Do you ever find yourself watching TV and scrolling through your phone at the same time or writing an email while listening to music? Well, this is known as media multitasking formally defined as a form of multitasking involving two or more unrelated tasks with at least one media-based application.

Within the past decade the exposure and use of digital media has drastically increased, and it’s been found that adolescents engage with media more than any other age group with an average of 7.5 hours every day with 35% of this time spent multitasking. On top of this, there has been a 50-70% increase seen in this screen time due to the COVID-19 lockdowns.

Often this engagement with media multitasking has been correlated and linked to having detrimental effects to cognitive processes, specifically executive functions which are critical for everyday functioning allowing people to interact, solve problems and get tasks done.

Ophir (2009) was an influential study within the literature who developed the Media Multitasking Questionnaire which distinguishes between heavy and light multitaskers and found a vast decrease in cognitive performance with heavy multitaskers across a range of task-switching paradigms highlighting how they were negatively affected by distractors. Further findings such as Baumgartner (2014) also found that HMMs underperform on tests relating to working memory, sustained attention and inhibitory control.

However, a research base regarding positive benefits of multitasking has also begun to emerge. A study by Alzahabi & Becker (2013) for example found that frequent multitaskers were not worse at dual-task performance and were actually better at task switching.

Within the literature media multitasking has been a contested concept with inconsistent definitions and juxtaposing theories such as Poplawska (2021) arguing that it’s purely a matter of subjective perception. Given the large and increasing amount of time spent with media as well as the concerning findings regarding detrimental effects, it’s critical to determine the impact that this increase in screen time had on multitasking and executive functioning.

Based off the findings that screen time is associated with impacting attention and impulsivity by Neophytou (2019) we can hypothesise that this increase in media use may have exacerbated these negative effects while on the other hand if we accept the findings from Alazhabi and Becker (2013) we could hypothesis that this increase in screen time may have led to a better generation of multitaskers and therefore, had positive effects.

This was explored, and three aspects of executive functioning were analysed: working memory (the way information is stored in our mind), cognitive flexibility (the ability to adapt your thinking) and inhibitory control (the ability to control impulses) addressing the research question: To what extent have the Melbourne COVID-related lockdowns influenced the relationship between media multitasking and executive functioning in Victorian adolescents?

To answer this, the study adapted the MMT questionnaire with additional lockdown related questions then three tasks assessing executive functioning to not only determine the extent of multitasking but also analyse and compare cognitive performance. Alterations were made to the original questionnaire to better reflect the behaviours of the participants and ensure that the results collected were accurate and relevant to the experimental cohort. In total 8 media forms were assessed. For these eight media categories, participants were asked to indicate how long they spent engaging in them throughout a typical week. A matrix with a four-point scale was then used requiring participants to indicate how often they engage in additional forms of media while using this primary media. From this a Media Multitasking Index was created through the MMI equation reflecting the extent of multitasking.

Participants were then classified as either heavy or light multitaskers through a normal distribution, with the individual indices that were 1 or more standard deviations ABOVE the mean classified as heavy and indices 1 or more standard deviations BELOW the mean classified as light. This allowed the data to be standardised and the extreme cases analysed. Additionally, questions regarding lockdown media behaviours were included which allowed the investigation to determine the extent of increased screen time and whether these behaviours changed due to the lockdowns.

This survey was relevant to time restrictions and allowed the experiment to gather real-world behaviours and a range of responses quickly and easily. However, it did contain flaws such as relying on self-report meaning that the results may have not been that accurate due to a possible lack of judgement by participants, response bias or misinterpretation of questions.

Three executive function experiments were then carried out to collect performance data and compare the groups. An online working memory test was used requiring participants to repeat back a patten they had just seen to allow recall ability to be assessed. Cognitive flexibility was measured through a verified test from Harvard requiring participants to connect 24 numbers that were randomly scattered on a page in correct ascending order, then do this again but alternating between numbers and letters. To measure inhibition the Eriksen, (1974) flanker task was used which allowed the investigation to test selective attention with participants presented a target arrow flanked as either congruent (same direction as target) or incongruent (opposite direction).

Consent was collected via a consent form which informed participants about the investigation, purpose, benefits, and risks while it was ensured that voluntary agreement was obtained, free from coercion, allowing participants to withdraw at any point. There was also respect for their confidentiality and privacy, ensuring personal information was not disclosed.

Onto the results. In terms of lockdown behaviour, 90% of the participants claimed that their media usage increased with 63% stating that this usage has stayed elevated. Additionally, 80% identified that they multitask with media due to boredom, being able to get more done or that it helps them concentrate.

The relationship between media multitasking and executive function performance wasn’t uniform across the three tests. As seen in the box plot, all the light media multitaskers reached an equal or higher level than the heavy multitaskers indicating a greater decrease in performance being associated and seen with heavy media multitaskers.

A similar decrease in performance was evident in the trail making task with heavy multitaskers, on average, taking longer to complete both trials. In the numbers conditions there was a 9 second difference between the two groups while in the number and letter condition there was a 32 second difference, suggesting that the heavy media multitaskers have weaker cognitive flexibility. However, there is also a level of uncertainty present due to manually starting and stopping the timers. The results were averaged out so therefore, this clear variation within the two groups is still valid.

In terms of inhibition there was no clear correlation. This challenged the results of Ophir and Baumgardner and didn’t provide any clear outcome therefore, these results were re-examined, and performance was compared against screen time, regardless of multitasking. A trend then became evident with individuals who spent more time with media being less distracted. A correlation analysis was performed with an r squared value of 0.1356 which indicates that 13.6% of the variation in the response time can be explained by variation in time spent with media. This suggests that additional variables were at play and is weak however does highlight a new and interesting trend.

This questions whether the media multitasking questionnaire, which is used widely across the literature, is the best method of assessing multitasking, as individuals who spend more time with media might be multitasking more or less than they realise or that individuals who choose to multitask might already be predisposed to do so such as having ADHD.

With experimentations come limitations. Due to the small scale of the study, the sample size only consisted of 40 individuals from the same school and the executive function tasks were only carried out once which may have resulted in a hidden bias or slightly inaccurate result. Additionally, a self-reported measure of frequency was used which may have not provided an accurate reflection of multitasking by the participants and is individual to each sample therefore, the results can’t accurately be compared with previous studies.

External aspects such as the type of multitasking, active effort put in or task demands also weren’t incorporated while confounding variables such as individual differences, skills and motives were present. To improve the experimental design, multitasking should also be assessed in person to allow for a cross reference and accurate indication of multitasking levels while individual differences and task demands should also be incorporated.

To conclude, the investigation highlighted that media multitasking is associated negatively and hinders performance in terms of working memory and cognitive flexibility, however, isn’t necessarily associated with inhibition but instead, the more one engages in overall screen time the better one is at ignoring distractors. The results suggest that multitasking during cognitive heavy tasks should be avoided while this increase in screen time could have had beneficial effects in terms of learning to cope and deal with distractors but also could have impacted ‘red alert’ skills that are critical for tasks such as driving. Further research is required for this dynamic phenomenon with a focus leaning away from the Media Multitasking Questionnaire and more towards the different types of multitasking and time spent with media to really determine where this may be beneficial or detrimental.

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