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The Role of Screen Time in Shaping Critical Thinking: A Study on Pubescent Children

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ABSTRACT

The ever-evolving technology has become an important and basic part in today's life impacting young and elder alike. The time that was once spent on activities outside have either been replaced by screen or are being accompanied by screen. The amount and type of fast media that is being consumed by the developing brain has an impact on different domains of their development. The echo chambers that have been created by the internet, influences the young minds the most, shaping their opinions for them, and hence not giving them the opportunity to discover their views on their own. Such consumption can have an impact on their executive functioning and as a product of it impacting their critical thinking skills and development. The purpose of this study was to understand the role of screen-time and its impact on critical thinking on adolescents. A sample of 140 students from grade 6th to 12th aged 12-18yrs was collected and CThQ tool was used to obtain their critical thinking levels along with three self-made screening questions to understand their usage with screens. The findings indicated that there was no significant overall relation between screen-time and critical thinking levels in adolescents (r= -0.052, p-value= 0.541). This correlation coefficient suggests a weak negative relation between screen-time consumption and critical thinking levels, indicating that changes in screen-time consumption may reflect as opposite changes in critical thinking levels, this relation however has been found non-significant at the 0.05 level.

Keywords: Screen-time, Critical thinking, Adolescents, Executive functioning, Pubescent, Media consumption, Screen-based media

INTRODUCTION

The new generation's growing dependency and reliance on screen-based media has raised serious public health issues posing a harm to their cognitive, linguistic, and social-emotional development (Muppalla *et al.,* 2023). Many researches indicate that media multitasking has a negative impact on executive functioning in teenagers, especially on working memory, inhibition, and the capacity to switch between tasks (Muppalla *et al.,* 2023). Screen exposure from a young age has been related with resulting in lower cognitive abilities and academic performance in later years (Muppalla *et al.,* 2023). Excessive technological usage has many health, developmental, and behavioural challenges in children (Panjeti-Madan and Ranganathan 2023). As recommended by the World Health Organization, there should be no stationary screen time for children under the age of 2 years and there should be a limited inactive screen time to no more than an hour for children older than the age of 2 but younger than 5 years. The American Academy of Paediatrics has too documented similar screen time restrictions (Panjeti-Madan and Ranganathan 2023). There are no screen-time cut-offs specifically recommended for older children or adolescents by either the World Health Organisation or any other government/ country health guidelines (Singh and Balhara, 2021). A significant amount of time spent by children nowadays goes in the use of social media, that they consume in many various forms. The risks that are associated with

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many social media algorithms now is that it can create an echo chamber that isolate people, especially children from different perspectives, isolating them from diverse perspectives and feeding them information that is already consistent with their existing beliefs (Bakshy *et al.,* 2015), this then strengthens their opinion of those existing beliefs and potentially inflates the perception of how many others share that belief. This does not help encourage critical thinking (Butler and Heather, 2024). The continuous growth and upsurge of social media usage is most likely to result in less critical thinking about the information people consume online (Butler and Heather 2024). The ability to think critically and our disposition to do so have major implications for our everyday lives. Critical thinking is simply defined as an ability to question; to acknowledge and test previously held theories; to recognize uncertainty; to examine, interpret, evaluate, reason, and reflect; to make informed judgments and decisions; and to clarify, articulate, and justify positions (Tekeci *et al.,* 2024). The disposition to use one's critical thinking skills is as important as the skills itself. If a person understands the skills involved in critical thinking but fails to deploy those skills when needed, they would not be classified as a critical thinker (Butler and Heather, 2024). Given the importance associated with critical thinking in our everyday lives, the fair and unbiased assessment of critical thinking is useful for guiding many such as educators in their classrooms, for the sake of self-improvement, and in employment decisions (Ennis, 1962).

Many studies also demonstrate many negative effects of screen-based media use on a number of cognitive areas such as executive functioning, sensorimotor development, and academic outcomes. Media multitasking has also been found to have a negative impact on executive functioning in teenagers, notably on their working memory, inhibition, and the capacity to switch between the tasks (Muppalla *et al.,* 2023). Studies have even revealed that children who have had a screen exposure time of two hours or more had a higher potential for screen addiction. Additionally, they seem to exhibit more problems related to attention and engage in deskbound behaviour when compared to those children with normal screen exposure time (Tekeci *et al.,* 2024).

Review of Literature:

The relationship between screen time and cognitive development has been extensively studies, particularly in the recent years as media consumption has increased among children and adolescents the same. As Edward Glaser has defined critical thinking, stating that it is the ability to think critically, involving three major things: [1] an attitude of being disposed to consider thoughtful ways to the problems and subjects that have come within the range of one's past experiences, [2] knowledge about methods of logical inquiry and reasoning, and [3] some skill in applying those pervious mentioned methods (Glaser, 1941). More simply, critical thinking is defined as a thinking that helps one navigate through various obstacle one faces using the apt knowledge of the past, often similar situations.

Screen media use can have both beneficial and detrimental effects on a child's cognitive results. Prolonged exposure to media devices with screens allows for interactive sessions and have the potential to improve education and learning, however, studies have also demonstrated that there are negative effects of screen media use on a number of cognitive areas such as executive functioning, sensorimotor development, and academics as they navigate their life (Muppalla *et al.,* 2023).

According to a survey conducted by Happinetz, 42% of children that are under the age of 12 spend up to four hours daily on screen-based media. Their survey also found that around 69% of those children possess their own devices. They stated that 74% of them consume media in the form of YouTube while 61% of those 12 years old and above gravitate towards gaming (Deccan Herald, 2024). Another study which was conducted by Social and Media Matters in 2020 revealed that the Indian youth spend on an average of 5 hours a day on the Internet, a number that they believed likely would increase by this year.

According to the 2011 census of India, there are approximately 25.3 crores adolescents in India, accounting for 20% of the country's population and it was also noted through recent studies that Indian adolescents spend an average of 4 to 5 hours per day on screens (Kumari and Choudhary, 2024), this prolonged exposure to screen, may have adverse effect on different aspects of their development particularly in the cognitive domain. The growing reliance of screen-based media and internet of the new generations and the ones coming ahead has termed the new generation as 'digital natives,' shedding light to the relevance of the concern between screen time and it's growing impact on the minds of the generation. Screen-based media is an unavoidable part

of young children's life. For those under the age of five, exposure to screens can pose risks and some benefits as well (Swider-Cios *et al.,* 2014), and continue to impact and play a role in the later stages of their life.

Hypothesis:

- H_0: There is NO significant relation among the screen time consumed and critical thinking skills in pubescent children.
- H_1: There is a significant relation among the screen time consumed and critical thinking skills in pubescent children.
- H_2: There is a significant relation among the screen time and critical thinking skill of females
- H_3: There is a significant relation among the screen time and critical thinking skill of males

METHODOLOGY

The study "The Role of Screen Time in Shaping Critical Thinking: A Study on Pubescent Children," focused on two variables, screen time (independent variable) and critical thinking (dependent variable). The study gathered information on different screen -time of students of various schools in New Delhi, India using self-made screening questions that helped determine their average screen time and the type of screen-based media they consumed and assessed their critical thinking skills using the CThQ developed by Kobylarek *et al.* (2022). Through purposive sampling, data of 140 students of grade 6^{th} to 12^{th} was gathered and assessed to see the existing relation between the student's screen time and their critical thinking skills.

Research design:

The study employed a correlational model. The correlational model helped observe the association of time spent on consuming screen-based media and the critical thinking development in pubescent children.

Purposive sampling was used to collect the quantitative data of student from class 6^{th} to 12^{th}. With certain objectives in mind, data of only those who met the grade criteria were collected, those who failed to meet the criteria were excluded from the study.

Research tools:

Critical thinking questionnaire (CThQ):

This is questionnaire by Kobylarek *et al.* (2022), consisting of 25 items and is designed to evaluate critical thinking skills of adolescents and adults using a 5- point likert scale, for all 25 items. The foundation for this questionnaire was to classify the educational goals proposed by Benjamin Bloom. The internal consistency coefficient for this questionnaire as measured by using the Cronbach's Alpha was 0.87.

Screening Questions:

Three self-made screening questions were included in the questionnaire to collect data on the participant's screen-time. This data helped establish association between the critical thinking scores for CThQ questionnaire and the screen-time collected from self-made screening questions.

Sample size:

Through purposive sampling, a sample size of 140 were collected from an age range of 12-18 year olds, from different schools in New Delhi, India. The study collected data of 50% males and 50% females.

RESULTS AND DISCUSSION

The study was conducted among 140 school going students aged 12-18 years from grade level of 6^{th}-12^{th}, where 50% of them were males and 50% were females. A correlational analysis using Pearson product moment method was calculated to understand the relation between adolescent's screen time (Less than and more than 3 hours) and critical thinking level (low, average and high). The overall mean score for their critical thinking levels was 80.99 and the standard deviation was 11.96. The Pearson correlation coefficient was -0.05236 (p-value=0.54175), indicating that the result is not significant at $p < .05$ (Table 1). This indicates that while there is a weak negative correlation among screen-time and critical thinking levels we cannot determine it as the sole variable that effects critical thinking levels among adolescents.

Pearson's correlation was also applied on the male and female population of the sample. The result of the Pearson correlation coefficient in males was 0.129272 (p-value=0.128161), indicating that the result is not significant at $p < .05$.

The result of the Pearson correlation coefficient in females was -0.22578 (p-value=0.007524), indicating that the result is significant at $p < .05$ (Table 2). This suggests that although there is a weak positive correlation among

Table 1 : Screen- time and critical thinking levels of adolescents

Screen-time	N	Mean	SD	r^2	p-value	Significance
Less than 3 hours	74	80.59	11.38			
More than 3 hours	66	81.43	12.56			
Total	140	80.99	11.96	-0.05236	0.54175	Not significant at p < .05.

Table 2 : Screen-time and critical thinking levels among males and females

Gender	N	Mean	SD	r^2	p-value	Significance
Male	70	79.98	12.81	0.129272	0.128161	Not significant at p < .05
Female	70	82	10.95	-0.22578	0.007524	Significant at p < .05

screen-time and critical thinking levels in male we cannot determine it as the sole variable that effects critical thinking levels among adolescents. Conversely, in females the weak negative correlation is significant indicating that increase in screen-time has a potential to decrease their critical thinking levels.

The findings indicate that overall, there was no statistically significant relation between screen time and critical thinking levels among adolescents (r= -0.052, p-value=0.541). Although the correlation coefficient showed a weak negative relation, indicating with change in screen-time consumption there will be a differing change in the critical thinking levels in adolescents, however this relation was proved to not be statistically significant at 0.05 level. This result aligns with the conclusion of Mesra *et al.* (2022), which emphasized that it is not the sole use of screen-based media and technology that has a direct influence on cognitive development but the proper use of one. This suggests that the type of media consumed while using screens is crucial in shaping the critical thinking abilities than just the duration. It was also noted from the research by Marcinio *et al.* (2021) that the frequency of screen time at most is only weakly and almost negligibly related to adolescent brain development, indicating that there are more significant factors at play in shaping and influencing cognitive development in adolescents.

Furthermore, the gender- specific correlational analysis suggests a weak positive correlation for males (r= 0.129, p-value= 0.128), which was not statistically significant, and a weak negative correlation for females (r=-0.225, p-value= 0.007), which was statistically significant. These findings indicate that the impact of screen time and critical thinking was inversely related in females, which means that with increase in screen-time there is a decrease in critical thinking levels (Fig.1), whereas in males, this relation was weakly positive, meaning with an increase in their screen time their critical thinking levels increased ever-so slightly (Fig.2).

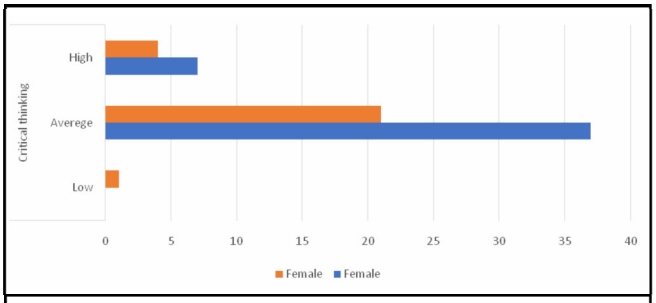

Fig. 1 : Screen-time and critical thinking scores in females

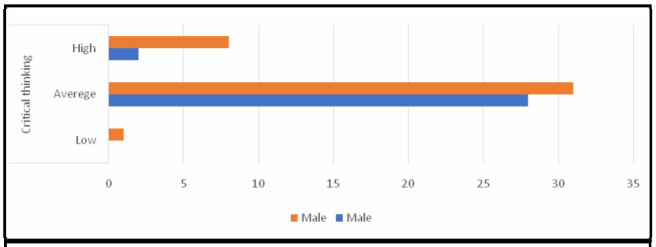

Fig. 2 : Screen-time and critical thinking scores in males

Conclusion:

Many studies have explored the effects of usage of screen-based media on young minds and impact on their cognitive development, working memory, executive functioning, etc. however, the association between screen-time and critical thinking have been scarcely studied especially among adolescents.

The result of this study indicated that in spite of having a weak negative correlation there wasn't a significant relation among the screen time consumed and critical thinking skills in adolescents. This signifies that there might be a weakly negative relation between the screen time adolescents consume and its impact on their critical thinking, however it is not statistically significant

indicating that there may be more factors such as the type of media consumed that has its effect on critical thinking development.

Correspondingly, when gender was made a variable, it was seen that in males a positively weak correlation was measured which was statistically non-significant and in females a negatively weak correlation was measured which was statistically significant. Therefore, this study's findings suggests that in females there is a significant impact on screen-time consumption and their critical thinking development, and points out that when consumption of screen-time increases their critical thinking skills conversely decreases.

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