings as well. Taken together, these studies underscore the logic that well-designed, well-implemented, and well-evaluated health promotion and disease prevention programs achieve positive and documented re-

sults. Achievement of these outcomes should help reinforce the corporate objectives of attracting and retaining a healthy and productive workforce.

Limitations

The most significant limitation to this research is the use of a pre-test/post-test research design, without a randomized control group. Because of the very high participation rates in the HWP, no suitable comparison group could be found. Consequently, because neither a randomized control nor a non-randomized comparison group was available to examine the behaviors and risk profile of non-participants over time, it cannot be established with confidence that the behavior changes and risk-reduction profile of program participants were a direct result of the program. Other factors may have contributed to risk changes over time, such as educational programs offered by health plans, or a general increase in awareness about health issues promulgated by the popular press. Ideally, information would be collected for all employees at multiple points in time, and surveys would be conducted to help differentiate between competing reasons for risk change when a randomized trial or well-designed quasi-experimental study are not feasible.

Other limitations include the inevitable problems related to self-report. Employees may have offered socially desirable responses to their HRA questions to avoid having to participate in the PTC program and to receive the \$500 medical benefit credit. This might be particularly problematic for cigarette smoking, as evidenced by the very low percentage of smokers in the PTC group (about 10%, Table 4) and the very high percentage of smokers among non-participants in the PTC program (about 61%, Table 4). Self-reported risks for other problems seemed within ranges reported in other studies, however.^{12,14}

Finally, the PTC program was not implemented as part of a randomized

trial, and no adjustments were made for differences in the demographics or other characteristics of PTC participants versus non-participants when the PTC impact was estimated. We decided against adjustments for these differences because the PTC program was developed mainly to address risks related to cholesterol, high blood pressure, and smoking, not all 13 of the risk factors examined. Thus, comments on the impact of PTC with regard to many risks would have to be viewed with caution even if adjustments had been made, and a reliance on adjusted differences might therefore produce a false sense of security.

Conclusion

This study of Johnson & Johnson's newly restructured HWP follows a long tradition within the corporation of introducing innovative health improvement initiatives that engage a large segment of the employee population and are supported by a culture that encourages a healthy lifestyle. The evaluation of the program complements a growing body of literature that supports the notion of corporate investment in the health and well-being of employees. As health care costs continue to rise, partly as a result of an aging workforce and partly because of increased stressors in employees' lives, corporate decision-makers will seek innovative programs that promote health and reduce costs. Senior executives would be wise to consider the mounting evidence accumulated here and in other studies conducted over the past 20 years that supports corporate investment in worker health. As illustrated here, such investment may result in better risk profiles. As noted elsewhere, a well-designed health promotion and disease prevention program may reduce benefit costs and improve worker productivity.¹⁰

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