Time for Break: Understanding Information Workers’ Sedentary Behavior Through a Break Prompting System

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What is a typical day for information workers like?
• American employees spend more than 8 hours on working every day.

• Uninterrupted sedentary behavior takes up more than 80% of work hours.

Prolonged sedentary behavior is detrimental to human health.

“Sitting has become the smoking of our generation.”
Even regular physical activities cannot fully compensate for the harm caused by prolonged sedentary behavior.

[Bankoski et al., 2011; Biswas et al., 2015]
Information Workers: Challenge to Break Prolonged Sedentary

Keep working or Take breaks
“Breaks” in Workplace
“Moving Breaks” in Our Context
We aim to understand information workers’ intention & practice in relation to “moving breaks” in workplace settings.
Research Questions
• RQ1: Information workers’ intended work & break duration and their actual practices

• RQ2: Reasons and contexts around information workers’ break-taking intentions & practices

• RQ3: The habit strength and self-regulation relate to information workers’ break-taking intentions & practices
Habit Strength & Self-Regulation: Why they matter?

**Habit strength:** the automaticity level of the target behavior

e.g., “taking moving breaks during work hour is something I do without having to consciously remember.”

**Self-regulation:** the ability to develop, implement, and keep a plan of performing the target behavior

e.g., “I have trouble making up my mind about taking moving breaks during work hours.”

[Verplanken & Orbell, 2003; Brown, 1999]
Time for Break

A desktop-based prompting system as a **data collection tool**, to capture people’s **situated responses** on their break-taking intentions & behavior in an exploratory study.
Time for Break

Set up work duration

Response latency
Respond to the prompt ("yes" or "no")

The reason for not taking a break

Actual break duration
Intended break duration
Time for Break

Design rationale as a data collection tool

• Autonomy: self-set work duration, freedom to take a break or not

• Minimal influence on current behavior: no feedback, neutral wording

• Minimal distraction: easy to dismiss, avoid prompting during typing
Study Procedure

Participants: 25 (18 female) information workers (age range: 24 to 60), spent > 6 hours sitting with computers per weekday.

Pre-study Activities
- Questionnaire (habit strength, self-regulation)
- Setup (Installation, study Instruction)

Field deployment Study (3 weeks)
Participants set work duration on Time for break and receive prompts every day

Post-study Activities
- Questionnaire (habit strength, self-regulation)
- Semi-structured interview (optional)
Data Analysis

Quantitative Data
linear & logistic multilevel modeling:
  • Everyday work duration
  • Response & response latency
  • Intended & actual break duration

paired t-test:
  • Pre & post-study habit strength & self-regulation

Qualitative Data
Bottom-up thematic analysis:
  • Motivation to take moving breaks
  • Reasons for not taking a break
  • Interview scripts (context around break-taking intentions & behavior)
Result Highlights
General Usage

374 entries of work duration settings

Total prompts: 1599

“Yes” responses: 642 (40%)

“No” responses: 542 (34%)

Ignored prompts: 415 (26%)
Work Duration Preferences

- **Work duration** was consistent at within-subjects level (ICC = .7).
- 13 participants ended up setting **60 minutes** as their work duration.

  “I pushed it to 60 [minutes], and that generally speaking became manageable.” (P11)

  “It’s easier to keep track on it by hour, kind of in my head without tracking the icon.” (P19)

ICC: intra-class correlation
Break-taking Intentions & Habit Strength

• Participants with stronger pre-study habit strength responded “yes” more often ($OR = 1.30$, $p = .029$).

• Participants with consistent intended break duration increased their post-study habit strength more ($b = -1.34$, $p = .04$).

OR: odds ratio; b: regression coefficient
Intended & Actual Break Duration

Longer actual break duration than intended break duration due to socializing.

“It’s easy to get caught in the hallway and talk to somebody.” (P9)

“I'm going to take a walk to make it a productive walk out of the first floor ask questions, and come back.” (P11)
Why Not Taking a Break (N = 525)?

- Busy working (40.6%)
- Meeting/class (18.9%)
- Coming back from a break (15.2%)
- Close to finishing something (8.8%)
- Looking for upcoming breaks (7.9%)
- Engaged in a conversation (3.7%)
- Engaged in screen-based activity (2.5%)
- Having lunch/dinner (2.4%)
The Gap Between Motivation & Actual Practice

Pre-study Survey: Why do you want to take moving breaks?
Lower stress, physiological needs, get refreshed from work, stay healthy

Post-study Interview: what were the cases you actually took moving breaks?
“Probably only when I had to go to the bathroom, grab coffee [or] lunch” (P20).
“Probably get up and go to the restroom.” (P16)
Increased self-regulation in taking moving breaks \((t(24) = -3.64, p = .010)\)

“Like 10 minutes before it’s coming up, I’d wrap up work and tried to get it done faster, so I’d catch those breaks.” (P6)

“I learned that I don’t get up enough. I need to do better, standing up and walking away“ (P10).
Design Implications
Considering Long-term Health As an Important Design Value

Long-term health vs. Near-term productivity
Support Creating Work & Break Rhythm

Consistent work schedule

Regular break routine
Promote Moving Break in Workplaces

- Stand-up meeting
- Breaks between back-to-back meetings
Future Work

Extend Time For Break into an intervention

• Accurately measure sitting & standing duration
• Incorporate productivity monitoring
• Provide effective feedback
• Identify appropriate prompting moments
Thank you!

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Photos from Google Image
Appendix: Time for Break

Diagram:
- **Take a break?**
  - Yes: For how long? $i$ minutes
  - No: Why not?
- Break prompt disappears after 2 mins
- Break is over
- Work mode begins
- First use of the day? (Yes)
  - Work duration? $w$ minutes
- Unlock the machine
- Lock the machine
- Machine not in use

Interactions:
- $10$ secs
- $i$ mins
- $2$ mins
- Interact with the machine

$w$ mins
Appendix: Time for Break

Please set how long you want to work (in minutes) before being reminded that it is time for a break. Then, check that your internet connection is working and click OK.

Time for Break allows people to set their preferred work duration, and prompts them to take moving breaks.
## Appendix: Descriptive Statistics

<table>
<thead>
<tr>
<th>Measures</th>
<th>ICC</th>
<th>Mean</th>
<th>SD</th>
<th>Min (raw)</th>
<th>Max (raw)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work duration</td>
<td>.70</td>
<td>69 mins</td>
<td>29 mins</td>
<td>20 mins</td>
<td>120 mins</td>
</tr>
<tr>
<td>Response latency</td>
<td>.10</td>
<td>23.47 secs</td>
<td>27.91 secs</td>
<td>3 secs</td>
<td>120 secs</td>
</tr>
<tr>
<td>Intended break duration</td>
<td>.13</td>
<td>4.42 mins</td>
<td>5.42 mins</td>
<td>1 min</td>
<td>60 mins</td>
</tr>
<tr>
<td>Actual break duration</td>
<td>.09</td>
<td>5.92 mins</td>
<td>11.88 mins</td>
<td>1 min</td>
<td>138 mins</td>
</tr>
</tbody>
</table>

ICC: intra-class correlation
Appendix: Habit Strength Measures

Please rate the following statements about how you take standing or moving breaks throughout the day during work hours.

"Taking breaks is something…"

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Somewhat disagree</th>
<th>Neither agree nor Disagree</th>
<th>Somewhat agree</th>
<th>Agree</th>
<th>Strongly agree</th>
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<tbody>
<tr>
<td>I do frequently.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I do automatically.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I do without having to consciously remember.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I start doing before realizing I’m doing it.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
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[Verplanken & Orbell, 2003]
Appendix: Self-Regulation Measures

Please rate the following items based on your experience on taking standing or moving breaks during work hours.

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Somewhat disagree</th>
<th>Neither agree nor Disagree</th>
<th>Somewhat agree</th>
<th>Agree</th>
<th>Strongly agree</th>
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</thead>
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<tr>
<td>My break-taking behaviors during work hours is not that different from other people's.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I doubt I can take more moving breaks than I do now during work hours even if I want to.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
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[Brown et al., 1999]
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<td>I have trouble making up my mind about taking moving breaks during work hours.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I get easily distracted from my plans of taking moving breaks during work hours.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
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[Brown et al., 1999]
## Appendix: Self-Regulation Measures

Please rate the following items based on your experience on taking standing or moving breaks during work hours.

<table>
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<th>I am able to accomplish goals I set for myself to take more moving breaks during work hours.</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Somewhat disagree</th>
<th>Neither agree nor Disagree</th>
<th>Somewhat agree</th>
<th>Agree</th>
<th>Strongly agree</th>
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<td></td>
<td>o</td>
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<td></td>
<td>o</td>
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<tr>
<th>I don't seem to learn from my previous experience in break prolonged sedentary behavior during work hours.</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Somewhat disagree</th>
<th>Neither agree nor Disagree</th>
<th>Somewhat agree</th>
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[Brown et al., 1999]