HOW PHONE NOTIFICATIONS IMPACT STUDENTS' TYPING PERFORMANCE

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RESEARCH QUESTION & RATIONALE

Research Topic

The impact of auditory smartphone notifications on sustained attention and typing performance.

Research Question

Do auditory notification sounds impair typing speed and accuracy during focused tasks?

Hypothesis

If participants are exposed to auditory notification sounds during typing tasks, then their typing speed and accuracy will significantly decrease due to attentional capture and increased cognitive load.

Rationale

Smartphones are constantly present in students' academic environments. Although notifications are often dismissed as minor distractions, cognitive science suggests they may trigger involuntary attentional shifts that reduce performance. This study investigates whether these everyday interruptions create a measurable cognitive cost.

VARIABLES & EXPERIMENTAL SETUP

Controlled Variables

- Consistent typing task format
- Fixed time duration for each trial
- Same device
- Controlled testing environment

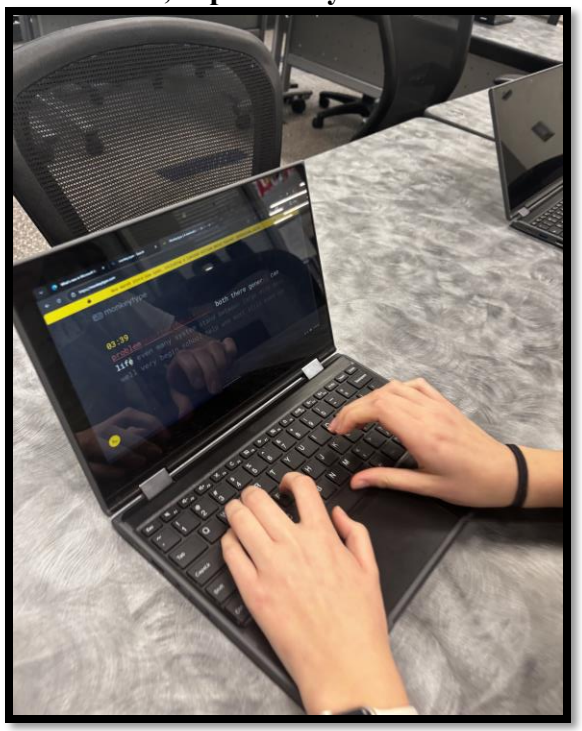
Experimental Variable

- Presence of auditory smartphone notifications.

Dependent Variables

- Typing speed (WPM)
- Accuracy (%)

Photo of the controlled testing environment and standardized typing task format, captured by Beren Uluc



Controlled testing environment

This design isolates the effect of auditory notifications by controlling external variables and using a within-subjects approach to reduce individual differences.

EXPERIMENTAL PROCEDURE & DATA COLLECTION

Participants (n = 34)
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Environment (quiet, controlled conference room)
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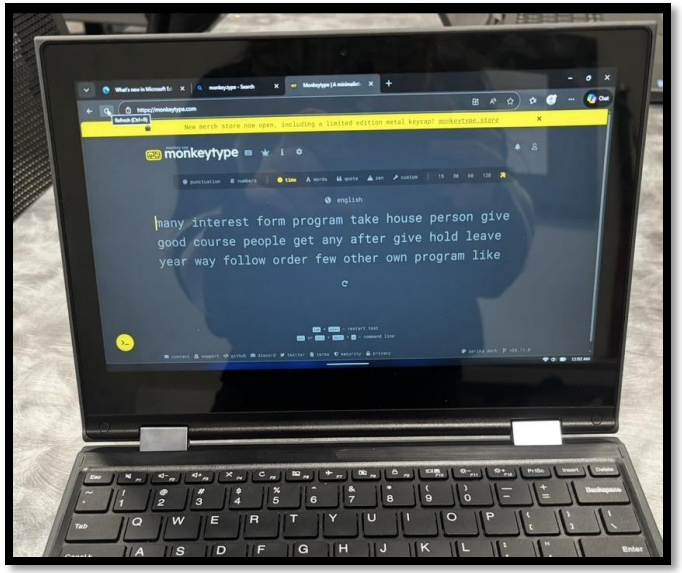
Typing Task (Monkeytype.com - 3 minutes 45 seconds)
↓
Conditions (Counterbalanced)
Silent ↔ Notification
↓
Notification (3 sounds at predetermined intervals)
↓
Data Collected
Speed (WPM) & Accuracy (%)

Photos of the standardized typing task format, captured by Beren Uluc



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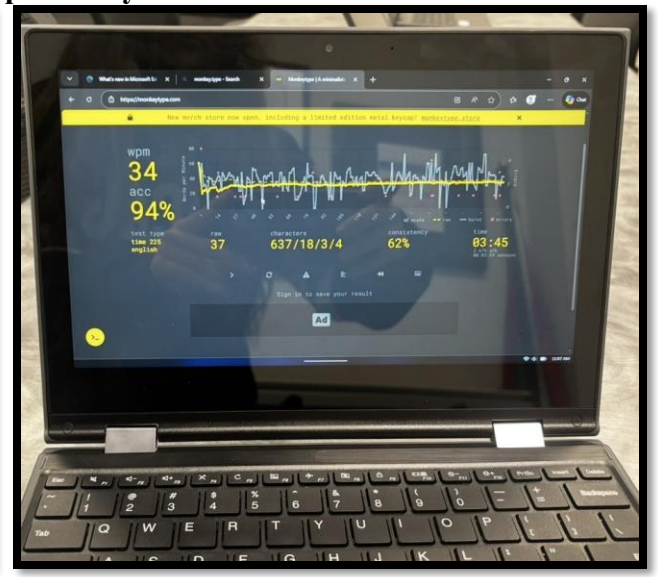
Pre-task interface



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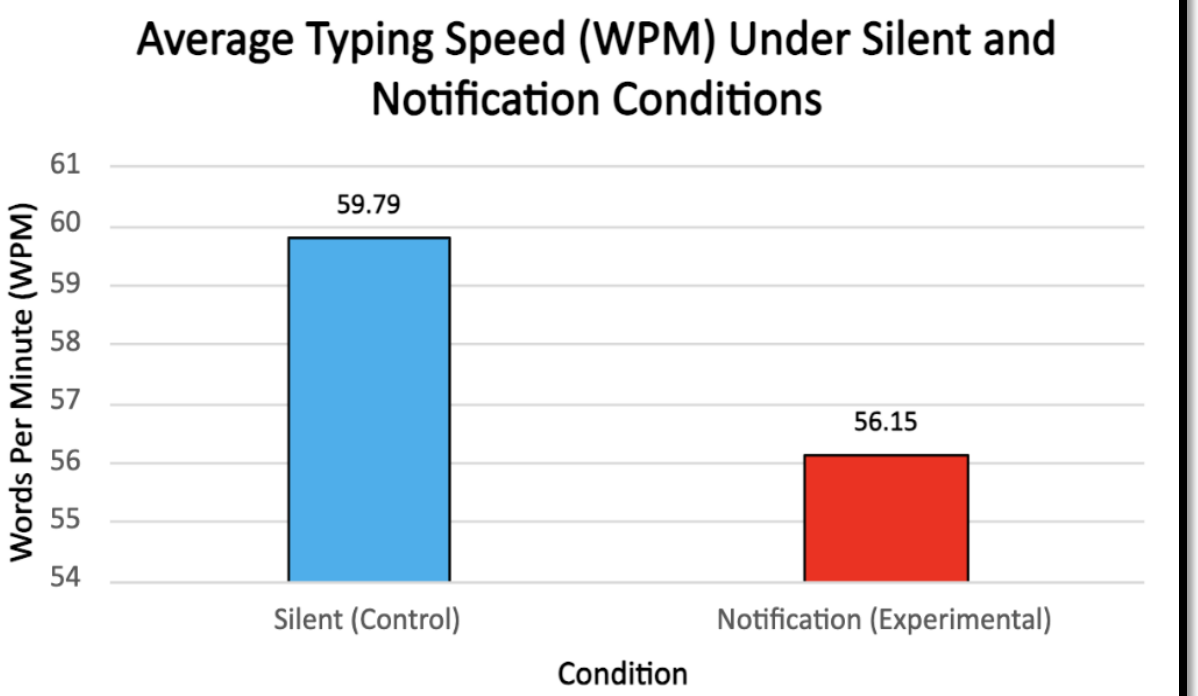
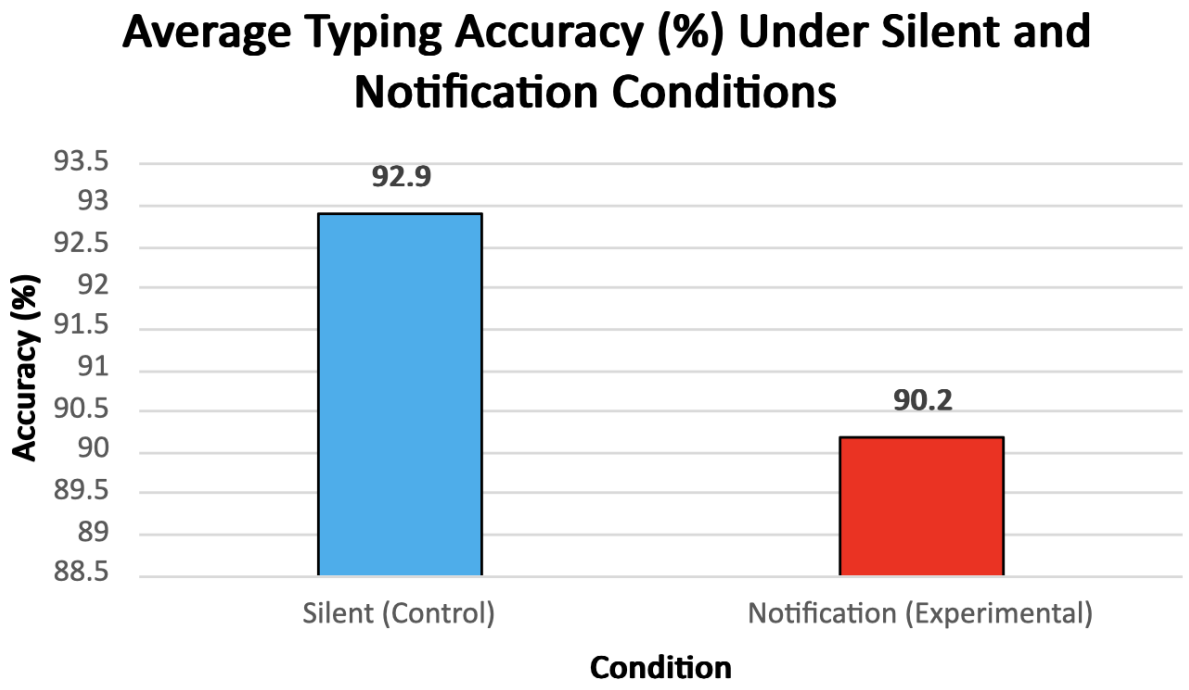
Post-task results

These images show the standardized typing interface before the task and the performance output after completion, including speed (words per minute) and accuracy (percentage). The results were collected into a spreadsheet.

DATA & RESULTS



Data captured and graphed by Beren Uluc, using Microsoft Excel.



Data captured and graphed by Beren Uluc, using Microsoft Excel.

Participants showed a clear and consistent decrease in typing performance under notification conditions compared to silent conditions. On average, typing speed decreased from 59.79 WPM to 56.15 WPM, while accuracy dropped from 92.9% to 90.2%

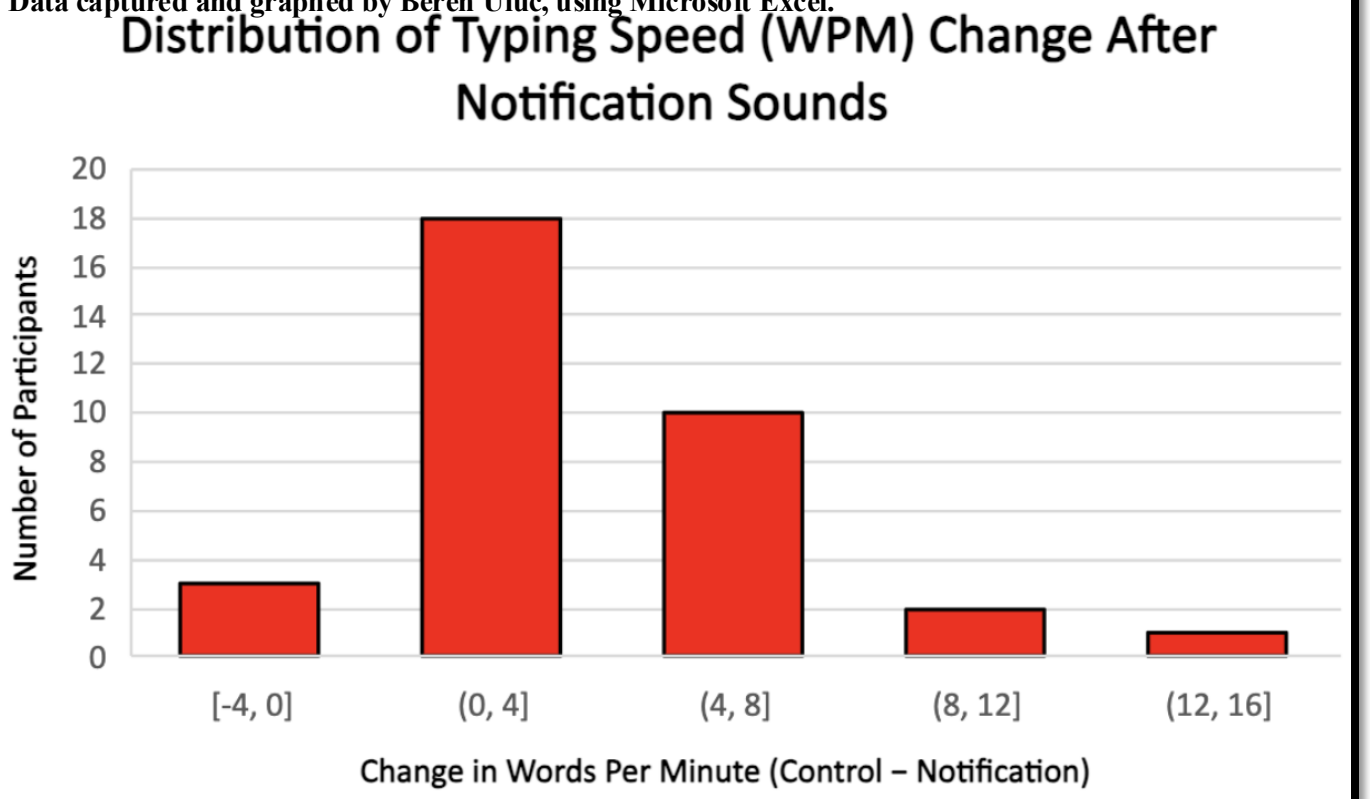
This pattern indicates that auditory notifications negatively affect both speed and accuracy, suggesting a measurable disruption in sustained attention during typing tasks.

DATA & RESULTS

Observed pattern

Most participants experienced a decrease in typing speed when exposed to notification sounds compared to silent conditions. The distribution of WPM changes shows that the majority of participants had negative differences (control > notification), indicating that performance declined when auditory interruptions were present.

Data captured and graphed by Beren Uluc, using Microsoft Excel.



Explanation

This pattern suggests that auditory notifications trigger bottom-up attentional capture, interrupting focus during the typing task. As a result, participants experience a switching cost, in which time and mental effort are required to refocus, leading to reduced performance.

STATISTICAL ANALYSIS & VALIDITY

Statistical Evidence

A paired-samples t-test showed a significant difference in typing speed between conditions ($t(33) = 5.51$, $p < 0.001$).

The large effect size (Cohen's $d \approx 0.95$) indicates a strong and consistent impact across participants.

Consistency of Results

Although the numerical differences appear small, the consistent decline across participants, along with a large effect size, indicates a meaningful real-world impact.

The distribution of WPM changes is primarily negative, supporting a consistent pattern rather than random variation.

Validity of Design

A within-subjects, counterbalanced design controlled for individual differences and order effects.

All testing conditions (environment, device, timing) were standardized to ensure fair comparison.

Overall, these factors support that the observed effects are reliable and not due to chance.

CONCLUSIONS & FURTHER DIRECTIONS

Cognitive Mechanism

Auditory notifications act as salient stimuli, triggering bottom-up attention to capture. This interrupts top-down control, regulated by the prefrontal cortex, which is responsible for goal-directed tasks and focus. As a result, a switching cost occurs, reducing efficiency and increasing cognitive load, supporting the results of this study.

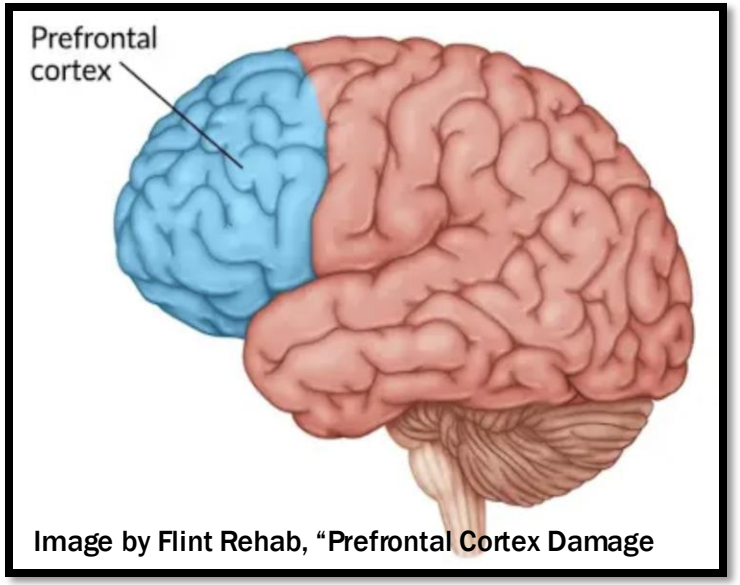


Image by Flint Rehab, "Prefrontal Cortex Damage

ADHD and Variability in Response to Auditory Distraction

Future research could examine whether individuals with ADHD show greater variability in response to auditory distractions.

Previous research suggests that differences in prefrontal cortex structure and function may influence attention regulation.

This could help determine whether the effects observed in this study remain consistent across individuals or vary based on attentional differences.

CONCLUSIONS & FURTHER DIRECTIONS

Interpretation in Cognitive Context

The results show that auditory notifications significantly reduce typing performance, supporting the hypothesis that external distractions impair sustained attention.

This aligns with cognitive science concepts such as attentional capture and switching cost, where interruptions disrupt focus and reduce efficiency.

Real-world Impact

These findings suggest that frequent notification sounds can reduce focus and productivity in academic settings. Minimizing auditory distractions may improve sustained attention and task efficiency.

Future Research Directions

Future studies could increase sample size and include broader age groups to examine whether these effects remain consistent across populations. Additionally, testing real phone notifications or visual alerts could improve ecological validity.

Further research could explore whether background sounds, such as brown noise, reduce the effects of notifications by altering attentional prioritization, helping identify when notifications are filtered.

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