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A Participatory Framework for Integrated Interventions

Martin G. Cherniack and Laura Punnett

The *Total Worker Health*® paradigm poses an alternative to traditional workplace health promotion by recognizing the contribution of the organizational and psychosocial work environment to chronic conditions such as heart disease and diabetes. The literature on mechanisms includes endocrinological and other physiological pathways, whereas newer evidence on behaviorally mediated effects is growing steadily (e.g., Chandola et al., 2008). Specific features of the work environment—from work scheduling to supervisor–employee relations—can act as either barriers to or facilitators of healthy behaviors. For example, low decision latitude at work is associated with obesity (Brunner, Chandola, & Marmot, 2007), alcohol consumption (Head, Stansfeld, & Siegrist, 2004), smoking, and reduced aerobic exercise during leisure time (Brisson, Larocque, Moisan, Vézina, & Dagenais, 2000). Having

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few decision-making opportunities is a notable feature of low-wage, low-status jobs, suggesting that work organization is thus also one mechanism of socioeconomic disparities in health.

A separate organizational issue, also remediable, is the increasing use of extended shift schedules. The relationship of overtime work with clinical fatigue has been strongly established for driving crashes (National Center on Sleep Disorders Research, National Heart, Lung, and Blood Institute, and National Highway Traffic Safety Administration Expert Panel on Driver Fatigue and Sleepiness, 1998) as well as with occupational injuries of other types (Dembe, Erickson, Delbos, & Banks, 2005; Vegso et al., 2007; Wagstaff & Sigstad Lie, 2011). The American College of Environmental and Occupational Medicine (Lerman et al., 2012) criticized the extensive use of overtime to compensate for short-staffing, noting its growing distribution and the strong association with absenteeism due to fatigue and health issues. Overtime work is strongly implicated in cardiovascular morbidity, with elevated risk of incident coronary heart disease (Virtanen et al., 2010) and nonfatal myocardial infarction (Hayashi, Kobayashi, Yamaoka, & Yano, 1996). There is also a marked association between overtime and depression (Virtanen, Stansfeld, Fuhrer, Ferrie, & Kivimäki, 2012).

In contrast, a health-promoting organizational environment at work can provide time, space, and material and social supports for enhancing choices such as smoking cessation, healthy diet, leisure-time exercise, and improved work–family balance. This approach forms the basis for an integrated programmatic approach to health, safety, and well-being in the workplace that emphasizes creating health-conducive conditions of work. (Throughout this chapter, *integration* refers to the *Total Worker Health* [TWH] goal of simultaneously addressing both work and nonwork root causes for a broad range of worker health and well-being outcomes.)

WORKER PARTICIPATION AS A CORE ELEMENT OF THE TWH PROGRAM

At the Center for the Promotion of Health in the New England Workplace (CPH-NEW), one of the first two National Institute for Occupational Safety and Health Centers of Excellence for *Total Worker Health*®, recognition of the particular importance of decision latitude for chronic disease risks has led to a focus on programs that increase opportunities for participation in decision-making by frontline workers. The direct involvement of workers in the planning and design of interventions can benefit group and individual self-efficacy. This is consistent with the concept of "sense of coherence" (Antonovsky, 1987), an internal resource for overcoming stress and an intermediate variable on the causal pathway from participatory activities to effective decision-making. Sense of coherence has been extended by other investigators to examine engagement in multiple settings (residential, educational, clinical, and occupational) and evaluate its role in reducing burnout and other adverse outcomes (Bauer & Jenny, 2007; Kähönen, Näätänen, Tolvanen, & Salmela-Aro, 2012). Engaging

workers in the design of interventions is also expected to contribute to program reach, effectiveness, and sustainability because employees can inform program design with firsthand information about obstacles to their own and colleagues' health and well-being.

As practiced at CPH-NEW, participation to increase worker decision-making is not a single intervention but a gradual process that builds incrementally, with learning on the part of the workers as well as the researchers (Hugentobler, Israel, & Schurman, 1992; Nielsen, 2013). Although the process invites consideration of risk factors originating both in and outside work, changes may address either of these or both at a given point in time. We consider that a selected intervention meets the TWH criterion when it is selected after consideration of root causes in both domains, which is one step in an ongoing process of continuous evaluation and improvement (Henning et al., 2009; von Thiele Schwarz, Augustsson, Hasson, & Stenfors-Hayes, 2015).

CPH-NEW researchers have developed a structured process to support worker participation in problem selection, investigation, and intervention for the TWH approach. Next, we describe some historical background for workers becoming stakeholders in workplace interventions. We then provide examples of our implementation strategy, offer preliminary evidence of program success, and discuss some of the challenges to this approach.[1]

PARTICIPATORY ACTION RESEARCH

One precedent for effecting change in a formally under-represented population is found in participatory action research (PAR) and its application to community-based participatory research (CBPR; Horowitz, Robinson, & Seifer, 2009; Minkler & Wallerstein, 2011). At its core, CBPR requires the engagement of all key parties—administrators, employers, workers, and investigators—in the multiple stages of planning, development, implementation, and project evaluation. The underlying principle of self-determination is coupled with a pragmatic understanding that improvements in workplace culture and individual worker health and well-being will ultimately stall without this commitment (Birken & Linnan, 2006).

Although we take PAR as the most general form of participatory decision-making in research, the translation from community-based participation into the workplace is not a simple adaptation. The workplace is inherently hierarchical, and confidentiality, subordination, and access to resources are not equally distributed. For these reasons, the introduction of participatory formats for improving workforce health requires development of structured processes for

[1]The National Labor Relations Act of 1935 may limit the form and structure of employee involvement in worker-management teams, committees, or groups. Employers should seek legal assistance if they are unsure of their responsibilities or obligations under the National Labor Relations Act.

effecting change within the existing organizational system while seeking ways to increase worker decision latitude and autonomy (Henning et al., 2009). Iterative trials and evaluations of these interventions—whether successful or not—produce empirical learning for each setting; generalizability to other contexts must be assessed for each in turn.

PARTICIPATORY ERGONOMICS

The most developed background experience for participatory interventions in the workplace comes from participatory ergonomics (PE). PE has been an accepted approach to the prevention of work-related musculoskeletal diseases for more than 2 decades; it was used first in manufacturing (Smith, 1994) and then extended to other sectors (e.g., Haines, Wilson, Vink, & Koningsveld, 2002; Haukka et al., 2008; Hignett, Wilson, & Morris, 2005; Punnett et al., 2013). Haims and Carayon (1998) recognized the empirical nature of these interventions and attempted to compose a methodologic intervention scheme by inserting the expert and participant-guided methodology of action research. Their prescribed stages were (a) training of the workforce by ergonomics professionals; (b) goal-setting by an ergonomics committee, with researcher facilitation; (c) workforce surveying, led by the committee; (d) worksite ergonomic evaluations by the committee; and (e) systems planning with expert assistance. Although useful, a more defined and translatable protocol is required for scale-up and generalized implementation, as also noted by Nielsen and Abildgaard (2013). This necessitates a series of well-designed field projects for iterative elaboration and refinement of that protocol.

In both its macro- and microergonomic formulations, PE addresses workplace organization. *Macroergonomics* refers to the analysis and design of workplace systems; microergonomics refers to job-level interface between the individual and the machine or work process. There are also some opportunities for broader health interventions. However, what PE traditionally does not broach are individual health issues, such as sleep, body weight, and family relationships. For application to the TWH program, the PE process must be expanded to include factors outside the workplace. Our own experience through CPH-NEW has underlined both its applicability and its limitations. Although it offers a platform to compose a more integrated work and health perspective, there has often been reluctance to address certain relevant issues, such as work scheduling, which are generally seen as managerial prerogatives.

OTHER WORKPLACE PARTICIPATORY PROCESSES

Other workplace participatory schemes are in use internationally; these take a variety of forms and produce varied outcomes, depending on such cultural, economic, and policy factors as workforce unionization and health care systems.

Optimizing Productivity in the United States

In the U.S. automobile industry, workforce participation in production processes and attention to quality of work life coincided with the decline of unionization (Rinehart, 1984). One newer development has been the inclusion of workers and their families in preventive health services (Yen, Edington, McDonald, Hirschland, & Edington, 2001). However, the potential benefit of cooperative decision-making about personal health matters is tempered by caution, especially if participatory health activities are run parallel to a "lean" process, which often leads to workforce downsizing, exacerbates job stress, and even encourages substance misuse (Cherniack, 2015; Landsbergis, Cahill, & Schnall, 1999).

An inherent problem with "high-performance" work systems that engage the workforce in team practices and decision processes for production efficiencies is the potential cost in quality of work life, and in some circumstances an intrusion into personal and family time (Gordon & Whelan-Berry, 2004). Bringsén, Andersson, Ejlertsson, and Troein (2012) observed that the approach falls short of being salutogenic (health supporting) when the objective is limited to goals such as rewards and teamwork. An orientation toward team processes and work culture has implicit omissions, perhaps most exemplified in the "California Corporation," a term used for work practices in the Silicon Valley electronics industry, in which teamwork and innovation occur at a cost to home life (Carnoy, 2009). Participatory goals may be achieved, but if work hazards are discounted and if the iron necessities of production are off-limits to modification, then worker and family well-being will be sacrificed.

Work Councils in Northern Europe

Northern European attention to the role of work stress preceded programs in the United States. The first steps in enhancing workplace participatory control came through the passage of more stringent health and safety legislation; the Swedish 1976 Co-Determination Act opened the way for the unions to negotiate agreements about the organization of work (Gourevitch et al., 1984). In Denmark and Sweden, the two most documented societies for workforce participation, there has been modest but positive evidence for improvement in quality of work (Gallie, 2003).

The German Works Constitution Act provides for the rights of employees to elect representatives to works councils (*Betriebsräte*). In principle, the Works Constitution Act provides for workforce participation in company planning, policies, and operations, including limited rights to information and consultation (FitzRoy & Kraft, 1993). Effective councils have redirected resources to health protection in the immediate environment (Askildsen, Jirjahn, & Smith, 2006). There appears to be limited drag on productivity, at least in larger firms (Addison, Schnabel, & Wagner, 2001). Overall, however, the *Betriebsräte* approach has had less pertinence to workforce health.

A more explicit example of integration comes from German "health circles," which have coincidently addressed both work organization and individual risk factors for cardiovascular disease (Aust & Ducki, 2004). They exist in mature industries with larger workforces, where there is already an established history of work councils and quality councils. The German health circle concept follows recognition that health-related issues are left unaddressed in quality circles invested in productivity and working conditions. The necessarily higher level of mutual trust in health circles is more difficult to achieve than what is required to discuss optimizing productivity (Brandenburg & Slesina, 1994).

EFFECTS OF THE HEALTH CARE SYSTEM ON WORKPLACE PARTICIPATORY PROCESSES

Robust national health or national health insurance systems, such as in much of Europe, have tended to encourage national workplace health programs because the costs of chronic disease, including early exit from the labor force, are borne societally instead of by individuals' employers (Downey & Sharp, 2007). The United States differs from its European peer countries by financing health care at the level of the individual firm; employer-sponsored health promotion has followed. This effect distinguishes TWH concepts of integration from the holism that is emphasized by Scandinavian investigators, who articulate the concepts of *intersectorality* and *equitability* as social rather than firm-specific goals (Lindström & Eriksson, 2009; Ringsberg & Borup, 2011). Nonetheless, health costs may have substantial societal impact in countries with a robust social safety net. This motivates public health efforts in those countries to seek effective workplace health promotion strategies, including integration with occupational health services.

The weaker federal mechanisms in the United States for unemployment support, education and retraining, and health care affordability outside of work cede a substantial role to the states and to employers. Costs of medical care weigh more heavily on the firm, motivating attention to individual behavior and nonoccupational disease. Further, when workplace health promotion programs are incentivized for the individual and focus primarily on group health insurance cost reduction or productivity, the consequences may be perceived coercion, increased socioeconomic health disparities, and dissociation of work from chronic disease and well-being by inserting an individual focus (Cherniack, 2015).

Separate from the form of the health care system, the increasing evolution of nonstandard work arrangements such as large-scale subcontracting is likely to marginalize workplace-based implementation of TWH concepts over time. The combined effects of all of these forces argue for a more comprehensive public health view of how to integrate occupational protection with extra-occupational measures to promote well-being (Baron et al., 2014; see also Chapter 11, this volume).

EVOLUTION AND APPLICATION OF THE PARTICIPATORY PROCESS FOR THE TWH PROGRAM: CASE STUDIES

Using evidence from prior PE programs, and recognizing that a tailored approach would be needed to fit a participatory program model within standard organizational structures in the United States, CPH-NEW researchers developed an approach for adapting PE methods to provide salutogenic benefits, in line with TWH goals. This structured process for root-cause analysis and intervention planning is now termed the CPH-NEW Healthy Workplace Participatory Program (HWPP). The program comprises a protocol for convening and training a committee of workers to assess and prioritize workforce health and safety problems; conduct root cause analysis, considering both work and nonwork contributing factors; brainstorm solutions and criteria for determining their success; make a formal presentation to management regarding strengths and weaknesses of the alternatives; and evaluate the selected intervention to determine whether it met the initial goals set by the committee (Dugan et al., 2016; Nobrega et al., 2017; Robertson, Henning, Warren, Nobrega, & Dove-Steinkamp, 2015). The cycle of steps is pursued iteratively; as one problem is determined to be resolved adequately, a new one is selected. The core instrument that guides these cycles is the Intervention Design and Analysis Scorecard (IDEAS) Tool, publicly disseminated online long with numerous TWH training and evaluation materials (University of Massachusetts Lowell, n.d.).

Used in the context of worker or labor-management team formation, the HWPP provides a structure for obtaining input from frontline workers, middle managers, and upper level managers about the causes of unsafe work, poor health, and/or lack of well-being within the workforce and for engaging these groups to collaborate on remedies. To qualify as a TWH strategy, it is not necessary that each specific *intervention* includes both work and nonwork components. Instead, integration is achieved by explicitly encouraging participants to consider the broad scope of possible risk factors, both within and outside work, and their interactions in each *cycle* of problem definition and solution. HWPP also meets the TWH definition through the nature of the program process itself by working to enhance workers' skills, confidence, and opportunities to take part in health-related decision-making within the workplace.

The formal HWPP was developed initially from the experiences of implementing a participatory, integrated team process in the nursing home sector (Case 1) and then formally designated and tested in a diverse set of workplaces (Case 2). More extensive experiences came with HWPP use in an intervention study to improve the health of public sector corrections officers (Cases 3, 4, and 5). Where there was labor union representation, the bargaining units were engaged, minimally in Case 2 but in the latter three cases as full partners with the investigators and managers.

The following cases collectively illustrate the value of the participatory process for eliciting workers' experiences and self-education to inform development of integrated interventions that are meaningful and acceptable to them and to engage them in postproject sustainability. The cases also reflect the need

for a structured process to maintain worker participation and for ongoing evaluations to support the program's continuous improvement and autocorrection while engagement is still being established. Health-related outcomes reported here include changes in work environment, self-efficacy, and personal health behaviors. Long-term changes in disease risk might be inferred, if the interventions were to remain in place, but could not be documented within the available study periods of these projects.

Case 1: The Health-Promoting Nursing Home

The first CPH-NEW health care study, "Promoting Physical and Mental Health of Caregivers through Transdisciplinary Intervention" (ProCare), featured a participatory intervention team process in three skilled nursing facilities (SNFs). The teams brainstormed the features of an "ideal nursing home" for both residents and staff. They selected specific goals for improved worker health and well-being and developed solutions to the potential obstacles. The investigators facilitated the discussions, ensured circulation of minutes and agendas, and met with the on-site team coordinators between meetings.

The three teams demonstrated enthusiastic uptake of the "integration" paradigm and achieved initial successes in improving the health environment in their workplaces (Zhang et al., 2016). Each team independently selected lack of healthy food options at work as its first priority, and together they were able to obtain healthier food choices in vending machines. In one facility the kitchen agreed to provide soups, salads, and sandwiches at reduced cost to employees. One team initiated the creation of a community garden, providing fresh produce, teamwork, physical activity, and an outdoor experience that could be shared with some residents. Other accomplishments included securing a quiet break room for staff relaxation and recovery, ergonomics training, nutrition, and weight loss programs. The participatory process had high participant acceptance and engagement; team members reported positive attention to organizational issues such as teamwork, respect, communication, and locus of decision-making.

Compared with three control SNFs with active corporate wellness programs but no worker involvement in program development, staff at the participatory sites were more aware of and likely to participate in activities such as exercise and nutrition/weight loss programs. More staff members in the participatory sites (28% vs. 16% in control SNFs) reported opportunities for decision-making. Both managers and employees cited the importance of factors such as employee program ownership, empowerment, and skill building, all of which are promising for long-term sustainability.

However, although proof of concept was demonstrated, over the longer term the scheduled reduction of investigator facilitation was followed by incorporation of the teams into other, existing activities and erosion of staff participation in project planning. The dilution of the health mission was aggravated by administrator changes, not uncommon within SNF middle management.

The loss of administrative memory resulted in loss of managerial participation and material support for program development, such as allocation of limited but important financial resources and provision of time release for program participation (Zhang, Flum, West, & Punnett, 2015).

Process evaluations identified other significant but modifiable challenges to long-term sustainability. These included communication barriers, especially between units, shifts, and levels of the managerial hierarchy; dependence on highly motivated individuals at both the facility and regional levels, but without rewards for champions' or administrators' efforts; and corporate shifts in demonstrated commitment to employee health promotion efforts. Another barrier was the differences between managers' and front-line workers' perceptions of the SNF environment (Zhang et al., 2011). These observations led to refinement of the CPH-NEW criteria for organizational readiness for change (Zhang et al., 2015).

The disappointing inability of the employer to recognize the contrast in effectiveness between the facilitated workplace health promotion program and the more generic corporate-sponsored program indicates an important limitation in management culture. "Data-driven" language pervaded company operational principles, and the organization's priorities included several potentially related concerns, including costs of employee disability, employee turnover, and resident outcomes. However, periodic and episodic shifting of priorities, in contrast to following evidence for their intersections, posed a cultural (rather than a financial) barrier to sustaining and strengthening this initiative to improve worker health.

Case 2: Initial Field Trials of the HWPP

Four employers were recruited from a group of organizations completing a worksite wellness capacity-building program. Employers were offered an opportunity to expand program scope and sustainability by addressing root causes of health issues—including both work organization and nonoccupational factors—and transferring problem-solving skills to people within the organization (Nobrega et al., 2017). The four organizations that volunteered were (a) a real estate management firm, (b) a human services nonprofit agency, (c) a state government human resources office, and (d) a public sector correctional institution. Each study site designated an internal program champion responsible for implementation, a design team (DT) of six to eight employees to prioritize problems and develop intervention proposals, and a managerial-level steering committee (SC) to select DT proposals to be implemented and provide overall program oversight and resources. A study investigator served as dedicated facilitator for each DT.

The HWPP was effective for engaging front-line employees. All four sites were able to implement the process and completed at least one complete cycle, that is, they implemented at least one intervention. The goal of identifying both occupational and nonoccupational risk factors was readily adopted by most DT

and SC members. Thus the "integration" concept—the key feature of the TWH approach—was successfully presented and taken up as definitional. Because HWPP is a participatory process, the desired health goals selected by the DT and SC members in each organization varied. Certain activities were initiated during the 2-year program:

- Education of apartment renters to reduce unnecessary work orders; better wireless phone service to reduce missed calls; better management of work orders—*to reduce stress from high workload and poor communication.* (Site A)
- Uniforms made of looser, more breathable fabric—*to reduce overheating and physical discomfort during physical exertion.* (Site A)
- Procurement policy to support purchasing of ergonomic equipment; provision of computer workstation adjustment information; training of ergonomic champions; walking breaks—*to reduce physical discomfort and associated stress.* (Sites B and C)
- Health fair with information responding to staff health concerns—*to address sleep disorders, overweight, mental health, and injury risk.* (Site D)

The funded study period was not long enough to complete quantitative evaluation at any site. However, multiple benefits were documented by participating workers, especially development of a more organized understanding of causes and outcomes of the selected problems; the ability to identify root causes; and the skills to compare possible solutions to find the best fit between the possible interventions and the organization's workforce, company culture, and budget. Other benefits included improved communication among personnel at different levels of the organization and ability to develop a common understanding of workplace obstacles to health, safety, and well-being. All of these represent foundational achievements for a sustainable program.

Baseline facilitators of program success included a preestablished priority on health and safety, a strong culture of quality and continuous improvement, relatively good communication channels, and consistent upper management support. Challenges to program success included the time required to accomplish the entire process, especially the first time through the cycle. (The research team responded during the study by reducing the start-up time line and other measures to facilitate a faster intervention process.) Other factors that impeded timely progress were cited as change-resistant management, highly bureaucratic decision/approval processes, and high staff turnover (including layoffs and retirements).

Connecticut Department of Corrections Interventions

In 2006, CPH-NEW responded to a request from union leaders in a state corrections system for help in addressing serious health problems experienced by correctional officers (COs) and supervisors. Among COs in early career, 38% were prehypertensive or hypertensive and 78% were overweight or obese (Cherniack

et al., 2016). There was also elevated prevalence of depression, work–family time conflicts, and sleep disturbances. Survey and demographic data were consistent with external evidence that nearly one in four correctional officers fit the criteria for posttraumatic stress disorder (Spinaris, Denhof, & Kellaway, 2012). Correctional officers suffer from suicide rates significantly higher than rates in the general population and other related occupations such as police officers (Stack & Tsoudis, 1997).

Health Improvement Through Employee Control (HITEC) began by comparing a program that engaged correctional officers in the participatory design of workplace interventions and a conventional program in which health promotion interventions were introduced in a top-down manner by health professionals. Reflecting sustained labor and management engagement and input, the research design and intervention protocols evolved steadily over the course of 10 years. The following examples illustrate the later use of the IDEAS Tool to concretize participatory action in integrated interventions at different stages of this evolving partnership. Because decision-making that involves organizational change or investment was beyond the authority of the COs themselves, over time two steering committees were created, at the facility and state (system-wide) levels, to oversee intervention selection and eventual implementation.

Case 3: Indoor Air Quality

Indoor air quality rarely presents as a one-dimensional issue. Particular exigencies in corrections include the concentration of many people in a confined space and the age of many facilities with obsolete temperature and humidity controls. In Department of Corrections (DOC) facilities, concerns over tuberculosis and other infectious diseases among the inmates, and popular press attention to mold exposure, inspired COs' concern about microbial contamination. In addition, there were prevalent suspicions that ambient temperature and humidity were only regulated during daytime work hours, the result being poor air quality. These concerns were resolved through the IDEAS process that followed.

In this project, one site was organized around an ongoing CO DT, and the second site featured labor-management Kaizen Effectiveness Teams (Dugan et al., 2016). The DT's work was augmented by consultative air quality assessment services from the state of Connecticut. In addition, the facility heating, ventilation, and air conditioning maintenance engineers attended selected DT meetings to clarify the operating features of the ventilation systems. The DT was assisted by the researchers to maximize their use of available resources, including content training, from the state Department of Public Health. They were also assisted in making cost estimates of different remediations to present a menu of choices to the facility SC.

The DT members made notable and relatively sophisticated adaptations in their approach to the problem over time. These involved considerable revision

of accepted assumptions, such as the putative inattention of maintenance staff during second and third shifts and the prominence of microbial hazards, following recognition that a large portion of discomfort and complaints were caused by large temperature shifts. Measured results were thus accepted in place of unsubstantiated perception. These process outcomes strengthened the DT's capacity and self-efficacy for the longer term.

A variety of maintenance and related practices were overhauled within the facility. The DT enlisted the investigators' assistance in preparing and administering a pre– and post–indoor air quality survey, which showed dramatic perceived improvements. Eventually, the state of Connecticut's response exceeded the best case projection of the DT by accepting their third and most costly priority, that is, complete replacement of the old and problematic facility heating, ventilation, and air conditioning system. The level of detail and step-wide process initiated by the DT consistently surprised administrators and engendered credibility for the DT and the entire PAR process. Together, it appeared that these factors created a climate where a substantial investment became possible.

Case 4: Work and Sleep

This project was initiated by the DOC Supervisors' Union as a self-contained derivative of the original HITEC intervention with COs. Supervisors perceived some of their problems as arising in their system-wide distribution with small numbers in separate locations; as a consequence, they established their own DT and followed the cycle of steps as just described. They began with the administration of their own survey, developed with researcher assistance, to evaluate and prioritize threats to their well-being. They identified issues of hypertension, job stress, lack of exercise, high caloric intake, work–family conflict, and drug and alcohol use as causatively overlapping. The most approachable core factor appeared to be high overtime and extended work hours, leading to disturbed and inadequate sleep, as well as exacerbating some of the other problems.

In brainstorming possible intervention strategies, the DT delineated three distinct areas: (a) personal and internal factors, such as exercise and relaxation techniques; (b) external and environmental factors, such as driving hours, lighting at work, and wind-down periods; and (c) work organizational factors, particularly long work hours and frequent overtime. Ideas selected to address the personal and environmental interventions were low in cost, using existing in-house resources. Development of a Sleep Hygiene Checklist and a supervisor-specific sleep app for mobile devices, offering bedtime prompts and relaxation exercises, were the main project outputs to support behavior change. There was also an extensive train-the-trainers program to enhance intervention effectiveness.

Managing overtime hours through reorganization and sharing among employees was recognized as a more complex and multistage issue, in part because of fiscal issues and in part because of divisions within the membership

around the core issue of overtime income versus health (see the preceding discussion of the evidence on this point). It remains under ongoing discussion by the bargaining unit leadership at this time.

Case 5: Peer-to-Peer Mentoring of New Officers

Arising from the HWPP process, the COs themselves eventually proposed and created a longer term program for integrated health and work mentoring between experienced and new officers. The rationale grew out of discussion of the baseline HITEC findings that adverse health patterns in COs were established within the first 3 years of employment (Cherniack et al., 2016). Veteran officers (mentors) were paired with new officers (protégés or mentees) to form relationships outside of the supervisory command. Regular informal meetings provided opportunities for new officers to discuss problems and to receive support and guidance from experienced officers. Training of mentors in health and well-being topics was conducted originally by the study team and subsequently by staff from the DOC training academy.

In 2014 to 2015, 105 mentors and 183 mentees were enrolled. Baseline and 12-month health evaluations were augmented by focus groups and surveys to assess the quality of the mentor–mentee relationship. Mentored cadets experienced a beneficial effect on blood pressure levels after 1 year when compared to a control group of new, nonmentored recruits. Controlling for baseline values, there was an increasing trend among mentees in *health improvement intentions* ($p = .081$, $n = 172$). *Mentorship quality* predicted a trend-level improvement in *organizational health climate* ($p = .097$, $n = 64$). Of interest, the mentors themselves became more aware of their own health challenges, the work and nonwork contributing factors, and potential impact on job performance.

CHALLENGES AND CONCLUSION

Our observations of PAR in corrections and in health care show that success depends upon a variety of factors, including participation of workers and supervisors, leadership, continuity and timing, resilience, and financial circumstances (Dugan et al., 2016; Zhang et al., 2016). Specifically in HITEC, the key factor in integrated program success was resilience: the capacity to regroup after project denial, wait out leadership and staff changes, and maintain functional continuity through failed interventions and reduced workforce participation (Dugan et al., 2016). Another enabling factor here was active attendance by bargaining unit leadership. The elements recognized as key to program resilience—a steering committee with an extended time line focus, a history of CO and supervisor cooperative success, and the authority to execute consensual actions—were developed through patience on all sides, commitment to compromise, ability both to surrender and to accept responsibility and authority, and the articulation of shared goals through the experience of participatory action. The

generalizability of these experiences and program components to other sectors, and proof that they can be sustained and scaled up, remain to be evaluated.

Experiences in the first two case studies, in particular, showed that new research design strategies and study tools were required to manage the participatory process in a way that supported meaningful research evaluation. The predominant health outcomes of interest, involving metabolic, mental health and cardiovascular conditions, evolve over a longer time period than typical study funding periods. Other challenges included balancing active participant planning with protection of fixed research methods and hypotheses, confronting the tension between stopping with positive early results and building a sustainable and a continuous improvement process, and imposing evaluation measures for interventions where process change is as important as health outcomes.

To incorporate worker participation in decision-making within a workplace, management and labor must engage in a cooperative effort, where this may not be the norm to date. Further, the construct of "fidelity" to the research design may conflict with active participant planning after the study begins, and process evaluations may be more salient than effectiveness outcomes, especially in the earlier cycles of problem definition and attempted solutions, before much common history has been established.

The successes and failures of HITEC and ProCare occurred in work environments that are challenging to TWH-type integrated interventions. The 24–7 provision of custodial care can mitigate against attention to workers, even though their well-being may impact others. Both projects have demonstrated that in two populations usually thought to be resistant to self-care and workplace engagement, there can be extraordinary levels of workforce involvement and innovation when important obstacles are recognized and addressed. In addition, for cultural change to take hold, programmatic interventions require a perspective that exceeds the life span of current key employers and managers, let alone an annual budget. Sustainability may well require long-term professional engagement in a format similar to that typical of other services such as environmental controls, environmental testing, or accounting.

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EDITED BY

Heidi L. Hudson, Jeannie A. S. Nigam, Steven L. Sauter, L. Casey Chosewood, Anita L. Schill, and John Howard

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