Media Multitasking and Cognitive Flexibility: An Investigation of a Non-linear Correlation

Manuel Althaler 12032737

Faculty of Psychology

University of Vienna

200233 SE Bachelorarbeit (2024S)

Bence Szaszkó BSc MA MSc

Abstract

Research on media multitasking is troubled by ambiguous results, often comparing extreme groups of media multitasking behavior. This study investigated a potential non-linear correlation by using all data from the short media multitasking measure and the Modified Card Sorting Test to gain a comprehensive understanding of the relationship. Anticipating an inverse U-shaped correlation, the study employed a novel approach by using polynomial regression. A total of 161 participants were tested online via survey exchange sites. By comprehensively exploring the impact of media multitasking on cognitive flexibility, this study aimed to address various conflicting aspects of the current literature. However, no significant relationships were found, and underlying limitations were discussed to guide future research in this area.

Keywords: media-multitasking, cognitive flexibility, polynomial regression, MMM-S, Modified Card Sorting Test

Media Multitasking and Cognitive Flexibility: An Investigation of a Non-linear Correlation

With the increased use of media technology and media multitasking (MM), there is a growing interest in the influence on our cognitions and behaviors (Carrier et al., 2009). One of the first studies that researched MM as a trait was conducted by Ophir et al. (2009). In their paper, MM was defined as the simultaneous consumption of different streams of content through different forms of media. The present work examines media multitasking as defined by the Media Multitasking Index, a questionnaire devised by Ophir and colleagues in the course of their work. This questionnaire categorizes individuals into Heavy (HMM), Light (LMM), and Intermediate Media Multitasking Users (IMM) based on standard deviations from the mean of the current sample. Future studies also used oter cut-off methods based on either quantiles or percentiles (Van Der Schuur et al., 2015). Further explanations of the MMI will be provided in the methods section. A review of the effects of media multitasking on youth by Van Der Schuur et al. (2015) found that MM was primarily investigated regarding three different aspects: cognitive control abilities, academic performance, and socioemotional function. In their review, the authors formulated two opposing hypotheses regarding the effects of MM on cognitive control: the scattered attention hypothesis and the trained attention hypothesis. The arguments supporting each one can be traced back to the discussion presented by Ophir et al. (2009). According to the scattered attention hypothesis, regular media multitasking leads to not only a "breadth-bias" toward media consumption but also a breadth-bias in cognitive control, which makes them susceptible to distractors. Conversely, the trained attention hypothesis argues that the ability to switch between tasks and focus on relevant stimuli can be developed through training. Since then, there has been evidence for either the scattered attention hypotheses (Kong et al., 2023; Ophir et al., 2009; Uncapher & Wagner, 2018; Van Der Schuur et al., 2015; Yap & Lim, 2013) or the trained attention hypothesis (Alzahabi & Becker, 2013; Ophir et al., 2009; Van Der Schuur et al., 2015). However, not all studies

have found significant relationships; for instance, Edwards and Shin (2017) and Seddon et al. (2018) reported no significant effects of media multitasking on cognitive control.

Methods

We report how we determined our sample size, all data exclusions (if any), all manipulations, and all measures in the study.

Participants

Material

Procedure

Data analysis

We used R (Version 4.4.1; R Core Team, 2024) and the R-packages *papaja* (Version 0.1.2.9000; Aust & Barth, 2023), and *tinylabels* (Version 0.2.4; Barth, 2023) for all our analyses.

Results

Discussion

References

Alzahabi, R., & Becker, M. W. (2013). The association between media multitasking, task-switching, and dual-task performance. *Journal of Experimental Psychology: Human Perception and Performance*, *39*(5), 1485–1495. https://doi.org/10.1037/a0031208

Aust, F., & Barth, M. (2023). *papaja: Prepare reproducible APA journal articles with R Markdown* [Manual].

Barth, M. (2023). *tinylabels: Lightweight variable labels* [Manual].

Carrier, L. M., Cheever, N. A., Rosen, L. D., Benitez, S., & Chang, J. (2009). Multitasking across generations: Multitasking choices and difficulty ratings in three generations of Americans. *Computers in Human Behavior*, *25*(2), 483–489. https://doi.org/10.1016/j.chb.2008.10.012

Edwards, K. S., & Shin, M. (2017). Media multitasking and implicit learning. *Attention, Perception, & Psychophysics*, *79*(5), 1535–1549. https://doi.org/10.3758/s13414-017-1319-4

Kong, F., Meng, S., Deng, H., Wang, M., & Sun, X. (2023). Cognitive Control in Adolescents and Young Adults with Media Multitasking Experience: A Three-Level Meta-analysis. *Educational Psychology Review*, *35*(1), 22. https://doi.org/10.1007/s10648-023-09746-0

Ophir, E., Nass, C., & Wagner, A. D. (2009). Cognitive control in media multitaskers. *Proceedings of the National Academy of Sciences*, *106*(37), 15583–15587. https://doi.org/10.1073/pnas.0903620106

R Core Team. (2024). *R: A language and environment for statistical computing* [Manual]. R Foundation for Statistical Computing.

Seddon, A. L., Law, A. S., Adams, A.-M., & Simmons, F. R. (2018). Exploring the relationship between executive functions and self-reported media-multitasking in young adults. *Journal of Cognitive Psychology*, *30*(7), 728–742.

https://doi.org/10.1080/20445911.2018.1525387

Uncapher, M. R., & Wagner, A. D. (2018). Minds and brains of media multitaskers: Current findings and future directions. *Proceedings of the National Academy of Sciences*, *115*(40), 9889–9896. https://doi.org/10.1073/pnas.1611612115

Van Der Schuur, W. A., Baumgartner, S. E., Sumter, S. R., & Valkenburg, P. M. (2015). The consequences of media multitasking for youth: A review. *Computers in Human Behavior*, *53*, 204–215. https://doi.org/10.1016/j.chb.2015.06.035

Yap, J. Y., & Lim, S. W. H. (2013). Media multitasking predicts unitary versus splitting visual focal attention. *Journal of Cognitive Psychology*, *25*(7), 889–902. https://doi.org/10.1080/20445911.2013.835315