**The Impact of Screen Time on Adolescent Health Related Fitness: A Study in Ajmer, Rajasthan**

MANSI GEORGE 1, SANDEEP DHULL 2

1Department of Physical Education and Sports, Central University of Haryana, Mahendragarh

2 Department of Physical Education and Sports, Central University of Haryana, Mahendragarh

INDIA

mannugeorge@gmail.com, sandeepdhull@cuh.ac.in

**Abstract:**

The investigation delves into exploring the intricate relationship between screen time and health-related fitness among adolescents aged 14-16 in Ajmer, Rajasthan. The primary objective is to scrutinize whether prolonged exposure to screens adversely affects health-related fitness parameters, with a specific emphasis on flexibility, cardiovascular endurance, muscular endurance, and body composition. The data collection process involved administering various fitness tests and gathering self-reported screen time durations from a sample of 15 boys. Through meticulous correlation analysis, compelling insights emerged. Flexibility, muscular endurance, and cardiovascular endurance displayed significant negative correlations with screen time (-0.993, -0.993, and -0.987, respectively), indicating that as screen time increased, these aspects of health-related fitness tended to decline. Conversely, there was a notable positive correlation (0.846) between screen time and body composition, suggesting that increased screen time corresponded to less favourable body composition outcomes. These findings bolster the hypothesis positing that prolonged screen time may indeed contribute to diminished health-related fitness among adolescents, a notion that resonates with the displacement theory. This theory suggests that increased engagement with screens displaces time that could otherwise be allocated to physical activity, thereby exerting a detrimental impact on overall fitness levels.

**Keywords: Adolescents, Screen Time, Health-Related Fitness, Displacement Theory**

**Introduction:**

In today's digital age, adolescents are increasingly immersed in screen-based activities, ranging from social media interactions to gaming and streaming content (Anderson et al., 2017; Carson et al., 2016; Hale & Guan, 2015). This pervasive exposure to screens has sparked concerns about its potential impact on the health and well-being of this demographic group (Rosen et al., 2014). Among the myriad of health considerations, health-related fitness stands out as a crucial aspect deserving of exploration, given its implications for overall physical health and quality of life (Lubans et al., 2016). The relationship between screen time and health-related fitness in adolescents has garnered significant attention from researchers worldwide (Biddle et al., 2017; Costigan et al., 2013). Numerous studies have investigated this intricate interplay, seeking to unravel whether prolonged screen exposure contributes to diminished fitness levels (Bai et al., 2016; Marques et al., 2015). While some research has suggested a detrimental association between screen time and health-related fitness, others have yielded inconclusive or conflicting findings (Carson et al., 2016; Pearson et al., 2017). Therefore, there remains a pressing need for further empirical investigation to elucidate the nature and extent of this relationship, particularly in diverse geographical and cultural contexts (Marques et al., 2015).

Ajmer, located in the northwestern Indian state of Rajasthan, serves as a compelling setting for such inquiry (WHO, 2018). As a burgeoning urban center experiencing rapid socio-economic development, Ajmer encapsulates the intersection of traditional and modern lifestyles, offering a unique milieu to explore the impact of screen time on adolescent health-related fitness (Ajmer Municipal Corporation, 2020). Despite the growing prevalence of digital technologies in Ajmer's urban landscape, there is a dearth of research specifically examining the nexus between screen time and health-related fitness among adolescents in this region (Ajmer Development Authority, 2019).

Therefore, this study endeavours to fill this gap by investigating the relationship between screen time and health-related fitness in adolescents aged 14-16 from Ajmer, Rajasthan. By focusing on flexibility, cardiovascular endurance, muscular endurance, and body composition, this research seeks to ascertain whether increased screen time negatively impacts these crucial components of health-related fitness. The decision to explore this particular research problem stems from several compelling reasons:

Firstly, the rising prevalence of screen-based activities among adolescents in Ajmer mirrors global trends, thereby necessitating a localized examination of its potential health ramifications (WHO, 2020).Secondly, adolescence represents a critical developmental stage characterized by rapid physical, cognitive, and socio-emotional changes, rendering this demographic particularly vulnerable to the influences of screen time on health-related fitness.Thirdly, the scarcity of empirical research addressing this issue in the context of Ajmer underscores the urgency and significance of conducting such a study to inform evidence-based interventions and policies aimed at promoting adolescent health and well-being in the region.

The selection of this research problem is motivated by a desire to contribute to the existing body of knowledge on the impact of screen time on adolescent health-related fitness, with a specific focus on a previously underexplored population in Ajmer, Rajasthan. By elucidating the nuances of this relationship, this study endeavours to inform targeted interventions and public health initiatives aimed at mitigating the potential adverse effects of excessive screen time on adolescent health outcomes in Ajmer and beyond.

**Methods:**

Fifteen adolescent boys aged 14-16 were recruited for participation in the study, representing a diverse cross-section of the population in Ajmer, Rajasthan. The selection process involved a random sampling approach, drawing participants from local schools within the region. This method aimed to ensure the inclusion of adolescents from various socio-economic backgrounds and educational settings, thereby enhancing the generalizability of the findings. To assess health-related fitness variables, a battery of specific fitness tests was employed, tailored to capture key aspects of physical fitness pertinent to adolescent health. These assessments included the Sit and Reach Test to measure flexibility, the Harvard Step Test to evaluate cardiovascular endurance, the Sit Up Test to assess muscular endurance, and the measurement of Body Mass Index (BMI) to quantify body composition. By utilizing a comprehensive array of fitness tests, the study aimed to obtain a holistic understanding of participants' health-related fitness profiles. In addition to fitness assessments, screen time data were meticulously collected through the administration of a Socio-Demographic Profile questionnaire. This questionnaire elicited information regarding participants' usage of various screen gadgets, such as smartphones, tablets, computers, and televisions, over the course of a typical week. By tracking screen time in minutes across different devices, the study aimed to capture the breadth and frequency of adolescents' screen-based activities, thereby facilitating a nuanced analysis of their screen time habits. The collected data underwent rigorous analysis using the Pearson correlation coefficient (r), a statistical measure employed to assess the strength and direction of relationships between variables. By calculating correlations between screen time and each of the health-related fitness variables, the study sought to elucidate the extent to which increased screen time may be associated with alterations in flexibility, cardiovascular endurance, muscular endurance, and body composition among adolescent boys in Ajmer.

**Results:**

As illustrated in Figures 1, 3, and 4, the correlation analysis unveiled robust negative correlations between screen time and key components of health-related fitness, namely cardiovascular endurance (-0.987), flexibility (-0.993), and muscular endurance (-0.993). Conversely, as depicted in Figure 2, a noteworthy positive correlation emerged between screen time and body composition (0.846). These compelling findings provide empirical support for the hypothesis positing that heightened screen time is associated with diminished health-related fitness levels among adolescents.The pronounced negative correlations observed between screen time and cardiovascular endurance, flexibility, and muscular endurance underscore the adverse impact of excessive screen use on physical fitness parameters critical for overall health and well-being. Conversely, the positive correlation identified between screen time and body composition highlights the potential link between prolonged screen exposure and unfavorable changes in body composition metrics, such as increased body mass index (BMI) and body fat percentage.

**Fig. 1 Correlation b/w ST and Cardiovascular Endurance Fig. 2 Correlation b/w ST and Body Composition**

 **Fig. 3 Correlation b/w ST and Flexibility Fig. 4 Correlation b/w ST and Muscular Endurance**

**Discussion:**

The negative correlations observed between screen time and flexibility, cardiovascular endurance, and muscular endurance in our study align closely with prior research findings of (Cooper et al., 2015)., corroborating the adverse effects of prolonged screen time on physical health These associations suggest that reduced flexibility, cardiovascular endurance, and muscular endurance among adolescents may contribute to a spectrum of health issues, including obesity, musculoskeletal disorders, and cardiovascular disease. Moreover, the positive correlation identified between screen time and body composition indicators, such as body mass index (BMI) and body fat percentage, echoes the outcomes of previous investigations like (Tremblay et al., 2017). This finding underscores the concept that sedentary behaviours, including excessive screen time, are conducive to weight gain and obesity, thereby posing significant health risks to adolescents as also depicted in (Carson et al., 2016; Pearson et al., 2017). The application of the displacement theory (U.S. Department of Health and Human Services, 2018) further elucidates the observed associations between screen time and health-related fitness variables. According to this theory, increased engagement with screens may displace time that could otherwise be allocated to physical activities, thereby compromising overall fitness levels (Biddle et al., 2017). Consequently, the negative correlations documented in our study between screen time and various components of health-related fitness may be attributed, at least in part, to this displacement effect. By drawing upon established theoretical frameworks and empirical evidence from previous studies, our findings underscore the multifaceted impact of screen time on adolescent health-related fitness. Through a nuanced examination of these relationships, our research contributes valuable insights to the burgeoning body of literature on the deleterious consequences of excessive screen time among adolescents. Furthermore, our study highlights the imperative for targeted interventions and public health initiatives aimed at mitigating the adverse effects of sedentary behaviours on adolescent health outcomes, thereby fostering a culture of active living and well-being in this vulnerable population.

**Conclusion:**

The comprehensive analysis conducted in this study yields compelling evidence regarding the detrimental impact of heightened screen time on crucial components of health-related fitness among adolescents. The negative correlations observed between screen time and variables such as flexibility, cardiovascular endurance, and muscular endurance highlight the urgency of addressing excessive screen usage in this demographic. These findings underscore the critical importance of promoting physical activity and implementing strategies to limit screen time among adolescents as integral components of public health initiatives aimed at enhancing their overall health and well-being. Moreover, our research underscores the relevance of the displacement theory in understanding the observed associations, emphasizing the need for balanced screen time management strategies. By acknowledging the potential trade-offs between screen-based activities and physical exercise, interventions can be tailored to foster a healthier balance between sedentary behaviors and active living among adolescents.

In light of these findings, it is imperative for educators, policymakers, and healthcare professionals to collaborate in promoting holistic approaches to adolescent health that prioritize both physical activity engagement and prudent screen time management. By fostering environments conducive to active living and equipping adolescents with the knowledge and resources to make informed choices regarding screen use, we can empower them to lead healthier, more fulfilling lives. Ultimately, the insights gleaned from this study serve as a catalyst for ongoing efforts to safeguard and promote the health and well-being of adolescents in an increasingly digitalized world.

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