

Promoting Employee Health by Integrating Health Protection, Health Promotion, and Continuous Improvement

A Longitudinal Quasi-Experimental Intervention Study

Ulrica von Thiele Schwarz, PhD, Hanna Augustsson, MSc, Henna Hasson, PhD, and Terese Stenfors-Hayes, PhD

Objective: To test the effects of integrating health protection and health promotion with a continuous improvement system (Kaizen) on proximal employee outcomes (health promotion, integration, and Kaizen) and distal outcomes (workability, productivity, self-rated health and self-rated sickness absence). **Methods:** Twelve units in a county hospital in Sweden were randomized to control or intervention groups using a quasiexperimental study design. All staff (approximately 500) provided self-ratings in questionnaires at baseline, and a 12- and 24-month follow-up (response rate, 79% to 87.5%). **Result:** There was a significant increase in the proximal outcomes over time in the intervention group compared with the control group, and a trend toward improvement in the distal outcomes workability and productivity. **Conclusions:** Integration seems to promote staff engagement in health protection and promotion, as well as to improve their understanding of the link between work and health.

In both practice and research, workplace health protection programs are often separated from health promotion programs (eg, wellness and disease management).¹⁻⁵ These program types originate from different disciplines: the former from psychology and medicine, the latter from public health.^{6,7} In organizations, they are often arranged in different organizational divisions, such that health protection is generally found in non-health-oriented units and health promotion activities in human resources departments.¹ Consequently, they are often managed as distinct, separate activities, with separate budgets, personnel, and discrete policies and with little or no coordination or integration.^{2,4} This lack of integration prevents optimal resource utilization and thwarts efforts to maximize the overall health and productivity of the workforce.^{1,8} Given that health risks in the population and the disease burden on the workforce are increasing, thus challenging the financial well-being of organizations, there is an urgent need for methods that can more effectively deal with these issues.

Health protection—also known as occupational health and safety—has typically been viewed as encompassing activities that protect workers from occupational injury and illness and that range from basic safety training to the use of protective gear, work organization, and safety-enhancing modifications.^{1,2} In contrast, health promotion has typically been viewed as primarily focusing on individual lifestyle behaviors and encompassing activities that maintain or improve personal health within a workforce—ranging from health

risk assessments to wellness initiatives and immunization.^{1,2} Thus, health protection has focused on on-the-job risks, whereas health promotion has mainly focused on off-the-job factors.⁹ The need for a more integrated approach has been acknowledged from both a health protection^{1,7} and a health promotion perspective.^{2,8,10} It has gained further support from recent research showing that well-being, in addition to health behaviors and disease, is an important predictor of productivity.^{11,12} Integrative approaches are also in line with the view that a healthy workplace is one that maximizes integration of workers' desire for well-being with the organization's goals concerning profitability and productivity.¹³

Several definitions of integrated approaches have emerged during recent years. Hymel et al¹ used the term “workplace health protection and promotion” and referred to integrated approaches as “the strategic and systematic integration of distinct environmental, health, and safety policies and programs into a continuum of activities that enhances the overall health and well-being of the workforce and prevents work-related injuries and illnesses.” In this definition, the underlying logic is that employers can substantially enhance the overall health and well-being of the workforce while better preventing work-related injury and illness.¹ Similarly, several authors have proposed that organizations should consider using comprehensive approaches for improving employee health (ie, initiatives that address individual, psychosocial, environmental, and organizational factors) as well as broader policy issues related to occupational health.^{2,8} Finally, the US National Institute for Occupational Safety and Health stressed the need for a holistic approach to worker health in its Total Worker Health™ approach, which is a strategy to “integrate occupational safety and health protection with health promotion to prevent injury and illness and to advance health and well-being.”¹³ Thus, although there is some variation in definitions, the main points are that integrated approaches are strategic and comprehensive and that health protection and health promotion are considered simultaneously, taking into account both individual and organizational factors.

A number of explanations for why integration of health protection and health promotion is beneficial to employees and organizations have been put forward. First, integration may be related to improved efficiency regarding both health promotion and protection, particularly when health protection and promotion share synergistic risk factors (examples of which are tobacco smoking and asbestos exposure, and poor health habits and stress-related diseases).^{8,14} Second, integration has been related to a more comprehensive approach to employee health, and in turn to improved productivity.^{8,12,14} Third, integration is thought to lower health care costs, including reducing the impact of the general increase in chronic diseases and the associated costs employers must bear (ie, medical insurance, costs of absenteeism, and of long- and short-term disability claims).^{1,8} Reduced costs owing to the elimination of redundant roles and services,¹⁴ through better management and coordination,¹⁵ have also been suggested. Nevertheless, empirical research on the effects of integrated approaches is still limited,¹ although the emerging body of literature shows promise.^{4,16} In a recent literature review, only 11 experimental studies on integration were found, and these consistently showed that integration was related to improvements in employee health.¹⁶

From the Medical Management Centre (Dr von Thiele Schwarz, Ms Augustsson, and Dr Hasson); and Department of Learning, Informatics, Management and Ethics (Dr Stenfors-Hayes), Karolinska Institutet, Stockholm, Sweden.

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Address correspondence to: Ulrica von Thiele Schwarz, PhD, Department of Learning, Informatics, Management and Ethics, Medical Management Centre, Tomtebodavägen 18A, Karolinska Institutet, SE-171 77 Stockholm, Sweden (ulrica.schwarz@ki.se).

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Findings from the experimental studies were also supported by meta-analysis and research reports discussing comprehensive work promotion programs, albeit without describing them as integrated approaches as such.¹⁶ The effects on productivity and costs are more uncertain,¹⁶ although a study investigating the costs associated with different health protection and promotion practices indicated that integration may be related to reduced expenditures.^{14,15} In addition, integrated programs are related to higher participation rates (ie, greater exposure to program content).^{16,17}

Organizational quality improvement and production processes—including workplace design, purchasing, production scheduling, and work assignments—have a great influence on health protection and promotion management.^{8,18} Similarly, employee health, and thus health protection and promotion, has important implications for productivity.^{11,14,19–22} In this view (the human capital model), employees are seen as resources that the organization needs to protect, maintain, and develop if it is to improve its performance.^{14,18} In line with this, it has been argued that health protection and promotion need to be explicitly aligned with business goals¹⁹ and that health protection and promotion should be integrated with systems and processes in the organization that are meant to support quality and production development, such as continuous improvement systems.^{23–27} Organizations often have separate systems and processes for addressing these issues. One reason for this may be that different systems are often developed at different time points, within different parts of the organization and in response to different types of needs. Nevertheless, there are also similarities between them, such as the emphasis on employee involvement and on monitoring and taking actions to improve outcomes.²⁸ Accordingly, companies that have a continuous improvement system have also been shown to apply broader and more institutionalized health protection and promotion strategies.²⁸

The arguments for integrating these three systems (health protection, health promotion, and continuous improvement systems) are similar to the arguments for integrating health protection and promotion: Integration decreases the risk of unnecessarily complex bureaucracy and separate or even conflicting procedures, reduces costs,²⁹ and enhances utilization of resources and synergies between different systems.³⁰ Also, in an organization, taking an integrated system approach can be seen as a prerequisite for sustainable development.^{27,30} Furthermore, integrated systems can entail that changes in one system are made with consideration to how it affects the other systems, decreasing the risk of unintended consequences such as when a change to improve productivity has a negative impact on worker health. Integrated systems are also thought to result in a greater focus on continuous improvement work, better collaboration across functional borders, and better preparedness for future integration of new standards.³¹

One way of working with continuous improvement is by applying the ideas of Lean production, or Lean for short. Lean is a philosophy that originated from the Toyota Production System³² and that has been widely applied in the manufacturing industry. At present, it is being implemented in other sectors as well, including health care.³³ There are a variety of definitions of Lean and ideas about what it should entail.³⁴ Lean has been described as operating on both the strategic level—where “customer-thinking” is essential (ie, understanding value so as to maximize value for the customer)—and the operational level—where tools for improving production and quality are in focus.³⁵ Different organizations often choose different aspects of Lean to focus on and different tools to use, meaning that the details of the approach may vary substantially across settings.

One of the operational-level tools used in Lean is Kaizen—a participatory, employee-driven, problem-solving tool.³⁶ The word *Kaizen* is Japanese and means “continuous improvements.” Kaizen builds on a participatory approach by encouraging employees to be actively involved in evaluating and improving work processes.³⁷

It aims to provide a structure for small-scale, continuous improvements that can be given shape directly, at the workplace level. Kaizen encourages quick identification of problems that arise in work processes as well as discussing and testing potential solutions.³⁸ Thus, it is often low-cost and low-risk changes that are in focus, whereas larger organizational changes that are more difficult to implement are regarded as the responsibility of management.³⁷ These characteristics of Kaizen, and the fact that Kaizen tends to give rapid results, are cited as the main reasons why Kaizen is the part of Lean that is most frequently implemented in health care organizations.³⁹ It can also be argued that these characteristics make Kaizen a suitable structure for integrating health protection, health promotion, and continuous improvement.^{27,40} This is supported by a case study from the construction industry, where health protection (eg, safety) was integrated with Kaizen and was found to be associated with reduced hazards and productivity and safety improvements.⁴¹ Nevertheless, to our knowledge, no previous studies have described organizations working with integrated systems for health protection, health promotion, and continuous improvement. Thus, this study is one of the first to describe and evaluate the integration of health protection and promotion with an existing continuous improvement system. More specifically, the aim of the study is to evaluate the possible effects of integrating workplace health protection, health promotion, and continuous improvement (ie, Kaizen) on proximal employee outcomes (workplace-based health promotion, integration, and Kaizen) and distal outcomes (workability, productivity, self-rated health, and self-rated sickness absence).

METHODS

Setting

The study was set in a county district hospital in Sweden that offers surgery, radiology, internal medicine, acute care, intensive care, rehabilitation, hospital-controlled home care, and geriatric care. Approximately 500 individuals are employed at the hospital.

Background

Continuous Improvement

The hospital has worked with the continuous improvement system Kaizen since 2009. The structure consists of regular, short meetings at the unit level that all employees are to attend, and where work problems are identified, possible solutions discussed, chosen, tested, and evaluated. One to three employees serve as Kaizen representatives at each unit. The meetings are held one to four times a month. The hospital units have a great deal of autonomy to form their Kaizen work as they see fit, but the general work process described above is the same for all.

Health Promotion

The hospital has been explicitly engaged in workplace health promotion since 2001. The health promotion program encompasses a staff health coordinator, one to two staff health representatives at each unit, an exercise room, and one hour of weekly exercise during work hours for all staff, workload permitting. The program also offers health profiles for all staff members and lectures on healthy lifestyles.

Health Protection

Traditional approaches to work environment issues at the hospital are based on the Swedish Work Environment Act (SFS 1977: 1160). Each unit holds monthly staff meetings where health protection issues can be raised and discussed, and safety inspections are performed annually by representatives of the employer and employee organizations (unions). Possible risks are identified, noted, and incorporated into an action plan. In theory, action plans should be followed-up, but in the past, this has rarely been done.

Study Design

The study had a quasiexperimental design with randomization at the hospital unit level. Half of the units were randomized to receive the intervention (ie, to integrate health promotion, health protection, and Kaizen). The 12 units that work directly with patients (excluding administrative departments) were first matched based on unit characteristics (size, acute vs nonacute care, and daytime vs around-the-clock care) and the intensity of work with Kaizen (frequency of Kaizen meetings). The units in each matched pair were then randomized to the intervention group or the control group.

Intervention Planning

The starting point for integration was hospital management's desire to bring the hospital's health promotion program closer to hospital operations. Underlying this desire was a sense that the health promotion focus on individual health behaviors was too narrow and that there was too little focus on the relationship between health and work. The vision for integration was to create an understanding of the mutual influences between health and work that are related to both prevention and promotion. In this way, the integration plan included ingredients from both health protection and health promotion. The plan was to be launched at the beginning of 2012. Nevertheless, at the time of launching integration, hospital management also decided to transfer the documentation from their annual safety inspection into Kaizen, for all hospital units. This was done in late 2011. This meant that all of the units (both intervention and control units) were expected to document the annual safety inspection on Kaizen notes, and to work with them through the ordinary Kaizen process. Thus, the aspects of the hospital's health protection that concerned annual safety inspections were also integrated into Kaizen in the control units. Nevertheless, the control units did not perform continuous identification of risks, and they did not perform analyses of worker health consequences before implementing changes in the Kaizen work. Thus, health protection was only integrated to a limited extent in the control units, whereas it was fully integrated in the intervention units.

Integration

The fundamental principle of integration of the systems was that no new structures would be created, but rather that integration would build on existing Kaizen work. Another fundamental principle was a high level of employee engagement, as in the existing Kaizen work. In practice, integration involved two main components played out within the preestablished Kaizen system and, thus, modification of the existing practice: (1) health promotion-related activities and improvements and work protection issues were to be identified, raised, and addressed on the Kaizen notes, thereby integrating health promotion and protection with other production and quality improvement issues; and (2) all problems mentioned on the Kaizen notes, regardless of which area the problem/proposal concerned, were to be analyzed from a health promotion and protection perspective (risk assessment).

In addition, integration entailed that the roles and responsibilities of the local Kaizen and health representatives changed, in that both were to structure their work around the Kaizen system by directing proposals and ideas to the Kaizen notes as well as to help their coworkers analyze the proposals' health consequences. As part of the intervention, joint meetings were also held for all Kaizen and health representatives. Beyond this, variation between intervention units in how they performed the integration was expected and allowed, as the Kaizen work differed across units before the intervention.

Implementation

To put integration into effect, two implementation activities were carried out in the intervention group: workshops for Kaizen and health representatives and managers from the participating units, and

coaching of unit managers and local management responsible for integration (the hospital Kaizen coordinator and the health coordinator) using a train-the-trainer approach.⁴² The workshops were held by the local management responsible for integration and the research group. The first workshop was held as part of the introduction to integration and intended to build a common understanding of the integration program's aim and approach and to start making preparations for integration in each unit. The workshop also aimed to promote a better and broader understanding of what health promotion entails, given that the previous general consensus was that it simply meant physical exercise. Three additional workshops were held (after two, nine, and 12 months), with the research group gradually handing over responsibility for the meetings to the internal resources. The purpose of the workshops was to give participants opportunities to exchange experiences, discuss difficulties, and exchange ideas concerning the continuing work.

During the first 1.5 years, the local management responsible for integration and the managers at units in the intervention group were offered the support of a certified coach (Coaching Healthcare Improvement Teams, Dartmouth Medical School, and the Dartmouth Institute). The coaching focused on supporting integration by seizing upon ideas, helping with any obstacles and providing tools and methods for change. Coaching was needs-based and, thus, the number of meetings differed across individuals and included over 20 coaching meetings (face-to-face or via telephone) with the local management responsible for integration. The coach also visited the intervention units up to three times and met three unit managers for individual coaching. The coach also participated in seven of the regular joint meetings between the Kaizen and health representatives from the integration units. The central Kaizen and health coordinators in turn also visited the integration units and coached the Kaizen and health representatives at each unit, who in turn had a coaching role in relation to their coworkers. Thus, the implementation strategy used to put integration into effect was a train-the-trainer approach, where the coach and researchers first supported the creation of a common understanding of the underlying principles of integration among the local management, so that they, in turn, could support integration among the units in the intervention group.

The idea for the present integration program was conceived in a collaboration between the researchers and the hospital, but it was the hospital that owned and managed the integration work. The researchers actively collaborated with management as well as the Kaizen and health coordinators to support the integration of health protection and promotion with Kaizen, and were responsible for evaluating the project using an interactive research approach.⁴³ More information on the background of the idea for the present integration program can be found elsewhere.⁴⁴

Data Collection Procedure

A web-based questionnaire was distributed via e-mail. The e-mail included detailed information about the project and ethical issues concerning participation. Informed consent was obtained through the questionnaire. The data collection procedure was repeated four times: before the intervention (baseline), and at six, 12, and 24 months after baseline. The six-month questionnaire only concerned data on the implementation process and was therefore not included in this study. The study was approved by the Local Ethical Committee (ref. no. 2011/1420-31/5).

Participants

All employees (356 at baseline, 317 at the 12-month follow-up, and 319 at the 24-month follow-up) at the participating units at the hospital—excluding those employed on an hourly basis or on long-term leave or sick leave—were invited to participate in the study. The rate of respondents who agreed to participate in the study was 87.5% at baseline, 81.5% at the 12-month follow-up, and 79%

at the 24-month follow-up. A total of 202 employees responded to the questionnaire at all three measurement points, and they make up the sample for this study (the panel sample).

Outcome Measures

Proximal Outcomes

Because no previously validated scales were available for measuring integration of health promotion, health protection, and Kaizen, three new scales were developed. Items relating to employee involvement, exposure, and first-line managers' attitudes and actions were derived from a previously validated scale measuring appraisal of interventions.⁴⁵ The items were measured on a visual analogue scale with 0 (disagree completely) and 100 (agree completely) as endpoints.

Workplace-based health promotion was assessed using five items measuring involvement in, influence over, encouragement of, and support and resources for health promotion. Cronbach α was 0.91.

Integration was assessed using four items covering: (1) the extent to which the unit analyzed potential effects on employee health before making changes (ie, risk assessment), (2) the extent of discussion on how work environment issues (ie, health protection) and (3) health promotion, respectively, influenced work, and (4) the degree of integration of health promotion and Kaizen. Thus, the index assessed both the practice of integrating health promotion and Kaizen as well as integration concerning employees' understanding of the links between work, work environment, and health. Cronbach α was 0.85.

Kaizen was assessed using three items measuring: (1) perceptions about the usefulness of Kaizen, (2) support from management for using Kaizen, and (3) personal engagement in Kaizen work. Cronbach α was 0.70.

Distal Outcomes

Previously validated scales were used to measure the distal outcomes of the intervention.

Workability was measured using a single item.^{46,47} Respondents were asked to rate their current workability as compared with their workability at its best on a ten-point scale ranging from "completely lacking workability" (1) to "workability at its best" (10).

Productivity was assessed using a short version of the productivity subscale from the Health and Work Questionnaire, a multidimensional instrument including three productivity dimensions: efficiency, quality, and quantity.^{48,49} For each item, the respondents were asked to rate how they perceived their own work-related efficiency, quality, and quantity, respectively, during the previous week. The response alternatives were presented on a ten-point visual analogue scale with "my worst ever" and "my best ever" as endpoints. Cronbach α was 0.92.

Self-rated health was assessed using a single item, where respondents were asked to rate their current health status as compared with other individuals of the same age. Ratings were made on a five-point scale ranging from "very good" (1) to "very poor" (5).⁵⁰

Sickness absenteeism: Two questions were used to measure absenteeism.⁵¹ *Frequency* of absenteeism was assessed using one item that asked "How many times have you been absent from work because of your own sickness during the past 12 months?" The four response alternatives were "never," "once," "two to five times," or "more than five times." This was then recalculated into three categories, by collapsing "two to five times" and "more than five times" into one category (more than twice). The *duration* of sickness absence was measured as the respondent's rating of the *total number of days* (duration) absent from work because of one's own sickness during the past 12 months. The five response alternatives were the

following: "not absent because of sickness," "one to seven days," "eight to 30 days," "31 to 90 days," and "more than 90 days." Because of the low cell count, the last three categories were collapsed into one category, "more than 8 days."

Statistical Analysis

Possible differences in background variables between the intervention and control groups were investigated using chi-square statistics and *t* tests. Changes in proximal and distal outcomes over time between the intervention and control groups were investigated using repeated-measures analysis of variance for baseline (T0), 12-month follow-up (T2), and 24-month follow-up (T3), separately, using Pillai's trace. If the time effect was significant, effects over time for each group were also tested. The Friedman test was used to examine differences in sickness absenteeism (frequency and duration) within conditions over time. Between-group differences in absenteeism at the two time points were analyzed using chi-square statistics. Because of internal missing values, the number of responses differs somewhat between the analyses.

RESULTS

The demographic characteristics of the sample at baseline can be found in Table 1. The majority of employees were women (96.4% in the intervention group and 91.2% in the control group); the mean of employees' age was 45.9 years. The majority were registered nurses or assistant nurses; the mean number of years in the profession was 18.3. About half of the staff worked full-time, and about half worked irregular hours or the night shift. Of those working part-time, 88% worked at least 75% of full-time. The only significant difference between the intervention and control groups was in the number of years at the current department and in the profession, where the control group had a greater number of individuals in the "other occupations" category (eg, manager, physiotherapist, physician, and medical secretary) (Table 1).

Comparing the participants (the panel sample) with all individuals who were invited to participate showed no difference in sex distribution between participants and nonparticipants. Nevertheless, compared to employees only responding on one or two of the three measurement occasions, respondents in the panel sample were slightly older (mean, 45.9 years vs 43.2 years; $P = 0.033$) and had worked longer at the current unit (mean, 8.7 years vs 6.9 years; $P = 0.046$). Also, a larger proportion of respondents in the panel sample were working part-time (50.3% vs 38.6%; $P = 0.029$).

Proximal Outcomes

A repeated-measures analysis of variance revealed a significant difference between the intervention group and the control group over time for health promotion, indicating increased workplace-based health promotion in the intervention group (Table 2) ($F(2, 196) = 5.99$; $P = 0.003$; $\eta^2 = 0.058$). The time effect was also significant ($F(2, 196) = 8.61$; $P < 0.000$; $\eta^2 = 0.081$). Similar results were found for the integration index, indicating increased integration over time in the intervention group compared with the control group ($F(2, 196) = 9.68$; $P < 0.000$; $\eta^2 = 0.090$). Again, the time effect was significant ($F(2, 196) = 11.41$; $P < 0.000$; $\eta^2 = 0.104$), indicating improved understanding of the link between work and health. In addition, a significant interaction effect revealed increased Kaizen work in the intervention group compared with the control group ($F(2, 197) = 4.35$; $P = 0.014$; $\eta^2 = 0.042$). The effect over time was not significant ($F(2, 197) = 2.32$; $P = 0.101$; $\eta^2 = 0.023$). Thus, the results overall indicate improvements in the proximal outcomes over time.

Distal Outcomes

For workability, the interaction effect approached significance, and inspection of the means indicates some improvement in

TABLE 1. Response Rates and Background Variables for the Intervention and Control Groups*

	Intervention	Control	Differences Between Groups ($P \geq 0.05$)
Response rate, n (%)	111 (84.1)	91 (74.6)	
Sex, female, n (%)	107 (96.4)	83 (91.2)	NS
Age, yrs, mean (SD)	46.7 (9.2)	45.0 (12.1)	NS
Profession, n (%)			0.004
Nurse	52 (46.8)	35 (38.5)	
Assistant nurse	45 (40.5)	27 (29.7)	
Other (eg, manager, physiotherapist, physician, and medical secretary)	14 (12.6)	29 (31.2)	
Years in profession, mean (SD)	19.9 (11.4)	16.1 (13.5)	NS
Years at the current department, mean (SD)	9.9 (8.4)	7.2 (7.9)	0.021
Working hours, n (%)			NS
Only daytime	60 (54.1)	40 (44.4)	
Only nighttime	12 (10.8)	8 (8.9)	
Irregular working hours according to schedule	39 (35.1)	42 (46.7)	
Full-time employment, n (%)	54 (49.1)	45 (50.6)	NS

*At baseline.
NS, not significant; SD, standard deviation.

TABLE 2. Means and Standard Deviations for Primary Outcomes of the Integration for the Intervention and Control Groups

		Baseline	12-mo Follow-Up	24-mo Follow-Up
Proximal outcomes				
Workplace-based health promotion	Intervention ($n = 107$)	55.0 (16.7)	63.2 (14.3)	60.9 (18.3)
	Control ($n = 92$)	56.6 (20.3)	57.7 (21.1)	55.2 (22.0)
Integration	Intervention ($n = 107$)	53.5 (16.5)	63.8 (17.8)	60.3 (21.1)
	Control ($n = 92$)	53.6 (19.0)	53.5 (21.2)	50.5 (21.8)
Kaizen	Intervention ($n = 107$)	58.8 (19.2)	62.6 (19.9)	61.5 (20.8)
	Control ($n = 93$)	59.0 (22.1)	58.0 (21.9)	55.1 (23.6)
Distal outcome				
Workability	Intervention ($n = 101$)	8.6 (1.4)	8.7 (1.3)	8.9 (1.3)
	Control ($n = 89$)	8.8 (1.3)	8.8 (1.1)	8.6 (1.4)
Self-rated health	Intervention ($n = 105$)	59.7 (18.6)	59.1 (18.8)	59.7 (19.0)
	Control ($n = 90$)	59.5 (17.4)	60.6 (16.7)	60.7 (18.8)
Productivity	Intervention ($n = 107$)	76.7 (15.1)	79.3 (13.8)	80.0 (13.2)
	Control ($n = 93$)	75.1 (15.7)	80.1 (11.4)	76.7 (13.5)

the intervention group and some deterioration in the control group ($F(2, 187) = 2.76; P = 0.066; \eta^2 = 0.029$). The time effect was not significant ($F(2, 187) = 0.06; P = 0.94; \eta^2 = 0.001$). For productivity, the interaction effect approached significance ($F(2, 197) = 0.281; P = 0.063; \eta^2 = 0.028$), and the effect over time was significant ($F(2, 197) = 6.01; P = 0.003; \eta^2 = 0.058$). Investigation of means and time effects within the groups showed that the control group showed not only a significant improvement from baseline to the first follow-up but also a significant decrease from the first to second follow-ups ($P = 0.004$), resulting in no change from baseline to follow-up. In contrast, the intervention group showed a slight improvement in productivity from baseline to both first and second follow-ups. The effect approached significance ($P = 0.07$). For

self-rated health, neither interaction nor time effects were significant (SRH $F_{\text{interaction}}(2, 192) = 0.34; P = 0.72; \eta^2 = 0.003; F_{\text{time}}(2, 192) = 0.14; P = 0.87; \eta^2 = 0.001$).

Results from a Friedman test investigating differences between sickness absence and frequency between baseline and the two follow-ups showed that there was a significant difference in sickness absence duration between time points in the control group ($\chi^2(2) = 7.4; P = 0.024$), but not in the intervention group (Table 3). A sign test indicated that this effect was related to a significant increase in sickness absence duration between the first and second follow-ups. There was no significant difference in sickness frequency in either group. Also, chi-square tests showed no between-group differences at any time point in sickness absence or frequency.

TABLE 3. Response Rates for Self-Rated Sickness Absence Frequency (Number of Occasions) and Duration (Total Number of Days) During the Past 6 Months Before the Intervention and After 12 and 24 Months for the Intervention and Control Groups

	Baseline		12 mo Follow-Up		24 mo Follow-Up	
	Intervention	Control	Intervention	Control	Intervention	Control
Sickness absence frequency, <i>n</i> (%)						
0	59 (53.2)	44 (48.4)	64 (59.3)	50 (56.2)	65 (59.1)	42 (46.7)
1	38 (34.2)	28 (30.8)	31 (28.7)	28 (31.5)	30 (27.3)	31 (34.4)
>2	14 (12.6)	19 (20.9)	13 (12.0)	11 (12.4)	15 (13.6)	17 (18.9)
Mean rank*	2.05	2.05	1.94	1.88	2.01	2.08
Sickness absence duration, <i>n</i> (%)						
0 d	59 (53.2)	44 (48.4)	66 (60.0)	51 (57.3)	64 (58.7)	41 (45.0)
1–7 d	45 (40.5)	42 (46.2)	40 (36.4)	34 (38.2)	39 (35.8)	40 (44.0)
>8 d	7 (6.3)	5 (5.5)	4 (3.6)	4 (4.5)	6 (5.5)	10 (11.0)
Mean rank†	2.06	2.01	1.94	1.87‡	2.00	2.13‡

*For comparison across time, *n* = 107 in the intervention group and *n* = 88 in the control group.

†For comparison across time, *n* = 108 in the intervention group and *n* = 89 in the control group.

‡Significant increase in sickness duration from 12 to 24 months of follow-up.

DISCUSSION

This study investigated the effects of integrating health protection and promotion with a continuous improvement system. The results show that integration was effective in increasing the workplace-based health protection and promotion work and in increasing employees’ understanding of the link between work and health as well as their engagement in continuous improvement. A trend toward improvement in workability and productivity was also identified.

During the past few years, the need for closer integration of health protection and health promotion has been emphasized, for example, in a special issue on the topic in the *Journal of Occupational and Environmental Medicine*, December 2013. This study adds to the literature by showing the positive effects of such integration on employee outcomes. The study shows a positive effect on the actual level of integration, operationalized to include both practical work with using the Kaizen system for health protection and promotion and employees taking the interrelatedness of work and employee health factors into consideration when making decisions about changes at work. One important aspect of being aware of such interrelatedness is that it decreases the risk of “unintended consequences,” that is, the risk of making changes to improve one area or type of outcome (eg, quality of care) that unintentionally worsen another area (eg, employee health).^{52–54} Second, integration increased health protection and promotion work at the units. This included increasing employee engagement in health promotion as well as perceived support from managers for such engagement. Thus, rather than health protection and promotion “getting lost” in the larger system of production and quality improvement, integration seemed to strengthen health protection and promotion. This is an important aspect, because it means that health promotion activities may now reach more staff than are already engaged in health protection issues or committed to maintaining a healthy lifestyle. Third, integration also led to an upswing for the continuous improvement system; it was perceived as more useful and there was increased engagement in it. Increased use of the Kaizen system may imply that, in addition to effects related to health protection and promotion, there may also be effects on other areas targeted by the Kaizen system, such as quality and productivity. This is in line with the trend toward effects on self-rated productivity, which, along with workability, was the distal outcome that approached significance. Whereas, according to program theory, the proximal outcomes were expected to occur in

the closest proximity to integration, the distal outcomes were more loosely related to integration regarding both time lag and the potential variance that could be explained. Although the present findings are not conclusive, the effects shown are in line with previous studies, suggesting that integrative approaches may be linked to such improvements.¹⁴

Researching interventions that build on participatory, continuous improvements is complex because these interventions consist of two parts that cannot be separated: the method by which the improvements and, in this case, integration are carried out and the content of the changes made using the method.⁵⁵ Thus, this study tests both the effects of integration and the effectiveness of the actual changes made. Although the effects are difficult to unravel, in this study, the proximal outcomes are those most closely related to the method by which the improvements are made (integration), whereas the distal outcomes are more closely related to the content of the changes made. As the content of the changes varies across the units, and over time, variation in outcomes related to the content is expected. To disentangle the full effects of integrated approaches, further research is needed that looks at the content of changes and relates content to outcomes.

In this study, integration did not only involve integration of health protection and promotion; it also included integration with a production and quality improvement system. Although the interrelation between health, ill-health, and productivity has frequently been acknowledged,^{14,18} the idea of expanding integration of health protection and promotion to include management systems aimed at quality and production processes has, with a few notable exceptions,^{27,28,40} largely been overlooked in the health protection and promotion literature. The arguments for such integration have instead come from quality management research.^{29–31,41} Nevertheless, because the main focus of quality management research is not on occupational health, this field has not fully acknowledged the potential benefits of such integration from a health perspective; that is, integration between continuous improvement and health protection and promotion can clarify the interrelatedness of employee health, in a broad sense, and work. In line with this, the present results show that integration can lead to improvements in employees’ understanding that their health affects their work, and that their work affects their health. This study provides a practical example of how integration can be accomplished, something that is largely missing

from the literature today and that may be one reason why integrative approaches still remain rare in practice.⁷

An important characteristic of the integrative system used in the study was that it was based on an existing system. Using existing mechanisms, practices and resources have previously been suggested as an important component in the development of an integrated system.^{4,16,56} Continuous quality improvement processes may be particularly useful in this regard, as indicated by research showing that such processes are part of the foundation for establishing healthy work practices that showcase the interdependence of health and work.¹⁸ Another important characteristic of the integrating system used here was that it was participatory. Participatory approaches have been recommended as an essential strategy in occupational health interventions⁵⁷⁻⁵⁹ in general and integrative approaches in particular.^{4,18} In this way, this study offers an alternative view on the practical approaches suggested earlier, where the focus has been more on the strategic identification of improvement areas and implementation of organization-wide integrated programs.¹⁴

In this type of integrated approach, the content of changes is determined by the practitioners rather than the researchers. This may have several implications for the field of occupational health interventions. On the positive side, the fact that the content is determined by the practitioners, who understand best the needs and possibilities of the particular organization, makes it more likely that the content of change will be well suited to needs in the unit. Moreover, determining the content of change is likely to increase engagement and motivation to participate in change efforts. Nevertheless, it is not a given that the content of initiatives will be aligned with the best evidence and practice or target the most important problems. Thus, a future challenge for integrated approaches is to determine how a high level of employee freedom in determining the content of the integration can be combined with evidence-based practice.

Methodological Considerations

At the time of launching the integration, hospital management also decided to move the documentation from their annual safety inspection into Kaizen, for all hospital units. Thus, these aspects of the hospital's health protection were meant to be integrated into Kaizen even for the control units, which meant that some integration was also carried out in the control units. Nevertheless, their integration was completely unsupported, as the only direction these units received was an e-mail explaining the new procedure with no further follow-up. Further research is underway exploring differences in the content of the integration using the actual Kaizen notes produced in control and intervention units, respectively. Preliminary findings support the results from this study indicating that there are indeed differences between the intervention and control groups in the level of integration. Thus, on the basis of these findings, it seems that although the intervention and control groups theoretically had some elements of integration in common, they did differ in practice.

The fact that a mere e-mail suggesting that work protection in terms of annual safety inspections should be integrated with a continuous improvement system was not sufficient in order for an integration to take place may offer some suggestions as to what the core components of successful integrations are. First, it may indicate that it is essential that issues be dealt with continuously throughout the year. Second, it may suggest that considering health protection and promotion as a secondary consequence of other improvement initiatives is a core component. Last, it may suggest that the implementation activities performed to put the system into place were essential to its success. Further research is needed to illuminate these issues.

The nature of the intervention under study (the integration) required that randomization be carried out at the unit level rather than at the individual level. Although matching was done to ensure that the intervention and control units were similar with regard to

unit characteristics that were likely to affect the integration (unit size, acute vs non-acute care, daytime vs around-the-clock care), it was not possible to match units on the basis of employee characteristics. Consequently, there is a difference between the intervention and control groups in two background variables (profession distribution and number of years at the current department), which is a limitation in the study. Furthermore, the analysis was conducted on panel data that included only people participating at all three time points. This was done to allow investigation of the development of outcomes over time. The panel differed somewhat from the baseline responders in background variables. Although little is known about whether these individual factors affect the outcome of integration, this difference does raise the question of the representativeness of the sample.

A previous study looking at implementation during the first six months of the intervention showed sizable differences between intervention units in the extent to which they had accomplished the integration.⁶⁰ In complex interventions this is expected, but it has implications for how we interpret the present results. One obvious implication is that the difference between the intervention units and the control units is not as distinct as it would be in a simpler, or individual, intervention. This decreases the potential difference between the intervention and control units. We chose to handle all intervention units as one condition, similar to an intention-to-treat approach (ie, all intervention units were included in the analysis, regardless of the extent to which they had carried out the integration). Despite this conservative approach, the results showed significant differences between intervention and control units. This indicates that the true effect of an integration that is fully implemented, or with an alternative analytic strategy taking the level of implementation into account, may be even more pronounced.

Given that integration is a relatively new concept, there has been a lack of validated methods for measuring it. One exception to this was a suggestion for metrics and indicators published in 2013.⁴ As this study began before that paper was published, we developed our own integration index. This index (the integrate index) encompassed four indicators: one focusing on the unit-specific practical behavior of using the Kaizen system for health promotion, one on the extent to which analyses were made of potential effects on employee health before changes were implemented (risk assessment), and two on the extent to which health promotion and protection were considered in relation to unit operations. In addition to the integration index, we added an index on health promotion, including five items covering involvement in, influence over, encouragement of, and support and resources for health promotion. In this respect, there are some essential similarities between our measure and the newly proposed indicators, namely acknowledgement of the importance of leaders' commitment, participatory approaches, resources for health protection and promotion, and the shared effects of health protection and promotion. The most important difference in the operationalization used in this study is the greater emphasis on the relation between health protection, promotion, and business operations, in line with integration with a system for continuous improvement of quality and productivity. Also, because the level at which the integration was carried out was the unit level, not the entire organization, the operationalization focused on factors at that level rather than the overall organizational level.

This study was set in a regional hospital in Sweden. Both wards operating around the clock and those open only during normal business hours were included. The units also differed in size, from around 20 employees to over 50. The previous study, looking at the compliance with the intervention (the integration) and implementation during the first six months of the intervention, concluded that although there were large differences between units in the extent to which they had carried out the integration, this did not seem to be a matter of formal factors.⁶⁰ Rather, it suggested that the determining

factor was the extent to which the unit had adapted the Kaizen system (ie, the basis for integration) to their unit's particular circumstances. Thus, regarding generalization, it may not be the formal setting that matters as much as the way in which the integration is carried out, and the extent to which it provides a good fit with the unit or organization. Nevertheless, it may be worth noting that Sweden has a long tradition of employee involvement in decision making and of management styles that favor such involvement.⁶¹ This may increase the likelihood of achieving managerial and employee support for this kind of integration. Also, the transferability of the findings will likely be affected by current systems for continuous improvement in the workplace, and as mentioned above, it is likely that a small-scale, participatory, continuous improvement system may be particularly suitable as a basis for integration.

CONCLUSIONS

In line with previous research supporting the use of participatory approaches to organizational-level occupational health interventions, we conclude that integrating health protection and health promotion with a continuous improvement system (in this case, Kaizen) provided a new way of working with these issues, and that integration also positively affected the use of Kaizen. A significant increase in proximal outcomes over time regarding increased workplace-based health protection and promotion work, employee's understanding of the link between work and health as well as engagement in continuous improvements was identified in the intervention group, as well as a promising tendency toward improvement in workability and productivity. We suggest that integration is a promising way of engaging staff in health protection and promotion, as well as improving employees' understanding of the link between work and health.

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