# Workplace Technology that Promotes Health and Well-Being

Cristina G. Banks, PhD[1] and Sally Augustin, PhD[2]
[1]University of California, Berkeley
[2]University of California, Berkeley, and Design With Science

We ask the question: *Which in-workplace technologies actually support employee health and well-being in concrete and impactful ways, and which technology does not?"* We focus on how technology can support health and well-being in general and in particular, reduce the likelihood of employee burnout. Our assessment based on criteria derived from studies showing that basic human need satisfaction underlies health, well-being, and productivity (Maslach & Banks, 2017; Deci & Ryan, 2000; Ayoko & Ashkanasy, 2020) and can build resilience to burnout (Maslach & Leiter, in press). Extensive literature within the fields of environmental psychology, occupational health psychology, and industrial-organizational psychology provides a structure to link forms of technology, the design of physical work environments, and fundamental organizational forces to well-being. These literatures have in common a core framework grounded in the importance of satisfying human needs: when basic needs are satisfied, stress is reduced, health and well-being is supported, and productivity is improved through greater focus, intrinsic motivation, and physical capability. We identify seven needs that are most relevant to the world of work: (1) autonomy; (2) social belonging; (3) competence/mastery; (4) physical and psychological safety; (5) meaning and purpose; and (6) positive emotions (Maslach and Banks, 2017), and evaluate five different forms of work-related technology regarding their potential for supporting need satisfaction and burnout suppression: (1) EQ controls; (2) Occupancy; (3) Personal Status; (4) Communications; and (5) Self-Help. We present a framework to inform the development of technology to encourage supportive in-workplace experience.

*Keywords*: Wellbeing, need satisfaction, workplace experience, burnout, stress, resilience

COVID-19 has changed how we think about employee health and well-being both in how employers view the importance of keeping employees safe and feeling "cared for" and how employees and job seekers want their employers to demonstrate their value by explicitly caring for their health, safety, and well-being. What form these demonstrations take through the use of technology is the question discussed in this paper. We examine technology as one area where employers *can* show the degree to which they support employees' health and well-being. With the plethora of technology-enabled devices and software swamping the commercial space today, it is important to examine the question, w*hich technology actually supports health and well-being in concrete and impactful ways by addressing employees' needs and suppressing factors that lead to burnout?* Answers to this question can help guide technology use and integration into workplaces in ways that can promote these desired outcomes.

The physical workspace is a common target for technology developers in part because of new work space realities brought about by the need to socially distance employees, suppress infection, optimize space utilization, distribute amenities efficiently, gather employees safely, and communicate both virtually and in-person--sometimes at the same time. Technology implemented in the built environment includes sensors, software, devices, controls, and equipment. In addition, individual users are also a common target for developers as employees turn to personalized tools to address and manage their stress and own health and well-being issues. While it is impossible to provide a complete review of all types of technology employers and employees use in their workplace, some technology is almost ubiquitous and will be our focus.

We reviewed literature that focused on technology utilized in workplaces to compile a (non-exhaustive) list of common product types used by employers as either part of their infrastructure or as tools to support employee health or productivity (e.g., Vendramin, et al., 2021; Bakker, 2020; Ashri, 2019; Cantoni & Danowski, 2015; Lee & Kirlik, 2013; Wang, 2012). We identified five common types of technology products as the focus of our examination:

Correspondence concerning this article should be addressed to Cristina Banks, Interdisciplinary Center for Healthy Workplaces, School of Public Health, 2199 Addison Street, Berkeley, CA 94720 USA. Email: cbanks@berkeley.edu.

1. Environmental Quality Controls: Sensors and controls that measure and adjust air flow, temperature, humidity, noise, and lighting
2. Occupancy: Sensors that monitor occupancies in physical spaces to adjust EQ and optimize occupancy
3. Personal Feedback: Wearables and software that deliver personal feedback to modify behavior
4. Communications: Software delivered through various devices and equipment that connects employees visually or audibly
5. Self-Help: Software accessible through downloads to provide general information that may be personally helpful.

## Evaluation Criteria

To evaluate the potential for certain types of technology for promoting health, well-being, and productivity and suppressing burnout, we began the process of developing a set of evaluation criteria by reviewing scientific studies across multiple literatures (e.g., clinical psychology, environmental psychology, industrial-organizational psychology, human factors, and occupational health) linking physical and psychosocial factors to health, well-being, and productivity (e.g., Maslach & Banks, 2017; Deci & Ryan, 2000; Ayoko & Ashkanasy, 2020; Augustin, 2009; Maslach & Leiter, 2016; Appel-Meulenbroek & Danivska, 2021). Studies within these literatures explicitly or implicitly point to a common framework underlying the connection between personal and organizational factors and satisfaction of basic human needs. When basic needs are satisfied, health and well-being is supported, productivity is improved through greater engagement, intrinsic motivation, and physical capability, and the underlying causes of burnout are suppressed. This literature provided a basis for criteria development: the extent to which a technology had characteristics that could provide need satisfaction in order to promote employee health, safety, well-being, and productivity.

Maslach and Banks (2017) conducted an extensive study of the relationship between psychological needs and personal and organizational outcomes to identify work-related needs that promoted health, well-being, and productivity. Of those identified as having a strong relationship, we selected six needs which we believed were most relevant to technology used in workplaces. They are:

- Autonomy: the desire to experience ownership of one's behavior and act with a sense of volition.
- Social belonging: the desire for close and intimate relationships and the desire to achieve a sense of communion and belongingness.
- Competence: the desire to feel capable of mastering the environment, to bring about desired outcomes, and to manage various challenges.
- Physical and psychological safety: the desire to be free from physical and psychological harms and threats.
- Meaning and purpose: the desire to experience meaning in one's life and to be doing something that one values.
- Positive emotions: the desire to experience positive feelings of hope, optimism, joy, pride, love, awe, and other emotions that underlie happiness.

We constructed evaluation criteria based on a general consideration of whether the technology is designed to increase satisfaction of a basic need and further, whether it was easily accessible anytime and by anyone at work in the organization, could be integrated seamlessly into employees' work routine, and is helpful to employees in a meaningful way. These considerations were necessary to ensure that the technology was linked in some way to basic needs and affected the vast majority if not all employees and did so without interfering with their work. The evaluation criteria given these considerations are the following:

- Supports employees doing their work well. Alignment with the task at hand, as discussed by Veitch (2012) among others, is key for both employee wellbeing and performance.
- Provides opportunities for cognitive refreshment. After employees become mentally exhausted via work that requires concentration/focus, their cognitive and social performance degrades; opportunities for mental revitalization restore both (Sander, et al., 2020).
- Provides comfortable amounts of environmental control. Comfortable amounts of environmental control have been linked to both enhanced wellbeing and performance (Appel-Meulenbroek, et al, 2020).
- Supports bonding among employees. Without suitable interpersonal bonds, workplace experiences are significantly compromised (Veitch, 2012).
- Protects employee safety and security. When we don't feel safe and secure, our wellbeing is dramatically degraded (Allen and Macomber, 2020).
- Provides choice in place and timing of activities. Activity-based work environments, where employees have a choice of work environments, have the potential, for example, to reduce the probability of burnout and increase the likelihood of enhancement (e.g., Appel-Meulenbroek, et. al, 2020).
- Provides opportunities to bond with the organization. Social environments can drive organization to, or from, performance by individuals and groups to their full potential (Veitch, 2012).
- Provides personalized information to promote healthy habits. Software delivered to a personal device or desktop and provides personalized health feedback and recommendations generally termed 'telehealth' has shown evidence of improved health and well-being status for particular kinds of health issues (Allen, 2016).
- Sends positive non-verbal messages. When employees feel that their contributions to organizational success are recognized and respected, wellbeing and performance are likely to be optimized (e.g., Luong, et al., 2020).

## Results

Given these criteria, we evaluated each type of technology in terms of the extent to which the technology in general possessed characteristics which met each the criteria. Judgments were rendered independently by each author, with the lead author providing her judgments and then the second author reviewing each judgment independently. A technology type received a "Yes" judgment if in general the technology potentially provided the benefit provided in the criterion if implemented as designed. If the general characteristics of the technology did not provide this benefit, then it received a "No" judgment. Results of our evaluation are summarized in Table 1.

As seen in this table, each type of technology included in this examination met at least one of the listed criteria. Environmental Quality Controls met the most criteria with four "Yes" judgments, and Personal Feedback and Self-Help technologies showed the least with meeting only one criterion each. Occupancy also met multiple criteria with three. These results suggest that some technologies are more useful to employees than others, assuming that providing more benefits to users is better than fewer benefits.

**Table 1.** ***Criteria Met for Different Types of Technology***

| | TYPE OF TECHNOLOGY PRODUCT | | | | |
|---|---|---|---|---|---|
| CRITERIA | EQ CONTROLS | OCCUPANCY MONITORS | STATUS FEEDBACK | COMM/ CONNECTION | SELF-HELP |
| Task performance support | Yes | No | No | Yes | No |
| Cognitive refreshment | Yes | No | No | No | Yes |
| Comfort control | Yes | Yes | No | No | No |
| Bonding among employees | No | No | No | Yes | No |
| Employee safety/security | Yes | Yes | No | No | No |
| Place/timing choice | No | Yes | No | No | No |
| Bonding with organization | No | No | No | Yes | No |
| Messages for healthy habits | No | No | Yes | No | No |
| Positive non-verbal messages | No | No | No | Yes | No |

The type of benefits may also be important in considering the value of a type of technology. For example, those supporting *competence, belonging and positive emotions needs* may be more valuable than those supporting *meaning and purpose.* In that case, EQ Controls, Communications and Occupancy technologies are more valuable to employees than Personal Feedback and Self-Help technologies because the former are important for job performance in the form of task performance, cognitive refreshment, and bonding with others whereas the latter support self-improvement. Satisfaction of employees' basic needs of *autonomy, competence, belonging, and positive emotions* appear to be fulfilled best by those technologies that provide the organizational information and feedback to facilitate performance and connections with others. *Meaning and safety* are not necessarily served by any of these types of technologies. *Physical and psychological safety* could be promoted through EQ Controls to the extent they optimizes air flow, humidity, and temperature to minimize the growth of pathogens, increase fresh air mix to lower CO2 levels, and maximize temperature comfort. Despite the capability of achieving these important outcomes for employee occupants of the workspace, this technology is under-utilized across workplaces, decreasing their potential for impact. Thus, this examination shows that some basic needs are not being addressed through technology to any measurable degree, leaving open the opportunity for technology developers to think about how new technology or existing technology can be designed or repurposed to assist employees in several areas of need.

## Conclusion

This study shows how certain technologies can be helpful in promoting health, safety, well-being, productivity by creating workplace conditions that support satisfaction of basic human needs and act against burnout. The criteria presented here offer a framework for future technology development to support these initiatives.

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