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ASSOCIATION BETWEEN SCREEN TIME DURATION AND BEHAVIOUR AMONG ADOLSCENT

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ABSTRACT

Background: Adolescent's screen time exposure has significantly increased in recent years due to the widespread use of cellphones, digital media, and online learning platforms. Results from different research, however, still vary, particularly when it comes to specific behavioural domains including cognitive performance, oppositional behaviour, and hyperactivity. Therefore, in order to encourage teens to establish balanced and healthy digital habits, a deeper understanding of the relationship between screen time duration and other behavioural effects is needed.

Objective: The present study aimed to examine the association between daily screen time duration and behavioural problems among adolescents, focusing on oppositional behaviour, cognitive problems, hyperactivity, and ADHD index scores.

Methodology: A cross-sectional observational study involved 280 adolescent aged 11 to 16. Participants were separated into two groups based on their daily screen usage: those who spent less than 90 minutes (<90 min) or those who spent more than 90 minutes (>90 min). Conner's Parent Rating Scale-Revised (S) was used to assess behavioural outcomes. The ADHD index, oppositional behaviour, cognitive difficulties, and hyperactivity domain scores were investigated. The two groups' mean scores were compared using independent samples t-tests with unequal variances (Welch's t-test). The statistical significance level was set at $p < 0.05$.

Result: When compared to adolescents who spent less than 90 minutes on screens, those who spent more than 90 minutes showed considerably higher mean scores in the majority of behavioural domains. For oppositional behaviour ($p < 0.001$), hyperactivity ($p < 0.001$), and the ADHD index ($p < 0.001$), statistically significant differences were found, suggesting moderate to strong relationships with increased screen usage. A smaller but statistically significant difference ($p = 0.03$) was seen in cognitive issues, indicating a weaker connection. In general, higher screen time was linked to higher behavioural issue scores.

Conclusion: The data imply that excessive screen use is linked to increased behavioural issues in teenagers, specifically oppositional behaviour, hyperactivity, and ADHD-related symptoms. Cognitive issues showed a lesser correlation, emphasising diversity across behavioural areas. These findings highlight the necessity of limiting screen time and encouraging balanced digital usage among adolescents. Future longitudinal studies are suggested to establish causal links.

Keywords: Screen time, Adolescents, Behavioural problems, Hyperactivity, ADHD index

INTRODUCTION

Rapid changes in biology, psychology, cognition, and behaviour define adolescence, a special and crucial stage of human development. It symbolises a period of transition between childhood and maturity when people form identities, autonomy, and behavioural habits that frequently last a lifetime. The brain experiences significant structural and functional development at this stage, especially in areas linked to executive functioning, emotional regulation, impulse control, and decision-making. Adolescents are particularly susceptible to lifestyle, social, and environmental factors that might influence behavioural outcomes in the short and long term because of their continuous neurodevelopment.

One of the biggest lifestyle shifts impacting teenagers in the modern digital age is the sharp rise in screen time. The amount of time spent using screen-based devices, including computers, gaming consoles, tablets, cell phones, and televisions, is referred to as screen time. Adolescent screen engagement has reached previously unheard-of levels in the last ten years due to rapid technology innovation, expanded internet accessibility, and the integration of digital platforms into social communication and education. Screen-based activities, including academic learning, entertainment, gaming, social networking, and digital communication, now make up a significant portion of everyday routines.

While there are many benefits to digital technologies, such as easier access to learning materials, better communication, and chances to improve one's skills, excessive or uncontrolled screen time has grown to be a public health concern. Sedentary behaviour and extended screen time have been identified by international health organisations, such as the World Health Organization, as potential risk factors for negative behavioural, psychological, and physical consequences in children and adolescents. Overuse of screens has been linked to decreased physical activity, poor sleep, increased sedentary behaviour, and decreased in-person social interaction, all of which are critical for the healthy development of adolescents.

An increasing amount of studies has looked at the connection between teenage behavioural issues and screen time. Adolescent behavioural issues can show up as internalising symptoms like emotional dysregulation and attention issues as well as externalising actions like hyperactivity, impulsivity, oppositional behaviour, and conduct-related issues. According to a number of studies, extended screen time is linked to higher levels of hyperactivity, inattention, and behavioural dysregulation; some of these findings may even be related to signs of attention-deficit/hyperactivity disorder (ADHD). However, the strength and consistency of these correlations differ between studies, and research on how screen usage affects particular behavioural areas is still ongoing.

According to neurodevelopmental theory, excessive screen time may affect behavioural functioning in a number of interconnected ways. The brain's reward-processing mechanisms may be impacted by prolonged screen time, especially when it comes to fast-paced and extremely stimulating digital content. This could result in impulsivity and a decreased capacity for delayed gratification. Long-term screen-based activities may also replace important developmental experiences including unstructured social interaction, physical play, and interpersonal communication. During adolescence, these experiences are essential for the development of emotional control, social skills, and self-regulation.

Moreover, abnormal sleep patterns, such as delayed sleep initiation and shorter sleep duration, have been connected to excessive screen usage. Sleep is essential for stable conduct, emotional control, and cognitive function. Therefore, persistent sleep disturbances during adolescence may worsen behavioural issues such hyperactivity, impatience, and inattention. Long-term sedentary screen use is linked to decreased physical activity, which may exacerbate behavioural issues by reducing possibilities for energy expenditure and stress management.

The current literature has a number of drawbacks despite growing study interest. Numerous research fail to differentiate between various behavioural domains, rely on self-reported screen time estimates, or have wildly disparate screen time classifications. Furthermore, some research only look at general behavioural outcomes rather than domain-specific effects including oppositional behaviour, cognitive issues, hyperactivity, and

symptoms associated with ADHD. This makes it more difficult to determine which behavioural areas are most closely linked to the amount of time spent on screens.

Adolescent behavioural outcomes must be accurately assessed using standardised and validated assessment instruments. A well-known and reliable psychometric tool for evaluating behavioural issues in kids and teenagers is the Conners' Parent Rating Scale-Revised (Short). It offers domain-specific ratings for the ADHD index, oppositional behaviour, cognitive issues, and hyperactivity, enabling a more sophisticated comprehension of behavioural functioning. Since parents are frequently in a good position to monitor behavioural patterns over long periods of time and in a variety of contexts, parent-reported measures are especially useful.

Finding relevant screen time criteria that may be used to evaluate behavioural outcomes between groups is another crucial factor. Even though different standards have different suggested screen time limits, classifying teenagers according to their daily screen time enables more accurate group comparisons and useful interpretation of results. Finding exposure levels linked to higher behavioural risk may be made easier by comparing the behaviours of teenagers who spend more and less time on screens.

In this regard, the current study was created to investigate the relationship between daily screen use and behavioural issues in adolescents between the ages of 11 and 16. The purpose of the study was to evaluate the behavioural results of adolescents who spent less than 90 minutes a day on screens with those who spent more than 90 minutes. Oppositional behaviour, cognitive issues, hyperactivity, and ADHD index scores were among the behavioural domains evaluated using the Conners' Parent Rating Scale-Revised (Short).

This study aims to advance knowledge of the relationship between screen time duration and many elements of adolescent behaviour by concentrating on domain-specific behavioural outcomes and utilising a standardised assessment method. The results could have a significant impact on how parents, teachers, and medical professionals monitor screen time and create evidence-based plans to encourage better digital habits. The study also contributes to the expanding corpus of research highlighting the necessity of balanced screen time during adolescence and the significance of early detection and control of excessive screen time in order to promote the best possible behavioural development.

METHODOLOGY

Study Design

This study employed an observational cross-sectional design to examine the association between daily screen time duration and behavioural outcomes among adolescents. The study was conducted in accordance with ethical principles for human research.

Participants

A total of 280 school-going adolescents aged 11–16 years were recruited for the study. Participants included both male and female adolescents and were selected based on predefined inclusion and exclusion criteria.

Participants were divided into two groups based on daily screen time duration:

- Group 1: Less than 90 minutes of screen time per day (<90 minutes)
- Group 2: More than 90 minutes of screen time per day (>90 minutes)

The <90 minutes threshold was selected to differentiate lower and prolonged screen exposure, consistent with public health recommendations regarding sedentary screen use in adolescents.

Inclusion Criteria

- Adolescents aged 11–16 years
- Both male and female participants

- School-going adolescents
- Regular users of screen-based devices (mobile phone, tablet, computer, television)
- Parents or guardians willing to complete the Conners' Parent Rating Scale–Revised (Short)
- Written informed consent obtained from parents or guardians

Exclusion Criteria

- Adolescents diagnosed with neurodevelopmental disorders (e.g., autism spectrum disorder, intellectual disability)
- Adolescents with known psychiatric disorders currently under treatment (e.g., ADHD, mood disorders)
- History of neurological disorders, head injury, or seizure disorders
- Presence of chronic medical illnesses affecting behaviour or cognition
- Visual, auditory, or speech impairments interfering with behavioural assessment

Outcome Measures

Behavioural outcomes were assessed using the Conners' Parent Rating Scale–Revised (Short Form) (CPRS-R:S), a validated and widely used parent-reported questionnaire for assessing behavioural and attentional problems in children and adolescents.

The following behavioural domains were analysed:

- Oppositional behaviour
- Cognitive problems (inattention)
- Hyperactivity
- ADHD Index

Domain-wise scores were calculated according to standardized scoring guidelines.

Data Collection Procedure

Screen time duration was recorded based on parent-reported average daily usage of screen-based devices. Parents then completed the CPRS-R:S questionnaire for their child. All data were collected during a single assessment period.

Statistical Analysis

Excel was used for the statistical analysis of this study. Descriptive statistics were used to summarise demographic characteristics, including age and gender distribution.

Mean scores for each CPRS-R behavioural domain were calculated for both screen-time groups. Independent samples t-tests assuming unequal variances (Welch's t-test) were used to compare behavioural domain scores between adolescents with <90 minutes and >90 minutes of daily screen time.

Effect size estimates were calculated to determine the strength of association between screen time duration and behavioural outcomes. Statistical significance was set at $p < 0.05$.

RESULTS

Table 1. Demographic Characteristics of Participants (N = 280)

| Variable | Frequency |
|-------------------------|-------------|
| Age range (years) | 11-16 |
| Male | 191 (68.2%) |
| Female | 89 (31.8%) |
| Screen time <90 minutes | 140 |
| Screen time >90 minutes | 140 |

Table 2. Comparison of Mean CPRS-R Domain Scores Between Screen Time Groups

| Behavioural Domain | <90 min (Mean) | >90 min (Mean) | p-value |
|----------------------------------|----------------|----------------|---------|
| Oppositional behaviour | 6.28 | 9.49 | <0.001 |
| Cognitive problems (Inattention) | 7.28 | 8.80 | ≈0.03 |
| Hyperactivity | 7.54 | 9.60 | <0.001 |
| ADHD Index | 13.27 | 16.84 | <0.001 |

Participant Characteristics

A total of 280 adolescents aged 11–16 years were included in the study. Participants were categorised into two groups based on daily screen time duration: <90 minutes (n = 140) and >90 minutes (n = 140).

The study sample comprised both male and female participants. Demographic details, including age and gender distribution, are presented in Table 1.

Comparison of Behavioural Domain Scores

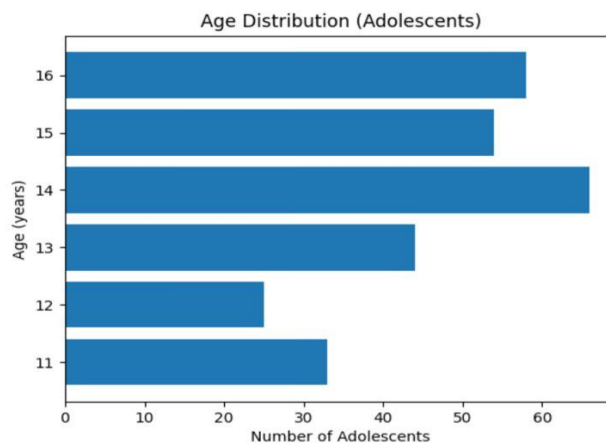
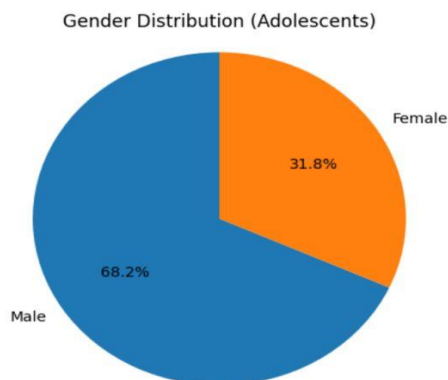
Mean scores for behavioural domains assessed using the Conners' Parent Rating Scale–Revised (Short Form) were compared between adolescents with <90 minutes and >90 minutes of daily screen time.

Independent samples t-tests assuming unequal variances (Welch's t-test) were used for group comparisons. Domain-wise mean scores and p-values are presented in Table 2.

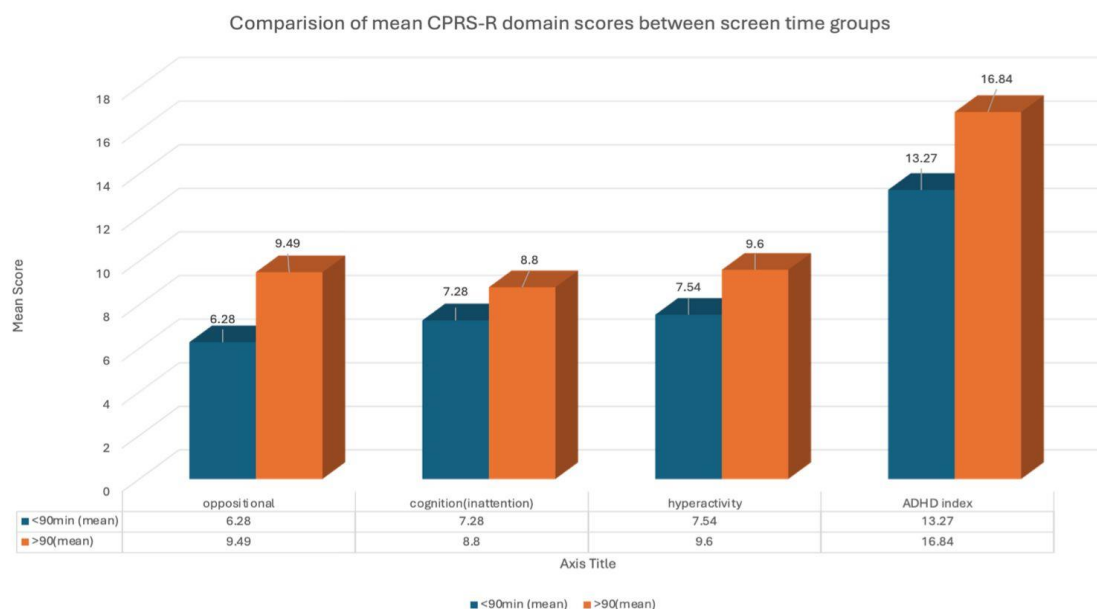
Statistically significant differences were observed between the two groups for oppositional behaviour, hyperactivity, ADHD index, and cognitive problems.

Domain-wise Mean Scores

Mean scores for each behavioural domain were as follows:



- Oppositional behaviour:
 <90 minutes group: mean = 6.28
 90 minutes group: mean = 9.49
- Cognitive problems (inattention):
 <90 minutes group: mean = 7.28
 90 minutes group: mean = 8.80
- Hyperactivity:
 <90 minutes group: mean = 7.54
 90 minutes group: mean = 9.60
- ADHD Index:
 <90 minutes group: mean = 13.27
 90 minutes group: mean = 16.84



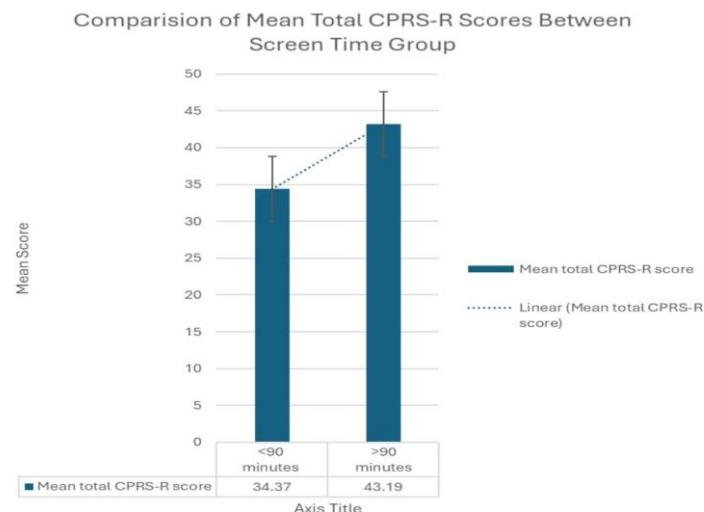
Graphical representation of domain-wise mean scores is shown in Figure 3.

Effect Size Estimates

Effect size estimates were calculated for all behavioural domains. Estimated effect sizes ranged from $r \approx 0.45$ – 0.55 for oppositional behaviour, hyperactivity, and ADHD index, and $r \approx 0.20$ – 0.30 for cognitive problems.

Total CPRS-R Score

The mean total CPRS-R score for adolescents with <90 minutes of daily screen time was 34.37, while the mean total score for adolescents with >90 minutes of screen time was 43.19. The comparison of mean total scores is presented in Figure 4.



DISCUSSION

This cross-sectional study looked at the relationship between the amount of time adolescents aged 11 to 16 spent using screens each day and their behavioural outcomes, namely oppositional behaviour, cognitive issues, hyperactivity, and ADHD index scores. The results show a clear difference in behavioural domain scores between teenagers who use screens for less than 90 minutes a day and those who use them for more than 90 minutes. The disparities are more noticeable in the externalising and ADHD-related domains. Teenagers who reported using screens for more than 90 minutes a day scored higher on the Conners' Parent Rating Scale-Revised (Short Form) in every behavioural domain. While cognitive issues showed relatively minor variations, oppositional behaviour, hyperactivity, and ADHD index scores indicated the biggest variances.

The nature of prolonged screen interaction, which frequently involves fast-paced, highly stimulating digital information, may account for the greater variations in externalising tendencies. Particularly during adolescence, a developmental stage marked by continuous evolution of executive functioning and self-regulatory brain networks, such exposure has been suggested to affect attentional management, impulse control, and emotional reactivity. Behavioural dysregulation may also be exacerbated by reduced opportunities for physical activity, organised routines, and in-person social connection linked to prolonged screen use. On the other hand, there was less of a correlation between screen time and cognitive issues. This could be a reflection of the variety of screen-based activities, since some types of screen use (such educational content or structured learning platforms) could not have the same negative effects on cognitive functioning as unstructured or entertainment-focused screen exposure.

These results show that behavioural influence varies across many domains. The current study's findings are in line with earlier studies that found links between children's and adolescents' behavioural issues and more

screen use. Previous research has shown that adolescents with extended daily screen use exhibit increased levels of hyperactivity, inattention, and oppositional behaviours. Population-based research that look at screen usage in connection to externalising behavioural issues and signs of ADHD have found similar trends.

According to a number of cross-sectional and longitudinal research, excessive screen time may be associated with increased impulsivity, attentional problems, and altered reward processing. These observations are supported by the current data, especially when it comes to hyperactivity and ADHD index scores. The idea that behavioural results may be more vulnerable to screen exposure than cognitive outcomes alone is supported by the somewhat smaller correlation seen for cognitive issues, which has also been documented in previous studies. Crucially, although the current results are consistent with previous research, variations in reported effect sizes may be explained by variations in screen time thresholds, measurement methods, and study population characteristics. The results highlight the significance of tracking teenagers' daily screen time from a clinical and public health standpoint. A greater understanding of the possible behavioural correlates linked to extended screen time may be beneficial for parents, educators, and healthcare professionals.

Early detection of excessive screen time in teenagers may enable prompt counselling, behavioural coaching, and lifestyle changes intended to encourage balanced use of digital media. For teenagers displaying behavioural issues, a focus on organised routines, exercise, and screen-free social interactions may be especially pertinent. Clinicians may find it easier to spot behavioural trends that call for additional evaluation or intervention if they employ parent-reported screening instruments like the CPRS-R:S. The current study has a number of limitations that should be noted. First, any conclusion about a causal relationship between screen time and behavioural outcomes is precluded by the cross-sectional methodology. Second, screen time was measured using parent-reported estimates, which could be skewed by recollection. Third, a parent-reported questionnaire was used to examine behavioural outcomes instead of diagnostic tests given by clinicians, which could affect the accuracy of the reporting. Furthermore, the study did not distinguish between different kinds of screen-based activities, which could have distinct consequences on behaviour.

Longitudinal study designs should be used in future studies to elucidate the temporal link between screen time exposure and behavioural outcomes. More research that differentiates between screen use for education, recreation, and social media may offer more complex insights into effects that are specific to different domains. Future research could be strengthened by include multi-informant behavioural assessments and objective screen time measurements.

CONCLUSION

This study looked at the relationship between the amount of time teenagers aged 11 to 16 spent using screens each day and their behavioural outcomes. When using the Conners' Parent Rating Scale–Revised (Short Form) to measure behavioural domains such as oppositional behaviour, hyperactivity, cognitive issues, and ADHD index, adolescents who spent more than 90 minutes a day on screens scored higher than those who spent less time on screens.

The results suggest that whereas cognitive issues exhibited relatively smaller disparities, externalising and ADHD-related behavioural domains showed more severe differences. These findings highlight how important it is to take screen usage length into account when evaluating teenage behavioural patterns.

Practically speaking, the results confirm the significance of routinely monitoring screen usage in teenage populations. Incorporating screen time measurement into community, educational, and clinical contexts may help identify behavioural issues early on and provide guidance for suitable counselling tactics that support balanced use of digital media.

It is unable to establish causal correlations because the study is cross-sectional. Longitudinal study designs should be used in future studies to investigate the temporal link between screen time exposure and behavioural outcomes. More thorough insights into the behavioural effects of screen use may also be obtained by differentiating between various screen-based activities and using objective metrics of screen usage.

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