To Break or not to Break: Exploring Technological Interventions for Adverse Breaks in the Workplace

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It is widely recognized that prolonged sitting and screen time periods can harm human health and well-being. Consequently, health experts advocate for the incorporation of regular short breaks within the workplace to alleviate these repercussions. Nevertheless, it has come to attention that many office employees tend to become sidetracked during these breaks, often engaging in activities such as watching videos or playing games, which subsequently impedes their ability to transition back into work mode. In response to this challenge, a brainstorming session was arranged with the objective of examining potential technological interventions aimed at ameliorating adverse breaks within the workplace. Our presentation encompasses interventions accompanied by potential scenarios, outlining how they could effectively assist employees in taking breaks without causing procrastination, thereby supporting their health and well-being.

Additional Key Words and Phrases: Well-being, Breaks in workplace, Office, AI technologies, Human-computer interaction

1 INTRODUCTION

The quest for enhanced well-being within the workplace has led to a surge in the development of interventions aimed at promoting healthier work habits and environments. In response to the growing concern over sedentary workplace behaviors, a variety of technological innovations have been introduced. Smart chairs, for instance, have been designed to combat the negative health effects of prolonged sitting by encouraging movement and proper posture, as documented

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in recent research [11, 12]. Similarly, smart monitor stands have been developed to not only improve posture but also to reduce eye strain and muscle fatigue, as highlighted in studies on workplace ergonomics [13].

To complement these physical health-focused technologies, emotional well-being has been addressed through the use of self-tracking devices [3, 4] and some desktop decors (e.g., a desktop robot [7]), which offer interactive experiences that can soothe and de-stress employees during intense work periods. Wearable devices, on the other hand, continuously monitor physiological indicators, providing users with insights into their emotional states and suggesting timely interventions [2].

While technology has offered these novel approaches to well-being, the traditional concept of taking breaks remains invaluable. Engaging in activities such as using a relaxation system, participating in physical exercises like boxing, indulging in a restorative nap, or enjoying entertainment options has been shown to effectively diminish work-induced fatigue and bolster overall well-being [9, 14]. These activities serve as a counterbalance to the demands of work, providing necessary mental and physical respite.

Despite the benefits of taking breaks, the digitalization of the workplace has introduced complex challenges. Social media breaks, which include interactions with notifications, messages, and media content, have been scrutinized for their potential to reduce productivity, leading to procrastination rather than providing the intended recovery [6, 10]. This paradox has prompted our research team to conduct an online brainstorming activity, aiming to identify and develop technological strategies that could counteract the adverse effects of such online breaks.

The brainstorming session yields a number of ideas for leveraging cutting-edge technologies to enhance the quality of online breaks. Participants proposed using technologies to create adaptive environment systems, personal virtual assistants for daily schedules, personalized immersive environments, and re-configurable Physical Space. We will first introduce the design of the brainstorming activity. Following this, we will present the findings of the brainstorming session, including the potential implementation of these technologies in the workplace. Through this exploration, we aim to contribute to the ongoing dialogue on how to design technological solutions that not only smooth the transition between work and breaks but also enhance the overall well-being and productivity of employees [1, 8].

2 BRAINSTORMING SESSION

The first two authors facilitated and coordinated the virtual brainstorming sessions, extending invitations to the additional co-authors for their involvement. The sessions were conducted using Tencent Meeting for synchronous interaction and boardmix.cn for collaborative ideation and organization. All participants were comprised of scholars and postgraduate students specializing in computer science and industrial design, thereby fostering interdisciplinary discourse for the purpose of stimulating innovative ideas.

The brainstorming process spanned a duration of 2.5 hours and encompassed four distinct segments: an introductory ice-breaking phase involving self-introductions, discourse on office well-being challenges, exploration of potential technological interventions, and a final phase dedicated to reflection and summarization. Prior to the commencement of the brainstorming, the organizers elucidated the scope and guidelines governing the session. Importantly, participants were encouraged to individually contemplate and formulate their ideas before engaging in group discussions. Further-more, each participant was requested to prioritize and rate the three most compelling challenges within the realm of office well-being, with the highest-rated issue being the focal point for the subsequent discussion on technological interventions. To conclude the session, organizers extended invitations for participants to provide additional input or expand upon prior discussions, followed by a brief summary outlining the principal outcomes derived from the brainstorming initiative.

3 FINDINGS

This section will present the major well-being challenge and the corresponding technological interventions.

3.1 Well-being Challenges

During the brainstorming sessions, participants articulated a diverse array of office well-being challenges, spanning sedentary behaviors, prolonged working hours, intricate interpersonal dynamics with colleagues, communication obstacles in cross-team collaborations, suboptimal working environments, the impact of adverse breaks, and usability concerns related to office software. Subsequently, based on the participants' assessment, adverse breaks received the highest number of votes (four votes), followed closely by working environments and communication barriers in cross-team collaboration, both garnering three votes each.
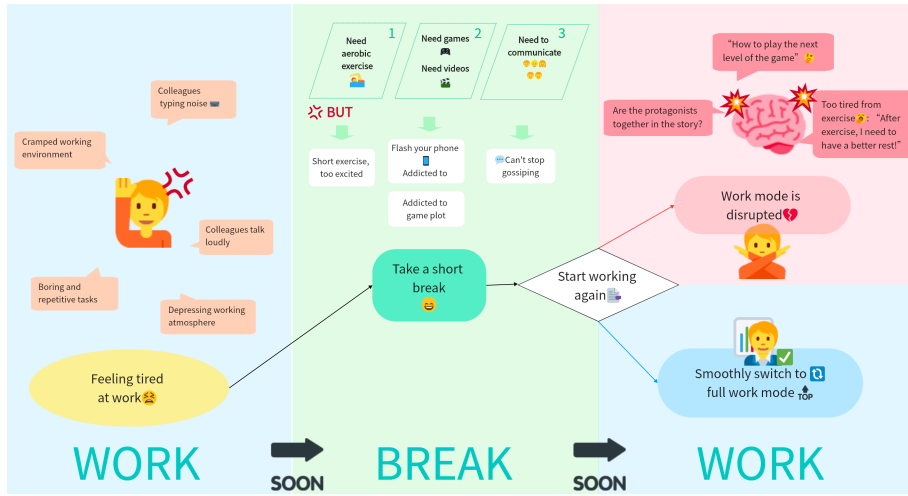

Fig. 1. **The typical scenario of short breaks in work.**

Adhering to the guidelines outlined for the brainstorming session, the top-rated challenge, adverse breaks, was earmarked for in-depth discussion due to time constraints. As identified as a prominent issue in our brainstorming, the significance of short breaks presents a dual potential to either bolster well-being as a rejuvenating activity or undermine it as a form of procrastination [6]. Figure 1 depicts a generic scenario depicting the adverse breaks. For instance, individuals experiencing difficulties concentrating on their tasks due to a disruptive working environment (e.g., noise) may resort to taking a break by engaging in aerobic exercises, watching videos, or engaging in social interactions. However, the enduring effects of such short breaks may engender challenges in regaining focus on work-related activities. Consequently, our objective is to investigate potential technological interventions to mitigate the detrimental impact of these breaks.

3.2 Technological Interventions

Our discussion on technological interventions centered on the adverse breaks in the workplace (see Figure 1). We will present our summarized four major interventions and further supplement and expand with the way of integrating technological interventions into everyday work environments.

3.2.1 Adaptive Environment Systems. Based on an employee's schedule and circadian rhythms, the office's lighting and temperature are automatically adjusted—for instance, providing cool-toned light during focus-intensive work periods and switching to warm-toned light during breaks. The central feature of this space is its adaptive environment system, which is designed to enhance employee well-being and productivity through subtle, automated adjustments to the environment.

- *Lighting*: The ceiling is equipped with an array of LED lights that can change color temperature throughout the day. During periods of intense work, the lights emit a cool-toned, blue-enriched white light that mimics daylight, helping to improve concentration and alertness. As an employee's schedule shifts to a break period, the lighting transitions to a warm-toned, yellowish light that creates a relaxed atmosphere, encouraging rest and recovery.
- *Temperature*: Alongside the lighting, the room's temperature is controlled by smart thermostats that are sensitive to the time of day and occupancy levels. During focus-intensive work periods, the temperature is kept slightly cooler to maintain alertness and comfort. During breaks or less intense work periods, the temperature is slightly raised to promote relaxation.
- *Scent*: A scent diffusers release different aromas based on the time of day and the scheduled activities. These diffusers are connected to the central adaptive environment system and are discreet in design, blending seamlessly with the office aesthetics. During times of high concentration, a subtle, invigorating scent like peppermint or citrus is emitted. These scents are chosen for their ability to enhance cognitive performance and alertness. As employees approach their scheduled breaks, the scent in the air shifts to a warm, comforting aroma of freshly ground coffee. This familiar scent is a psychological cue for relaxation and social interaction, signaling to employees that it's time to step away from work and recharge.

3.2.2 Personal Virtual Assistant for Daily Schedule. A personal virtual assistant (PVA), leveraging advanced AI capabilities, could help workers better plan breaks and work duties. The PVA could integrate with attention management software to learn the user's work habits and preferences. It could then proactively schedule deep work sessions during times when the user is historically most productive. The assistant could also manage notifications, silencing them during focus periods and summarizing them when the user is ready to take breaks, ensuring minimal distraction.

Moreover, PVA could learn from the user's input and feedback to create an adaptive work environment. It could suggest breaks when it detects signs of stress or prolonged work without pause. Additionally, it could propose deadline adjustments when feasible, re-prioritize tasks based on the user's current mental state and workloads, and even recommend the best times for collaborative work versus solo tasks based on the user's productivity patterns.

3.2.3 Personalized Immersive Environment for Breaks. The personalized immersive environment is designed to create a clear demarcation between the high-pressure work environment and a tranquil space dedicated to relaxation and mental recovery. This separation is crucial in helping employees to detach and recover from work demands, thereby reducing stress and preventing burnout. Research has shown that exposure to natural environments can significantly contribute to psychological well-being and stress recovery [5]. The VR cave is an advanced system that can simulate a variety of natural settings. It is an enclosed space equipped with immersive VR technology that can create convincing simulations of natural environments. Natural settings have a restorative effect, helping to replenish the mental resources that are depleted during work. By simulating these environments, VR technology can provide an effective means of relaxation and stress relief within the workplace.

3.2.4 Re-configurable Physical Space. Re-configurable physical spaces are designed to adapt to the various needs of employees throughout the workday, promoting productivity, creativity, and well-being. These areas can transform from a quiet lounge for relaxation into a social space for collaboration. The office furniture is equipped with sensors that can communicate with each other, allowing for personalized settings for each employee. With modular furniture, the layout can be easily changed to suit the type of break employees need, whether it's a quiet space to meditate or a communal area to socialize and exchange ideas.

4 CONCLUSION

In summary, the research underscores the detrimental impact of prolonged sitting and screen time on human health and well-being, prompting health experts' recommendation to integrate regular short breaks in the workplace to counteract these effects. However, the observation that office employees often become diverted during these breaks, leading to challenges in refocusing on work tasks, highlights the need for innovative solutions. The establishment of a brainstorming session to explore potential technological interventions aimed at mitigating adverse breaks signifies a proactive response to this issue. The interventions proposed in this study, coupled with their potential scenarios, offer promising avenues for supporting employees in effectively engaging in breaks without succumbing to procrastination, thereby fostering positive effects on their overall health and well-being. This research not only identifies the problem but also presents actionable solutions with the potential to reshape workplace practices for the betterment of employees' health and productivity.

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