

# Stedi: Proactively Preventing Burnouts among Office Workers through App-Based Workflow Management Services

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## ABSTRACT

Burnout prevention has become increasingly crucial to sustaining office vitality. However, existing strategies mainly focus on the recovery phase of burnouts, and their preventive effect is minimal. This design study explores a digital solution utilizing a data-driven approach to prevent burnouts among office workers. We present Steadi – a personal app that integrates a task planning and reflection system as well as an interactive workflow guidance to optimize the daily work task experiences. We evaluated Steadi with nine participants to acquire some preliminary insights for validation and exploring design opportunities. Quantitative results suggest that the workflow guidance feature of Steadi was effective in improving the perceived work value, which could play an important role in reducing the risks of developing burnouts. The qualitative data indicated that Steadi could offer positive user experiences, which might help prevent repeat burnouts through enhanced work performance and mental resilience in the long-term. Based on our findings, we discuss the next step of this research.

## CCS CONCEPTS

• **Human-centered computing** → Human computer interaction (HCI); HCI design and evaluation methods.

## KEYWORDS

Burnout prevention, Computer-supported workflow, Office worker, Digital health service

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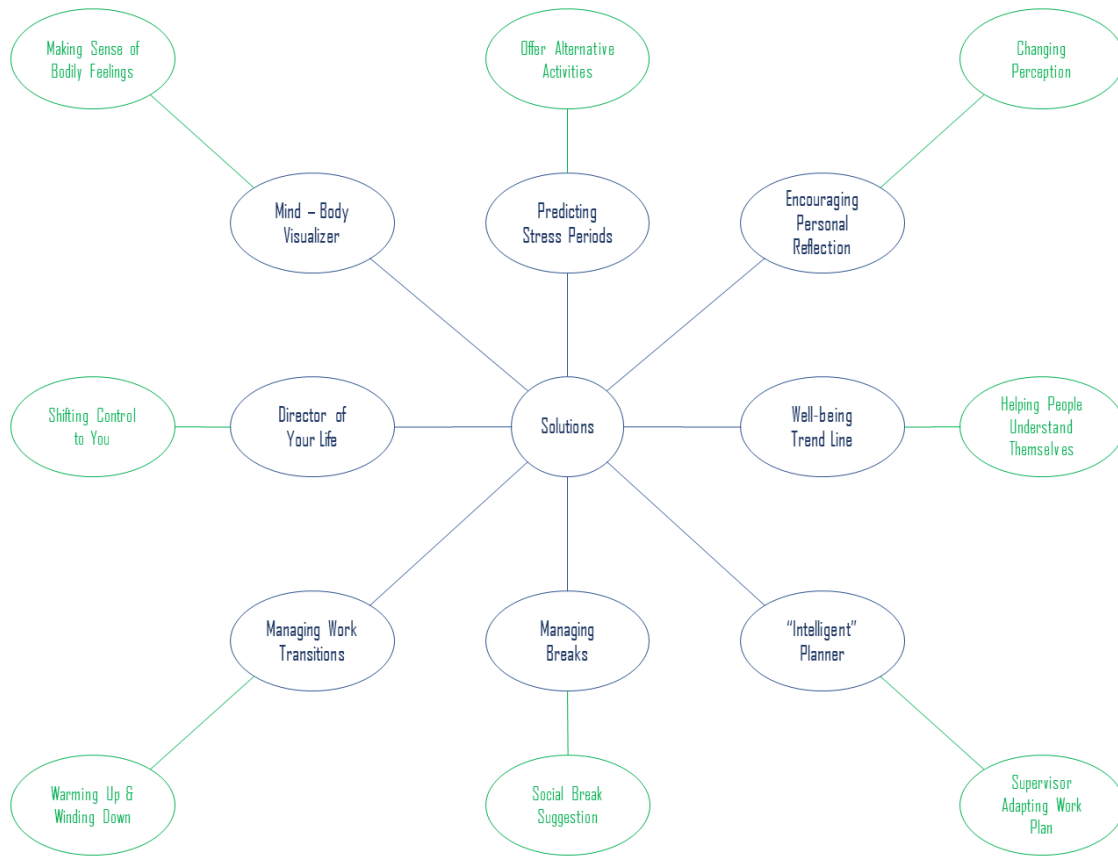
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## 1 INTRODUCTION

Nowadays, work-related mental illnesses have become an increasingly critical issue in modern society. In the Netherlands, for instance, during the year of 2018 only, more than 263,500 people were diagnosed to be overworked and over 17% of employees have reported experiencing burnout symptoms [17]. Particular professional groups such as academic workers could have an even higher probability of experiencing burnout [8], [9]. Experiencing burnout means that a person suffers from excessive stress, fatigue, insomnia, and bodily pain, and thus would be unable to work for an extended period [10]. Many strategies have been developed to help patients recover from burnout, such as cognitive-behavioral therapies, coping techniques, relapse prevention plans, etc. [5], [12], [10]. Nevertheless, burnout brings with it high risks of repeat burnouts [9]. Yet, based on the aforementioned interventions, it is still challenging to prevent future burnouts from happening.

Burnouts can occur due to the absence of preventive strategies and the increased mental workload in daily routines, which usually lead to a failure of health interventions [16], [15], [12]. To tackle this problem, the rapid growth of Human-Computer Interaction (HCI) and User Experience (UX) technologies shows several potential opportunities. By supporting healthier work routines and better task performance, it may use assistive features to help office workers prevent burnout proactively [18]. For instance, digital health services could leverage data acquisition to continually track personal health status and work-related information [5]. Subsequently, it could adopt a few behavior-change techniques into persuasive applications to guide healthful work activities for minimizing the relapse of burnout [13, 14].

Based on these guidelines for effective health interventions, we set out a design research study to explore a digital service solution for burnout prevention to capitalize on the aforementioned research promise. A digital app system called Steadi was developed to support the prevention of burnouts using several UX features, including the task intensity management of the work schedule and guidance for improved workflow. Based on the prototype, a preliminary study was conducted with nine office workers. Steadi's workflow guidance feature was evaluated in a within-subject study to see whether it could result in meaningful change to mental task experiences. We then carried out a UX walkthrough [4] to identify some potential UX issues and design opportunities of Steadi.



**Figure 1: The mind map of the Steadi system design.**

## 2 STEADI

Steady was developed based on a series of design activities, including interviews with office workers and psychotherapists, brainstorm sessions, and sketching and paper prototyping. To start, we interviewed two office workers, who self-reported to have experienced burnouts, to understand the fundamental reasons for developing mental illness and burnouts in daily work. From the interviews, we learned that the lack of control of the workflows as well as challenges with reflecting on the work experiences were the two issues faced by our interviewees. Next, we conducted several brainstorming and rapid prototyping activities to generate design ideas (e.g., Figure 1) and create low-fi prototypes (e.g., Figure 2). These low-fi prototypes were featured with the easy self-tracking of daily work experiences and a technology-assisted healthy workflow. We finally assessed these preliminary prototypes with two psychotherapists to review our design concepts and discuss possible improvements. In general, the initial design concept of Steadi was well received by the health experts for its aim of coaching potential burnout victims into a better perspective of work, stress and life. Moreover, the discussion encouraged us to investigate further on how these conceptual features could be converted into the digital format for service applications. The design process resulted in Steadi, a digital

service system that comprises two UX features that work in combination to improve work pacing and, consequently, maintain user remission from burnout.

Firstly, at the service system level, Steadi was integrated with the personal work schedule planner to better fit into the lives of office workers. Specifically, as shown in Figure 3(a), it allows the app to automatically collect data about the tasks that the user is involved in via the outlook API. Besides, Figure 3(b) shows that for each task, the user could rate the intensity level of the mental workload from low (1) to high (4), as well as affective experiences [1], in terms of the perceived valence, arousal, and dominance. In the long run, as shown in Figure 3(c), the app could create an additional visualization layer to the outlook agenda to provide an overview of the users' task intensity and emotional status; this would support reflection through a sustained workload and help in monitoring the impact on personal mental health.

Secondly, at a micro-level, Steadi is designed to provide task guidance for improving work efficiency. Figure 3(d) shows that task guidance was designed as an always-on display to create ambient awareness. In an unobtrusive manner, it functions effectively in the user's periphery and tries to demand as little attention as possible to provide information about the task flow. Specifically, similar to the Pomodoro technique [3], the real-time guidance breaks down

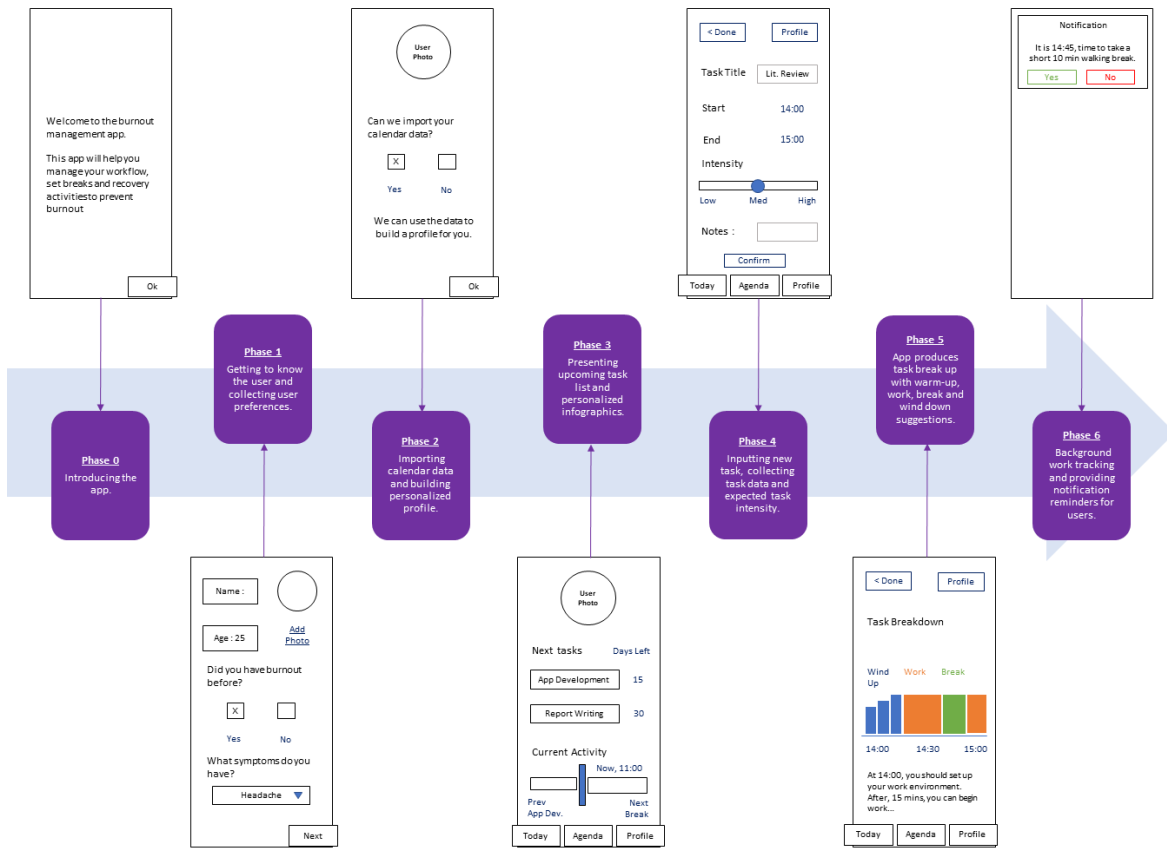


Figure 2: The wireframe sketches of the Steadi app.

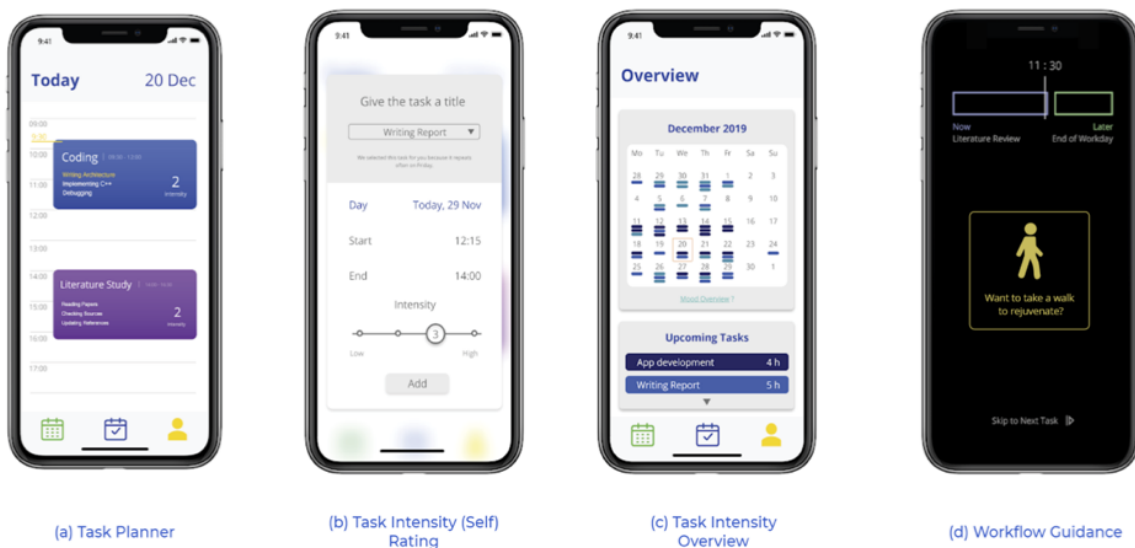


Figure 3: User interfaces of Steadi designed to support improved work experiences for the prevention of burnout. Icons adopted from [6].

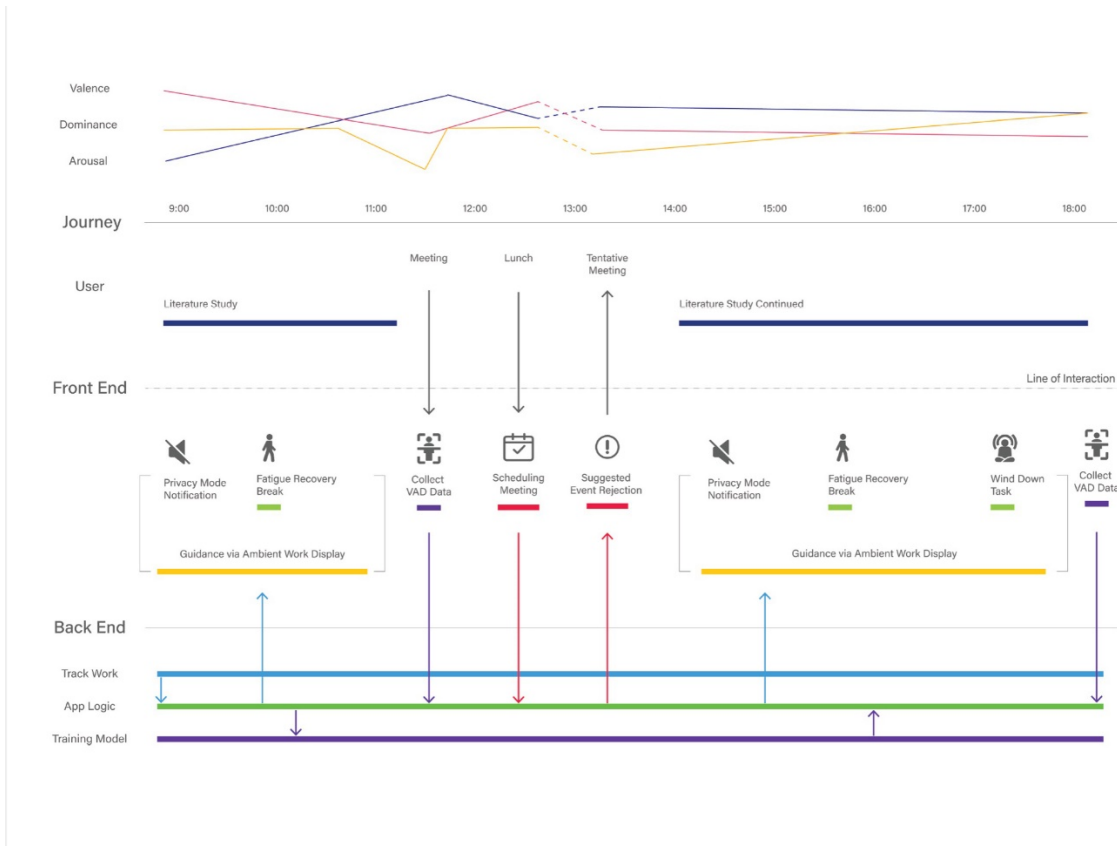


Figure 4: The diagram of the customer journey of the Steadi service. Icons adopted from [6].

the ongoing workflow based on the task spread, intensity of work tasks and the knowledge of user state. What is more, for a short work break, the system would provide recommendations on health-promoting activities for improving the quality of the rest (Figure 3(d)). Also, Steadi was envisaged to suggest cancellations of events when it recognizes negative emotions or a state of overwork.

Based on the consolidated design proposal, we developed a high-fi prototype using Adobe XD which enable users to experience Steadi. As can be seen from Figure 4, a diagram was also created to visualize the customer journey of the Steadi service throughout a regular workday.

### 3 PRELIMINARY USER STUDY

A preliminary user study was conducted using the experiential prototype and the customer journey map to quantitatively evaluate the workflow guidance feature of Steadi and to qualitatively examine some potential benefits and design opportunities of the Steadi services. In the remainder of this section, we elaborate on the recruitment of participants, the setup and study procedure, and the data analysis in detail.

#### 3.1 Participants

We recruited nine participants, all of whom were PhD students. As junior office workers, PhD candidates are vulnerable to burnouts

due to daily work pressure and task overload [19]. Among our participants, four were in the first year of their doctorate studies. The remaining were from 2<sup>nd</sup> (n=2), 3<sup>rd</sup> (n=2), and the 4<sup>th</sup> (n=1) study year respectively. Moreover, four participants (self) reported that they had experienced symptoms of burnout or had a full burnout. This study was approved by the ethical review board at the Eindhoven University of Technology. Prior to the test, all participants were well informed about this study without any discussion on research assumptions. We obtained consent upon their voluntary participation.

#### 3.2 Setup, Procedure, and Data Collection

**3.2.1 Within-Subject Study to Evaluate the Workflow Guidance Feature.** As the first part of the user study, the workflow guidance feature of Steadi (Figure 2(d)) was validated using a within-subject test. The test consisted of a text entry task for approximately 30 minutes. The text to be entered was chosen to be of an unfamiliar language to all the participants (Portuguese in this case). This ensures that participants put conscious effort into the task. The text length was adjusted to ensure that most participants would spend at least 20 minutes on the task.

There were two test conditions. In the baseline condition, the participant completed the text entry task without receiving any

guidance from Steadi. In the Steadi condition, participants performed the text entry task following the Steadi guidance. In this case, the system leverages the always-on display to remind the user to a) take a 10-min break after 15 minutes and resume the task afterwards; b) recommend a specific health-promoting activity (e.g., stretching, walking, listen to the music, etc.) for the work break and c) stop the task earlier than scheduled. The exposure of the two conditions was counterbalanced.

During the test, we firstly collected quantitative data. After each condition, we asked the participant to fill in a questionnaire, including a NASA Task Load Index (NASA-TLX) [7] and a tailored Intrinsic Motivation Inventory (IMI) [11]. NASA-TLX was used to measure the perceived workload using its six subscales: mental demand, physical demand, temporal demand, performance, effort, and frustration. The subscales of enjoyment and perceived value of IMI were used to measure participants' motivation towards the task under two conditions.

**3.2.2 UX Walkthrough to Examine the Task Planning and Reflection Services.** After the evaluation of the workflow guidance feature, as the second part of the study, we conducted a UX walkthrough [4] for all the UX features of Steadi. Explicitly, we began with the demonstrations and explanations of different UX features of Steadi. The participant was then asked to use the Steadi prototype to execute the following tasks.

- Planning work activities on the agenda;
- Rating the perceived workload, the valence, arousal, and dominance for a specific activity on the agenda;
- Reflecting on the past experiences based on a monthly overview of the task intensity and affective experiences created in advance.

While the participant was using the prototype, observational notes were taken to aid the post-study interview. The semi-structured interview was meant to collect participants' qualitative insights into the potential benefits and design opportunities of our Steadi service. Moreover, we also asked participants to explain their experiences with the workflow guidance feature to help us interpret the quantitative results from the previous part. All the interviews were audio-recorded, transcribed, reviewed, and summarized into transcripts for data analysis.

### 3.3 Data Analysis

The quantitative data were analyzed using Wilcoxon Signed Ranks Test to compare the questionnaire results of two conditions. This non-parametric approach was chosen because of the relatively small sample size due to which the data cannot be normally distributed. The qualitative interview data were thematically analyzed [2] to understand participants' experiences and opinions of Steadi.

## 4 FINDINGS

### 4.1 Quantitative Findings

As shown in Figure 5(a), the perceived value has increased significantly from the baseline condition ( $M = 1.90$ ,  $SE = 0.16$ ) to the Steadi condition ( $M = 3.10$ ,  $SE = 0.24$ ), with  $Z = 2.52$ ,  $p = 0.01$ . Moreover, Figure 5(b) shows that the enjoyment of the text entry task with the guidance ( $M = 3.10$ ,  $SE = 0.20$ ) was perceived higher than

the baseline condition ( $M = 2.77$ ,  $SE = 0.23$ ) though without any significance ( $Z = 0.74$ ,  $p = 0.45$ ). In summary, our results showed that the Steadi guidance feature could improve users' motivation towards mentally demanding daily tasks, particularly the perceived value of the work.

There were no significant differences between the two conditions across all NASA-TLX subscales. Yet, as shown in Figure 6, we still observed a small impact of Steadi in reducing the physical (7.4 vs. 8.5) and temporal (10.1 vs. 12.0) demands of the task. No changes have been observed in terms of mental demand and the satisfaction of the performance. However, compared to the baseline, Steadi has led to a very tiny increase in effort (11.3 vs. 11.1) and frustration (10.4 vs. 10.2) respectively.

### 4.2 Qualitative Findings

The qualitative analysis resulted in three themes that can be used as guidelines for future design research projects for burnout prevention, which are described as follows.

Firstly, the "Positive Experience" theme highlights the fact that the majority of the users found that the Steadi system has a meaningful role in helping them complete tasks and maintain better mood over tasks. This positive feeling was attributed to both planner and guidance features of Steadi, which implies that the app's feature set works together in a comprehensive manner for improved office work experiences.

Secondly, the "Benefit of Steadi" theme consists of a number of positive impacts due to the UX features of the app. Some participants liked the task breakdowns, while others preferred the monthly task overview. A notable insight from this theme was that the users wanted the app to enhance their performance at work and not just help them steer away from burnout. This projected a potential scenario that the app would have long-term benefits to office workers, regarding both better work performance and higher resilience to burnout.

Lastly, the "Design Improvements" theme can be unfolded in two clusters, namely *the service mechanism* and *the UX features*. Regarding the service mechanism, a majority of participants indicated that the service adaptivity based on user differences would be appreciated. For example, we learned that participants might want to take breaks at different intervals and be recommended with appropriate activity options. In this scenario, the app's goal is to nudge users through the system customizations that fit physiological needs and provide actionable recommendations according to the analysis of the specific context. Regarding the UX features, we observed that there could be some places for improvements in the interaction design of Steadi. For instance, in this study, we leveraged the display of the mobile phone together with sound notifications to provide the user with task guidance. However, they were still perceived as distracting by a few participants. This design's unobtrusiveness could be enhanced further through e.g., an ambient display embedded in the working environment or a plugin of the office software.

## 5 CONCLUSION AND FUTURE WORK

In this design study, we aim at exploring a digital solution to support office workers, such as junior academic workers, in preventing

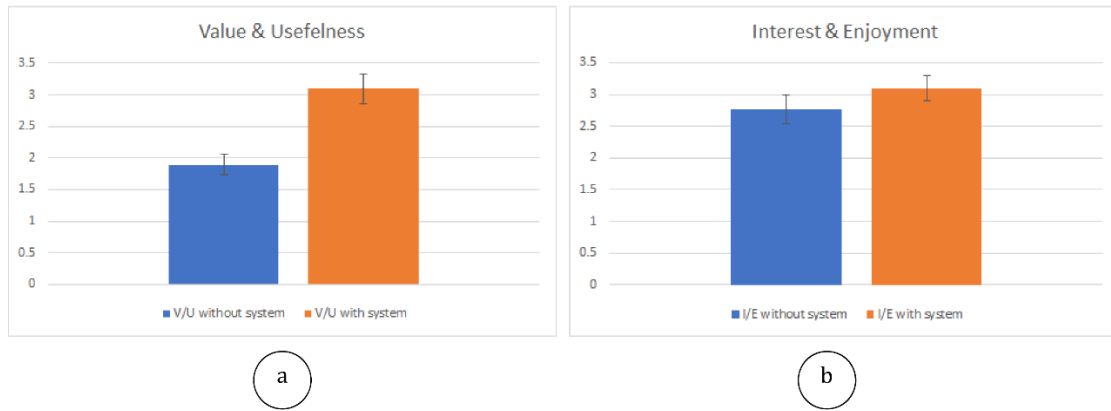


Figure 5: IMI results – (a) perceived value; (b) task enjoyment

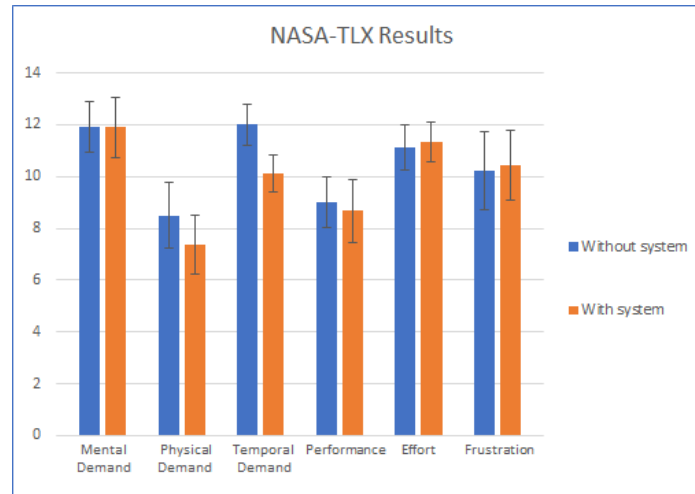


Figure 6: NASA-TLX results

burnouts resulting from daily tasks. We have presented the development of the Steadi app, which leverages task planning, systematic reflection, and interactive workflow guidance to optimize the daily work experience of office workers. A within-subject study showed that the always-on display, for workflow guidance with breakdowns and healthy break recommendations, could significantly improve the perceived value of a mentally demanding task. Moreover, the qualitative user feedback suggested that Steadi contributed a positive user experience and might provide benefits to improve knowledge-based work performance and mental resilience in the long term.

For future study, firstly we plan to improve the service mechanism and UX designs of Steadi to realize a robust prototype. Based on the improved Steadi, we then plan to conduct several experiments, such as a controlled user test with a larger number of participants to validate insights acquired from this design research, as well as a longitudinal field study in real life to learn the long-term impacts of Steadi in preventing mental illness and repeat burnouts among office workers.

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