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# "Role of Physical Activity and Screen Time in Subjective Well-Being of Adolescents, A Cross-Sectional Study "

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KEYWORDS Adolescents, Physical activity, screen time, Subjective well- being	ABSTRACT: Background: Adolescence is a It is vital to u developmental s activity and scree various health b television viewin This cross-sectio Subjective Well- Methods & methods	crucial period characterized by signific inderstand the factors that affect Su tage. There are many factors that imp een time being significant contributors. benefits, excessive screen time, particu ng, gaming, and social media, has raise nal study aims to explore the relationship Being among adolescents.	ant physical, emotional, and social changes. ibjective Well-Being (SWB) during this pact adolescents' well-being, with physical While physical activity is associated with ilarly from screen-based activities such as ad concerns about its impact on well-being. p between physical activity, screen time, and
	A cross-sectiona Arakkonam, Tar subjective well-l was used to asse cognitive compo (SWLS), and th Positive Affect N of time spent on <b>Results:</b> The study found	I study was conducted among 200 stude nil Nadu. Validated questionnaires wer being, and screen time. The Physical A ss physical activity. Subjective well-bei onent, which measured life satisfaction e affective component, which measure legative Affect Schedule C8 (PANAS C screen in hours per typical weekday. I that a significant proportion (47%, n	ents aged 14-17 years at a private school in re used to collect data on physical activity, ctivity Questionnaire-Adolescent (PAQ-A) ng was assessed using two components: the n through the Satisfaction with Life Scale d positive and negative affect through the 8). Screen time was assessed by the duration
	exposure, which reported low leve time exposure an	was defined as more than 2 hours per da els of physical activity. The study showed d high physical activity had higher levels	ay. Furthermore, a majority $(57.5\%, n=115)$ ed that adolescents who reported low screen s of life satisfaction and more positive affect.

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However, neither screen time exposure nor physical activity showed a significant association with Negative Affect **Conclusion:** 

Our study showed an association between physical activity and screen time with subjective wellbeing. Therefore, it is suggested that reducing screen time and increasing physical activity can positively impact adolescents' lives and increase their subjective well-being, thereby leading to a better overall quality of life.

#### Introduction:

Throughout history, there has been various research conducted on defining well-being. Later Diener et al in 1984 defined Subjective Well-Being (SWB) in terms of evaluating a person's overall quality of life from their perspective<sup>1</sup>. According to his principle, SWB is defined as "a person's cognitive and affective evaluations of his/her life". SWB is a complex construct that includes possessing high life satisfaction and experiencing more positive feelings and less negative emotions<sup>2</sup>.

Numerous research studies have been conducted on SWB and its impact on adult's health. A significant outcome linked to SWB is positive mental health. Boiler L's study showed that an improvement in SWB and psychological well-being can reduce depressive symptoms<sup>3</sup>. Recently, the study of SWB among adolescents and children has drawn a lot of interest, given its significance in adults. The Programme for International Students Association (PISA) studied students 'well-being in terms of good physical and mental health based on how happy and satisfied they are with their life and their future aspirations<sup>4</sup>.

SWB plays a vital role in the mental health of adolescents<sup>5</sup>. Studies have shown that lower SWB is associated with increased depression<sup>6</sup> and anxiety<sup>7</sup>. Additionally, SWB has been associated with positive youth development<sup>8</sup>, decreased fear of failure, increased self-efficacy<sup>9</sup> and education performance<sup>10</sup>.

Also, Studies claim that adequate physical activity, low sedentary behaviour, low screen time and adequate sleep have positive effects on both SWB<sup>11</sup> and mental health<sup>12</sup>.

But, for children and youth, the existing global guidelines on physical activity focus only on Moderate to Vigorous Physical Activity (MVPA), while neglecting other aspects of the movement spectrum such as sleep, sedentary time and Light-Intensity Physical Activity (LPA). Focusing solely on MVPA, which accounts for less than 5% of a person's time in 24 hours, restricts the opportunity to maximize the positive effects of mobility on health<sup>13</sup>.

Research suggests that optimal health benefits require comprehensive consideration of 24-hour movement behaviour. In line with this, Canada has developed a 24hour movement guideline for children and adolescents. According to this guideline, "A healthy 24-hours for children and youth aged 5-17 years includes:

- An accumulation of 60 minutes per day MVPA
- Several hours of varieties of light physical activity LPA
- Not more than 2 hours per day of recreational screen time
- Uninterrupted 8-10 hours sleep per night for those aged 14-17 years<sup>\*\*</sup>.

According to the World Health Organization (WHO), over 80% of adolescents of school-going age across the world, comprising 85% of girls and 78% of boys, failed to meet the current WHO guidelines for physical activity<sup>15</sup>. Previous research has shown that regular physical activity plays a crucial role in maintaining good physical and mental health outcomes, including better sleep, cognition, quality of life, and reduced risk of depression and anxiety<sup>16</sup>.



Adolescence is a vulnerable transitional stage from childhood to physical, psychological, and social growth<sup>17</sup>. Mental illness affects one in seven people aged 10 to 19 years worldwide, contributing to 13% of adolescents' overall disease burden. Failing to address mental health issues in adolescents has long-term effects on physical and mental well-being in adulthood, making it harder to lead a life of fulfilment as an adult<sup>18</sup>.

Studies show half of most mental health disorders have their onset in childhood and adolescence and they have a lifetime prevalence in adulthood<sup>19</sup>. Hence, the perspective of their own life in the growing phase of adolescence defines the quality of their life in adulthood. Overall, this study aims to address a gap in the literature by investigating the role of sedentary lifestyle habits such as low physical activity and prolonged screen time on the SWB of adolescents.

#### **Objectives:**

- 1. To estimate the prevalence of screen time and physical activity among adolescents in a private school.
- To explore the association between physical activity and screen time with subjective wellbeing among the study population.

#### Methodology:

#### Study design and setting:

A cross-sectional study was carried out in a private school in Arakkonam town, Ranipet district of Tamil Nadu. A school-based study was designed and conducted between November 2023 to January 2024.

#### **Study population and sampling:**

The study population was adolescents studying in a private school in Arakkonam.

Inclusion criteria: Students aged 14 -17 years.

**Exclusion criteria:** Students who are ill and those who have dysfunction which limits their physical activity.

Based on the study findings of Mitra R, the prevalence of low SWB of 49.4% is used for sample size estimation<sup>20</sup>. The sample size was calculated with a 5% margin of error, 95% confidence level, allowable error of relative precision of 15% and prevalence of 49.4 %. On substituting in formula [n=Z $\alpha^2$ pq/d<sup>2</sup>], the sample size calculated was n=175. Adding a 10% non-response rate, n= 192. On rounding off, the final sample size was 200.

The simple random sampling technique was employed to collect the samples. The selection was based on the school attendance register of students aged between 14-17 years. A total of 419 students from this age group were available. The students' names were entered into MS Excel, and a random number was generated to select the desired samples of n=200.

#### **Study Variables:**

Dependent variable: Subjective well-being [Life Satisfaction, Positive and Negative affect]

Independent variable: Physical activity and Screen time.

#### Measuring tools for study variables:

The study was conducted using a validated, selfadministered questionnaire. The Questionnaire was developed for the study which had 4 sections.

#### 1) Socio-demographic details

#### 2) Physical Activity

Physical activity was assessed by using the Physical Activity Questionnaire - Adolescents [PAQ-A].

The PAQ-A was used to assess general levels of physical activity in the past 7 days for students in grades 9 to 12 (approximately 14 to 19 years). It provides a summary physical activity score derived from eight items, each scored on a 5-point scale. A summary score of 1 indicates



low physical activity, whereas a score of 5 indicates high physical activity<sup>21</sup>. The Cronbach's alpha coefficient is between 0.72 - 0.85<sup>22</sup>.

#### 3) Screen time

The method used to measure screen time was asking participants to rate how many hours they had spent consuming TV, mobile phones, playing video or computer games, or using a computer for non-school-related activities over the past seven days. 1-no time, 2- an hour, 3-two hours, 4-three hours, 5-four hours, and 6-five hours or longer were the possible answers. Based on the International guidelines on screen time for children and adolescents, the recommended screen time is not more than two hours per day<sup>14</sup>

#### 4) Subjective well-being

Based on Diener's tripartite model, SWB was assessed, which includes two key elements contributing to the framework of SWB: the affective (or emotional) component and the cognitive (or judging) component. The judgmental component is Life Satisfaction (LS) which was assessed by the Satisfaction With Life Scale (SWLS) and the emotional component is Positive Affect (PA) and Negative Affect (NA) assessed by the Positive Affect Negative Affect Schedule C8 (PANAS C8) scale<sup>1</sup>. SWLS comprises 5 items and these variables are measured using a 7-point Likert scale (1- Strongly disagree to 7- Strongly agree)<sup>23</sup>. This scale has a significant level of reliability with an alpha coefficient = .83<sup>24</sup>

PANAS C8 scale evaluates "How they feel about themselves?" with PA ("Joyful, Cheerful, Content, Fun") and NA ("Humiliated, Bothered, Irritated, Embittered") and it was measured using a 5-point Likert scale (1- very slightly or not at all to 5 - Extremely). The alpha coefficient for PA was .84 and for NA was .75 <sup>25</sup>

#### **Ethical consideration:**

The study protocol was approved by the Institutional Ethics Committee [Reference number: MMCH & RI IEC/ PG/ 36/ OCT / 23]. Permission from the corresponding school was obtained to conduct the study in the school. Written assent of adolescents and consent from their parents were obtained.

#### Data collection:

Two phases of data collection were carried out.

In the first stage: Approval to conduct the study was obtained from the school principal. On the day of the Parent-Teacher meeting, the study purpose, data collection procedures and confidentiality were explained to the parents of the study population. Informed and written consent was obtained from the parents and a copy of the participant informant sheet was provided to them. Then teachers received training on how to fill out the questionnaire. The principal and six teachers who volunteered convened in the seminar hall. Teachers received handouts with questionnaires, followed by a briefing on the aim of the study, the particulars of the questionnaire and how to respond to it.

In the second stage: Selected students (n=200) assembled in the school auditorium along with the trained teachers and the principal. The data collection was done during the class hours in the presence of teachers and the principal throughout the procedure. Students were explained about the research process and written assent was obtained from them. They were then provided with printed copies of the study questionnaires and were guided by the researcher and teachers to complete them. Finally, the students and teachers were thanked for their participation.

#### Statistical Analysis:

The data collected was coded and entered in MS Excel and analysed using IBM-SPSS version 25.0.



For continuous variables, descriptive data are presented as the mean and standard deviation. For categorical variables, data are presented as frequencies and percentages. An Independent t-test was used for the comparison of means and the chi-square test was used for categorical variables.

#### **Results:**

#### Participant characteristics:

A total of 200 students participated in the study. Table 1 shows the descriptive characteristics of the students. Among the 200 students, female students were predominant, accounting for 66% (n=132). On parents ' education, 60.5% (n=121) had school-level education. Around 65% (n=130) of the students were from urban areas, and 61% (n=122) of them lived in a nuclear family.

Around 63% (n=126) of the students have 1-3 gadgets at home (including TV, mobile phone, computer, laptop, tablet, and video games). Only 14.5% (n=29) of students have their own mobile and 32% (n=64) have internet access in their home. Nearly 65% (n=130) of the students use passive means of transport (i.e. car, auto& public transport) to school

Characteristics	Variables	Frequencies (percentage%)
Age	14-15 years	40(20%)
	15-16 years	128(64%)
	16-17 years	32(16%)
Gender	Male	68(34%)
	Female	132(66%)
Father's education	illiterate	14(7%)
	School education	112(56%)
	Graduate	74(37%)
Mother's education	illiterate	18(9%)
	School education	130(65%)
	Graduate	52(26%)
Family type	Nuclear family	122(61%)
	Joint family	67(33.5%)
	Single parent	11(5.5%)

#### **Table 1 : Participant characteristics**

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#### **Table 1 : Participant characteristics**

Residence	Rural	70(35%)
	Urban	130(65%)
Total no.of gadgets in home(TV, mobile phone,computer,laptop,tablet&vi deogames)	1-3	126(63%)
	4-5	47(23.5%)
	>5	27(13.5%)
Having own mobile	Yes	29(14.5%)
	No	171(85.5%)
Having Internet access	Yes	64(32%)
	No	136(68%)
Mode of transport to school	Walking	42(21%)
	Cycling	28(14%)
	Other Vehicles (Auto, Bus, Car, Train)	130(65%)
Screen time exposure	<2 hour/day	106(53%)
	>2 hours/day	94(47%)
Physical activity	Inactive	115(57.5%)
	Active	85(42.5%)

Table 2 shows that the mean life satisfaction was 18.9 which indicates slight dissatisfaction with their life and the mean positive & negative affect were 3.1 & 3.05 respectively.



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Table 2 : Subjective well-being variables			
SWB variables	8	Mean <u>+</u> Standard deviation	
Life satisfaction	LS	18.9 <u>+</u> 6.8	
Positive Affect	PA	3.1 <u>+</u> 1.04	
	Joyful	3 <u>+</u> 1.4	
	Content	2.8 <u>+</u> 1.2	
	Cheerful	3.2 <u>+</u> 1.4	
	Fun	3.5 <u>+</u> 1.4	
Negative Affect	NA	3.05 <u>+</u> 0.7	
	Humiliated	3.6 <u>+</u> 1.4	
	Bothered	2.9 <u>+</u> 1.3	
	Irritated	3.3 <u>+</u> 1.5	
	Embittered	2.4 <u>+</u> 1.3	

Data presented as mean and standard deviation

# Prevalence of Screen time and Physical Activity in Adolescent students:

Figure 1 shows the prevalence of screen time and physical activity in adolescents.

High screen time exposure was found to be prevalent in 47% (n=94) of adolescents. Low physical activity was

found to be prevalent among 57.5% (n=115) of adolescents. Out of these, Female students were found to be predominant in both high screen time 69% (n=91) and low physical activity 71% (n=94) compared to their peers.



Figure 1 :Prevalence of Screen time and Physical Activity



Association between physical activity and screen time Table 3 shows the association between physical activity and screen time. Around 28.5% (n=57) of adolescents who reported high

physical activity had less screen time exposure

# Association between physical activity and screen time with subjective Well-being

Table 4 shows the association between Life satisfaction, Positive affect and Negative affect with physical activity and screen time. [<2hr/day]. Around 33% (n=66)] of adolescents who reported low physical activity had high screen time exposure [>2hr/day]. A chi-square test was performed and a statistically significant association was found between physical activity and screen time (p=0.001).

An Independent t-test was used to compare the association between Subjective well-being variables with physical activity and screen time.

	Screen ti		
Physical activity	< 2 hr/day	> 2 hr/day	P value
Low	49 (42.6%)	66(57.4%)	
High	57(67.1%)	28(32.9%)	0.001*

#### Table 4: Association between physical activity and screen time-1

Data presented as frequency & percentage

Chi square test performed

\* p value <0.05 denotes statistically significant

Adolescents who reported high physical activity had higher Life satisfaction (22.09  $\pm$ 5.37) and Positive affect (13.36  $\pm$ 3.50). Adolescents who reported low screen time exposure had higher Life satisfaction (23.25  $\pm$ 4.08) and Positive affect (13.40  $\pm$ 3.63).

A significant association was found between Physical activity with Life satisfaction (p=0.0001) and Positive affect (p=0.009). Also, a statistically significant association was found between Screen time with Life

satisfaction (p=0.0001) and Positive affect (p=0.001). For negative affect, no association was found for both physical activity (p=0.895) and screen time exposure (p=0.569)

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	Physical activity			Screen time	Screen time		
	Low	High	P value	Low (<2 hr/day)	High (>2 hr/day)	P value	
Life satisfaction	16.56 <u>+</u> 6.69	22.09 <u>+</u> 5.37	0.0001*	23.25 <u>+</u> 4.08	14.2 <u>+</u> 5.71	0.0001*	
Positive affect	11.81 <u>+</u> 4.48	13.36 <u>+</u> 3.50	0.009*	13.40 <u>+</u> 3.63	11.43 <u>+</u> 4.47	0.001*	
Negative affect	12.18 <u>+</u> 3.05	12.24 <u>+</u> 2.41	0.895(NS)	12.31 <u>+</u> 2.47	12.09 <u>+</u> 3.12	0.569(NS)	

#### **Discussion:**

The purpose of this study was to explore the relationship between screen time, physical activity and SWB among adolescents. Our findings indicate that almost half (47%) of adolescents are exposed to high screen time, and more than half (57.5%) have low levels of physical activity. Furthermore, our study has revealed that adolescents who spend less time on screens and are more physically active tend to have higher levels of life satisfaction and positive feelings towards themselves. Whereas negative emotions among adolescents were found to have no association with physical activity and screen time.

According to research conducted in Chennai, Tamil Nadu, 61.73% of adolescents have excessive screen time<sup>26</sup> and 63% have low physical activity<sup>27</sup>. According to a study conducted by Pavan Kumar A, 36% of adolescents had excessive screen time, while 57% had inadequate physical activity, which is consistent with our findings<sup>28</sup>. Another study carried out in India reported a significantly higher prevalence of screen time exposure, with a rate of 83.2% compared to our research<sup>29</sup>.

The physical activity recommendation for children and adolescents is to engage in at least 60 minutes per day of MVPA<sup>14</sup>. Our study has discovered a strong association between meeting this recommendation and experiencing higher levels of life satisfaction and positive emotions. Numerous studies corroborate our findings. A recent study shows that decreased depression scores, lower psychological/emotional disturbances and better subjective well-being were observed in those with increased MVPA, adequate sleep and decreased screen time<sup>30</sup>.

A systematic review suggests that engaging in physical activity has a positive effect on the emotional well-being of adolescents<sup>31</sup>. A study on Iranian youths found there is an association between physical activity and life satisfaction. However, there is a lack of association between screen time and life satisfaction<sup>32</sup>. Regular physical activity has been shown to improve self-esteem



in students<sup>33</sup>. Additionally, studies have indicated that physical activity can lead to decreased levels of depression, improved self-esteem and cognitive function<sup>34</sup>. A comparative analysis of 16 countries on leisure activity and subjective well-being found that frequent participation in sports and physical activity had a positive impact on the overall subjective well-being of children<sup>35</sup>.

Based on international guidelines, high screen time is referred to as  $>2hr/day^{14}$ . Our study revealed that curbing screen time leads to heightened life satisfaction and positive affect, though no association with negative affect was found. These findings are consistent with many other studies. A study has found that adhering to physical activity, screen time, and sleep guidelines is associated with better subjective well-being compared to non-compliance<sup>36</sup>.

A study from Lancet Child and Adolescent Health shows a collaborative association between screen time and physical activity with mental health proving that less screen time and more MVPA had considerably higher life satisfaction and lower psychosomatic complaints<sup>37</sup>. Our study supports previous research that suggests that individuals who engage in more physical activity and spend less time in front of screens are less likely to report symptoms of depression, anxiety, low self-esteem and life dissatisfaction. These individuals also have a lower risk of experiencing negative mental health outcomes, illustrating the beneficial relationship between physical activity, screen time and mental health<sup>38</sup>.

The present study offers novel insights into the relationship between negative affect and certain lifestyle habits, which diverge from existing literature. Specifically, our findings indicate that no statistically significant association exists between negative emotions

and either physical activity or screen time. This contrasts with prior investigations, which have linked elevated screen time with negative emotions such as irritability, bitterness, and sadness. Nonetheless, the current state of knowledge regarding the interplay between physical activity and screen time remains limited. Further research is needed to elucidate this complex and potentially significant interaction<sup>39</sup>.

In summary, our research reveals that: (i) Adolescents who engage in physical activity and exhibit lower levels of screen time tend to experience higher levels of life satisfaction and positive affect.; (ii) A significant association was found between screen time and physical activity, indicating that higher levels of sedentary behaviour are associated with higher screen time and vice versa; and (iii) Negative emotions are not impacted by excessive screen time or low levels of physical activity.

#### **Conclusion:**

The findings of this cross-sectional study shed light on the intricate relationship between physical activity, screen time and SWB among adolescents. Furthermore, our findings suggest a potential mediating role of physical activity in mitigating the adverse effects of excessive screen time on subjective well-being.

The implications of this study extend beyond academia, informing public health interventions and policies aimed at fostering positive mental health outcomes among adolescents. In essence, this cross-sectional study contributes to the growing body of literature on adolescent mental health, emphasizing the multifaceted nature of factors influencing subjective well-being. Moving forward, continued research and collaborative efforts are warranted to develop holistic approaches that address the complex interplay between physical activity, www.jchr.org

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screen time and subjective well-being, ultimately empowering adolescents to thrive in today's digital age.

#### **Strengths and Limitations:**

The main strength of the study was using a validated structured framework to evaluate SWB based on Diener's tripartite model.

The limitations of the study are (i) The cross-sectional design of the study limits to establishing the causality, despite correlating physical activity, screen time and SWB. Therefore, longitudinal and intervention studies are required to validate the findings (ii) The sample size was small and restricted to a single school.

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