ISSN: 2754-6659

Journal of Artificial Intelligence & Cloud Computing

SCIENTIFIC Research and Community

Review Article

Open Access

ReMotive: Enhancing Digital Calendar Experience with AI

Shriyash Shete

Zscaler, Inc. Bloomington, IN, USA

ABSTRACT

This paper investigates the impact of the shift to remote work on working parents, heightened by the COVID- 19 pandemic. Utilizing surveys and interviews, it explores the challenges these individuals face in balancing professional duties with childcare. A key focus is a development of 'Remotive', an AI/ML-powered tool integrated into Google Calendar, designed to aid remote working parents in managing their well-being. This research highlights the necessity for adaptive work policies and digital tools in enhancing the work-life balance of remote workers, paving the way for future studies on the long-term effects, broader demographics, and the efficacy of such technological solutions in diverse working environments.

***Corresponding author**

Shriyash Shete, Zscaler, Inc. Bloomington, IN, USA.

Received: May 09, 2022; **Accepted:** May 19, 2022; **Published:** May 27, 2022

Keywords: AI in Remote Work, Work-life Balance, Digital Well-being, Digital Calendar, Productivity

Introduction

Remote work, often recognized as a flexible work arrangement, involves employees completing their job tasks away from a traditional office setting, relying on digital communication methods. This concept, which began to be explored in the 1970s, gained traction in the following decades, with notable corporations like JCPenney, IBM, American Express, General Electric, and Sears Holdings adopting various remote work strategies [1]. These strategies, ranging from part-time work from home to hiring exclusively remote employees, have become a crucial aspect of many companies' operational models. Before the COVID-19 pandemic, a shift towards remote work was already noticeable.

The pandemic accelerated this trend significantly, with about 34.1% of Americans transitioning to home-based work. It's estimated that nearly 37% of American jobs have the potential to be conducted remotely. In response to these changes, several major tech companies, including Quora and Twitter, have declared options for permanent remote work for their employees [2].

In March 2020, the World Health Organization (WHO) declared COVID-19 a global pandemic, recognizing its rapid spread and the serious threat it posed worldwide. This pandemic brought about significant challenges to both public health and the global economy. Governments around the world were compelled to enforce stringent measures, such as mandatory stay-at-home orders and maintaining physical distance from others, to curb the virus's spread. These actions had a profound impact on how society functioned, particularly affecting people's mobility.

As a result, numerous companies faced major disruptions in their operations, leading to a swift and unprecedented shift to full-time remote work for many employees. This situation marked a historic first, where knowledge workers globally had to adapt to working from home daily on a massive scale, confronting various unforeseen challenges [1].

According to a specialized analysis by Global Workplace Analytics using data from the U.S. Census and Bureau of Labor Statistics, there was a 159% increase in remote workers in the U.S. from 2005 to 2017. By recent counts, approximately 4.7 million Americans are engaged in remote work, a notable rise from the 3.9 million in 2015. Prior research on this topic has often centered on the assumption that remote work was a choice made by employees for various reasons. These include factors like reducing commute times, managing household duties, and escaping the distractions commonly found in traditional office environments [1].

Several prominent companies such as Google, Microsoft, Twitter, Facebook, Shopify, Atlassian, and Dropbox have announced transitions to either fully remote or hybrid work models. In these hybrid arrangements, employees are given the flexibility to work from home permanently or for several days each week. This shift in the post-pandemic work landscape, particularly the adoption of hybrid models, presents both new challenges and opportunities.

Researchers are encouraged to delve into these hybrid work environments to better understand the specific challenges faced by hybrid teams and the various factors that need consideration within such settings. The in-sights gleaned from these studies could be particularly valuable for the human-computer interaction community, aiding in the design of products and services that are both usable and meaningful for remote and hybrid teams. Additionally, organizations can leverage the findings from these research efforts to develop and enhance their own remote and hybrid work programs for employees [1].

At the heart of remote work are the virtual meetings, typically organized using digital scheduling tools such as Google Calendar and Microsoft Teams/Outlook. These tools play a vital role in keeping remote team members connected, enabling collaboration,

and ensuring the smooth functioning of an organization despite geographical distances. Given this context, it becomes essential to explore and understand the various factors linked to remote work experiences. Such understanding is crucial for enhancing both productivity and the digital well-being of individuals working remotely [2].

The objective of this study is to explore how contextual data can be utilized to help parents working remotely in managing their well-being, while they juggle between professional duties and childcare responsibilities.

Related Work and Background

Remote work has been an important topic of research in HCI. Borse V. et. al, in their work, present five factors that impact the productivity and job motivation of remote workers: 'Remote Social Interaction', 'Social Support and Knowledge Sharing', 'Upskilling and Reskilling Opportunities', 'Remote Work Policy', and 'Interaction between Leadership and Employees'. Further, they argue that the 'Guided micro-breaks and science-based exercises reminder' feature was perceived as the most useful by 7 participants [1].

Damen I. et. al. explore the topic of guided micro-breaks and science-based exercise reminders through the lens of Digital Behavior Change Intervention (DBCI) and propose the digital calendar-based intervention design. With Tweak, they show how integrated delivery mechanisms such as the digital calendar can be leveraged to tailor health interventions for personal and contextual needs and offer a new perspective on DBCIs. Further, they outline 6 design considerations for future research [3].

An example of an integrated health suggestion system is Google Goals, a planning feature using Google Calendar [4]. It allows for setting personal health goals and finding the right time to schedule these events. It does not, however, allow for more exploratory behavior in trying out new healthy habits nor use a multi-component approach to health. Huang D et. al, on the other hand, examines how visualization design could enhance the reflective understanding of one's behaviors. They propose a design approach of embedding personal quantitative data within a personal digital calendar to encourage new habits based on the feedback process [5].

According to Neustaedter C. et al, families often have a calendar that acts as a *shared family information resource* where the calendar is visible to all family members (whether they check it or not). The awareness provided by the calendar is used by family members to coordinate activities. Based on their thorough analysis, they clearly articulate a need for an alternative calendar design that more adequately meets the needs of families [6].

The study conducted by Toscano and Zappala shows that both remote work engagement and living with minor children play a key role in the relationship between overall job performance and remote work productivity for employees. This study provides some initial results for HR practitioners and professionals which, although observed in a pandemic situation, are helpful even when the pandemic is over [7].

User Research

We explored the broader landscape of remote work by conducting a survey that included a WHO-5 questionnaire to calculate the well-being index [8]. We received 60 responses from all over the world. Along with contextual details about respondents' remote work situations, we gained insights into how people are dealing with the new normal of remote work.

We identified five different user groups from the respondents: parents/caregivers, students, employers/employees, teachers and new graduates. We set the primary focus on parents/caregivers because it was evident that their situation with remote work is more challenging compared to the other groups, especially being young parents who are working from home with 1 to 5-year-old children struggling to strike a balance between work, childcare and self-care.

Also, we interviewed seven remote working professionals from the USA, India, Ireland and Hungary to understand their experience and perspectives with remote work. Two of the seven interview participants work in the Human Resources department so they represented the organization's perspective as a whole and shared the business insights. We gathered data about their work schedule and major challenges of their work- life balance and mental well-being.

Insights

Although employees responded with the positive effects of remote work such as lack of commute, comfort of home, more flexibility, more family time, etc., we found some common drawbacks: 62% of the remote workers said their work and personal lives don't have clear boundaries 55% of the respondents had a poor well-being index based on the WHO-5 questionnaire meaning that they need to test for depression 70% of the people still prefer working remotely in some capacity after the pandemic.

We divided qualitative insights from interviews into three categories:

Well-being

- Parents do not feel in control of their day
- They expressed the need for an enforced schedule and routines to ensure they get all tasks done efficiently
- Parents struggle with taking breaks with remote work. They feel like they are always "ON"
- They experience longer workdays and struggle to switch off from work
- Increased stress, anxiety, and burnout if they fail to manage work-life balance
- Employers are also trying to improve their employees' job satisfaction with the new normal the pandemic has set.

Individual Data

- There's a significant increase in online activities and screen time in a remote work environment
- Employees are familiar with project management tools and extensively use calendars and note-taking apps to create lists manually
- Parents are willing to contribute individual data if they know the purpose and data tracking process clearly
- Parents are willing to provide sensor-based tracking of personal data to devices such as Fitbit or Apple Watch but expect a tangible outcome for the data contributed

Collaboration

- Parents find patterns in their kids' behavior and routine and have to adjust their work times accordingly
- They share childcare and household responsibilities with their partners, daycare workers and nannies through the paper family calendar

Citation: Shriyash Shete (2022) ReMotive: Enhancing Digital Calendar Experience with AI. Journal of Artificial Intelligence & Cloud Computing. SRC/JAICC-188. DOI: doi.org/10.47363/JAICC/2022(1)173

Leveraging the Power of AI/ML

As shown in Figure 1, we enlisted the data opportunities associated with work conditions and mapped out the data flow for the proposed design. We realized that making the calendar smarter and automated and creating a seamless work schedule experience requires the fuel of data. Also, by using the power of AI/ML, sensor-based health data from activity trackers, weather data and work schedule data, we envision the calendar to be more adaptive to the user's context in the long run.

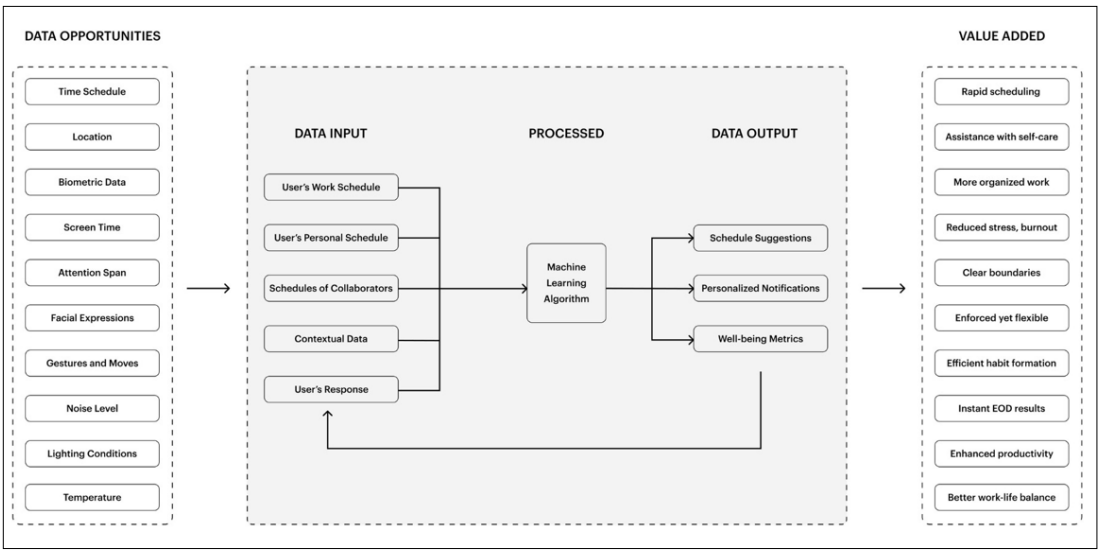

Figure 1: AI/ML Data Model

Remotive Design Concept

Data Input

The calendar serves as an output modality (e.g. daily suggestions) as well as an input modality (e.g. contextual data). As a calendar provides a representation of a worker's schedule and routines, it can offer rich contextual data. This contextual data, like the amount of meetings in a day, is important for the timing and personalizing of an intervention. However, in most interventions obtaining this type of data requires time and effort of the user. By automatically taking existing appointments and blocked time slots into account, ReMotive aims to limit this additional effort and maximize the convenient timing of suggestions. Alternatively, remote working parents can contribute contextual data regarding their work location, companions around them, break preferences and well-being reminders. As suggested by Neustaedter C. et al, they can also share the schedule with their family members and nannies as shown in Figure 2 [6].

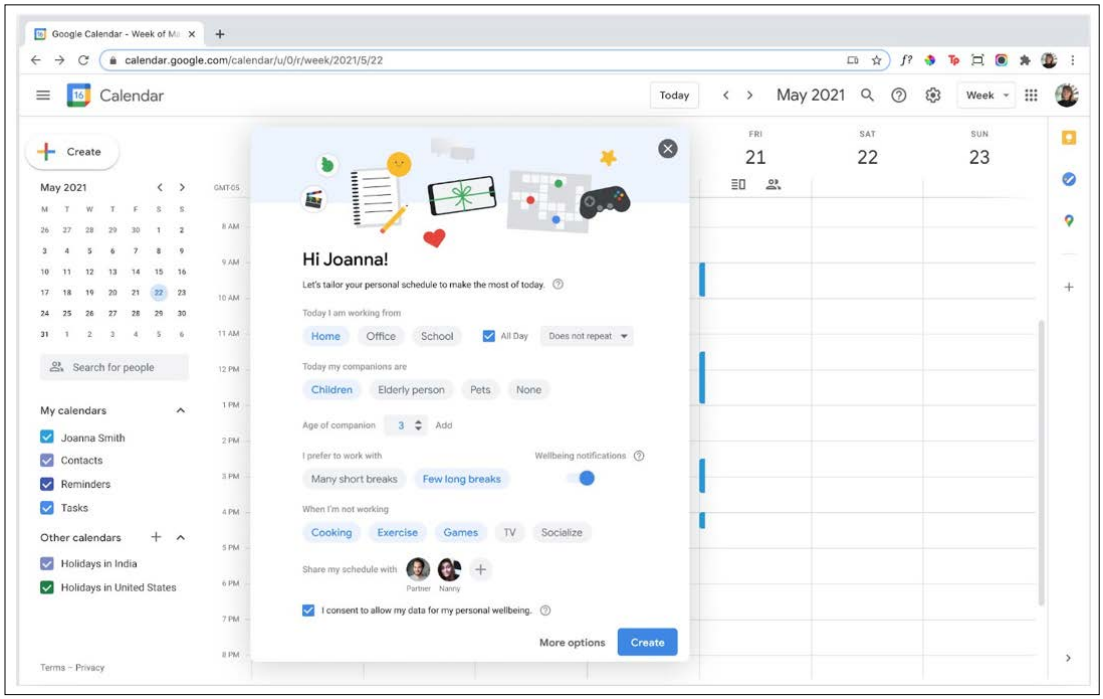

Figure 2: Data Input in Google Calendar

Guided Breaks with Well-Being Notifications

In line with the Exploratory Factors Analysis and DBCI approach, Remotive aims to let users interact with a diverse set of well-being suggestions in the form of calendar notifications during their workday [1,2]. Remotive aims to tailor the selection and delivery of these suggestions through the use of various data inputs.

This AI / ML algorithm would leverage user preferences, biometric data, screen time, physical activity data, work schedule and weather data to recommend guided micro-breaks and science-based exercise reminders to motivate remote working parents. Besides the usual meeting reminders, well-being notifications can also engage parents by providing interesting prompts and fun facts. (see Figure 3).

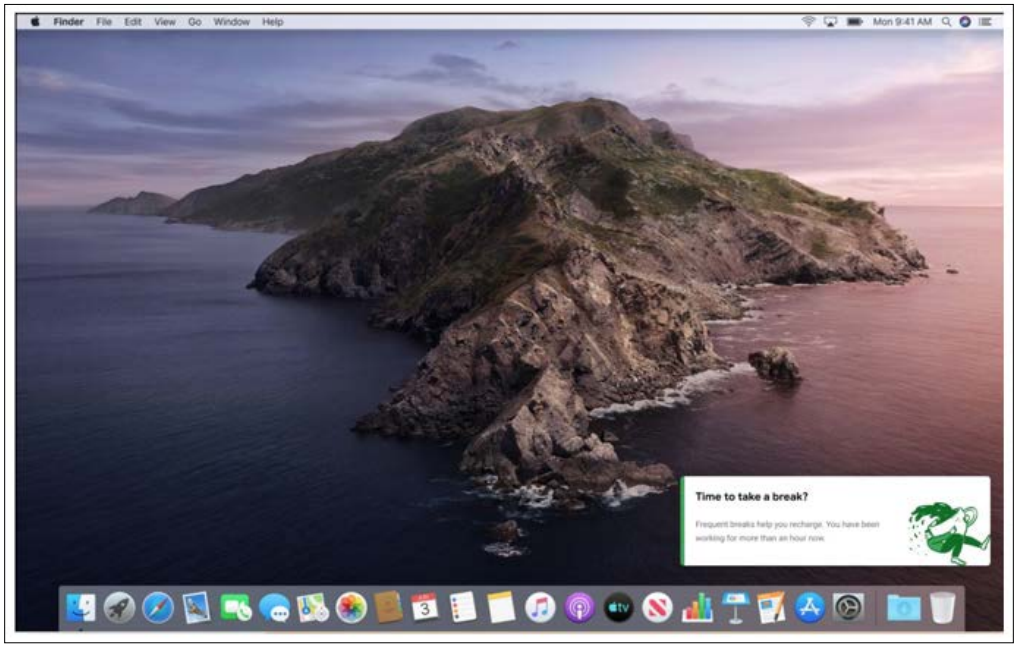

Figure 3: Well-Being Notifications

End of the Day Summary

Leveraging the intent behind the Google Goals feature and the feedback approach suggested by Huang et. al. we propose showcasing a summary with useful metrics to users at the end of the workday [4,5]. This feature can act as feedback as well as a reward to motivate better user behavior. Users can review their accomplishments, feel content and switch off from work with a clear intervention that acts as a boundary and marks the end of the work for remote workers (See Figure 4).

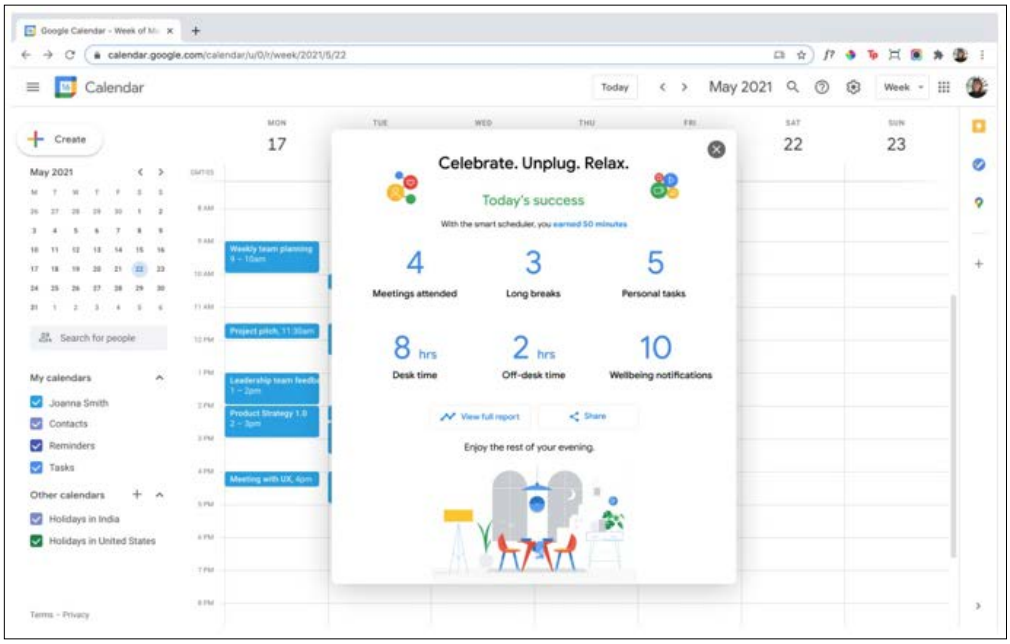

Figure 4: End of the Day Summary

Dashboard for HR Professionals

In the long run, we envision this feature being deployed at the level of organization. In such cases, the Calendar Insights enterprise dashboard will provide employers with an anonymized view of the engagement and well-being of employees across all business units. It will enable employers to get qualitative insights and make well-informed decisions about the future of work and employee retention policies (See Figure 5).

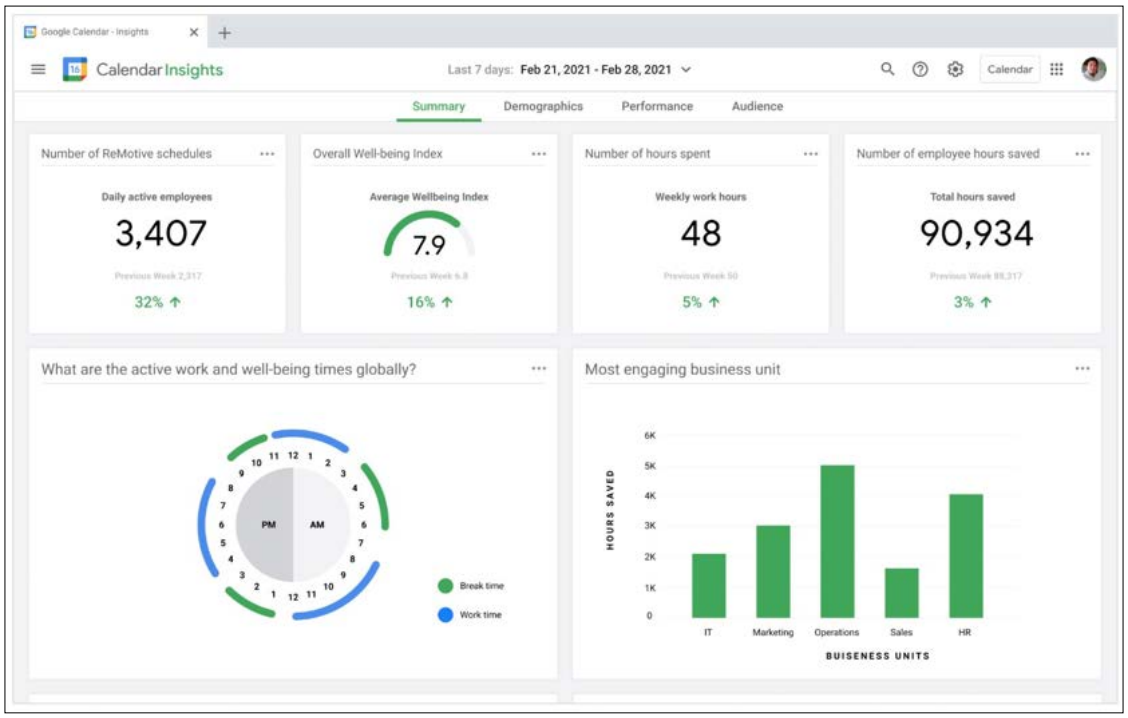

Figure 5: Dashboard for Employers

Future Work

Looking ahead, several areas warrant further investigation to deepen our understanding and support of remote work dynamics:

Longitudinal Studies

Future research should include longitudinal studies to assess the long-term impacts of remote work on employees' productivity, well-being, and work-life balance.

Diverse Demographics

Expanding research to include a wider range of demographics, such as single parents, multi- generational households, or different cultural contexts, would provide a more comprehensive understanding of remote work's impact.

Technology Adoption and Efficacy

Investigating the adoption rate and efficacy of tools like 'ReMotive' in diverse work environments would provide valuable insights into their practical utility and areas for improvement.

Organizational Policies and Practices

Further studies could explore how organizations can implement and optimize remote and hybrid work policies to support employees, especially those with caregiving responsibilities.

Mental Health and Well-being

As remote work continues to evolve, research focusing on mental health and strategies to combat issues like isolation, burnout, and digital fatigue is critical.

HR and Leadership Strategies

Additional research could focus on how HR and leadership can adapt their strategies to better support remote employees, ensuring a healthy, productive, and engaged workforce. By continuing to explore these areas, we can better understand and support the evolving needs of the remote workforce, ensuring that the shift to remote work is beneficial and sustainable for all.

Conclusion

This paper has explored the evolving landscape of remote work, with a special focus on the challenges and needs of working parents. The shift to remote work, accelerated by the COVID-19 pandemic, has brought to light various aspects of work-life balance, productivity, and well-being in a home environment. Our research, through surveys and interviews, as revealed the complexities faced by remote working parents, particularly in managing their well-being while balancing professional and childcare responsibilities.

The introduction of the 'Remotive' tool, an AI/ML-powered application integrated into Google Calendar, proposes an innovative solution to these challenges. By offering tailored well- being suggestions and health-focused reminders, 'Remotive' aims to enhance the digital well-being of remote working parents, ensuring a more balanced and effective work-from- home experience. This tool exemplifies how technology can be leveraged to address specific needs in remote work settings. The insights and solutions presented in this paper contribute to the broader discourse on remote work and its impact on family life. They highlight the need for more nuanced and supportive remote work policies, especially for those juggling parenting alongside their professional roles.

References

1. Borse V, Mishra W, Loudon G (2022) Sorry you're on mute: Towards determining the factors that impact the productivity and job motivation of remote workers and a conceptual framework. Proc. 12th Indian Conf. Human-Computer Interaction (IndiaHCI '21)*, New York, NY, USA: Assoc Comput 47-58.
2. Cao H, Lee CJ, Iqbal S, Czerwinski M, Wong PNY, et al. (2021) Large Scale Analysis of Multitasking Behavior During Remote Meetings. Proc 2021 CHI Conf Human Factors in Computing Systems (CHI '21), New York, NY, USA: Assoc Comput Mach 1-13.
3. Damen I, van den Heuvel R, Brankaert R, Vos S (2021) Advancing Digital Behavior Change Interventions by Exploring a Calendar-Based Suggestion System. Proc 32nd Eur Conf Cognitive Ergonomics (ECCE '21), New York, NY, USA: Assoc Comput 1-7.
4. Find Time for Your Goals with Google Calendar (2021) Google https://blog.google/products/calendar/find-time-goals- google-calendar/.
5. Huang D, Tory M, Bartram L (2016) A Field Study of On-Calendar Visualizations. Proc Graphics Interface 2016 (GI 2016), Victoria, British Columbia, Canada 13-20.
6. Neustaedter C, Brush AJB, Greenberg S (2009) The calendar is crucial: Coordination and awareness through the family calendar. ACM Trans Comput-Hum Interact 16: 1-48
7. Toscano F, Zappala` S (2021) Overall job performance, remote work engagement, living with children, and remote work productivity during the COVID-19 pandemic: A mediated moderation model. Eur J Psychol Open 80: 133-142.
8. WHO-5 Questionnaires (2021) Psykiatri Region H https://www.psykiatri-regionh.dk/who-5/who-5- questionnaires/Pages/default.aspx.