



AN EMPIRICAL STUDY OF THE SCREEN TIME EFFECT ON THE COGNITIVE AND SOCIAL SKILL OF THE ADOLESCENT: A REGRESSION ANALYSIS-ENTER METHOD

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Abstract: The study aims to determine the effect of the screen time on the cognitive and social skill of the adolescent. This research study employed an exploratory and descriptive research design, beginning with a preliminary pilot study among adolescent and their parents. A web-based, structured Google form questionnaire was designed for the primary data collection from the adolescent and their parents. The reliability and validity of the questionnaire was checked using Cronbach's alpha, Bartlett test of significance and Kaiser-Meyer-Olkin (KMO) values. This study employed a sample size of 384 respondents. The correlation, regression enter method was used to check the cause-and-effect relationship and hypothesis testing. The study's findings concluded that screen time had a significant negative effect on the cognitive and social skill of the adolescent. As the screen time will increase then there will be high decrease in the cognitive and social skill of the adolescent. The SPSS 23.0 version software was used for statistical calculation and pictorial presentation.

Index Terms - Screen Time, Cognitive Skill, Social skill, Adolescent, Correlation & Regression.

I. INTRODUCTION

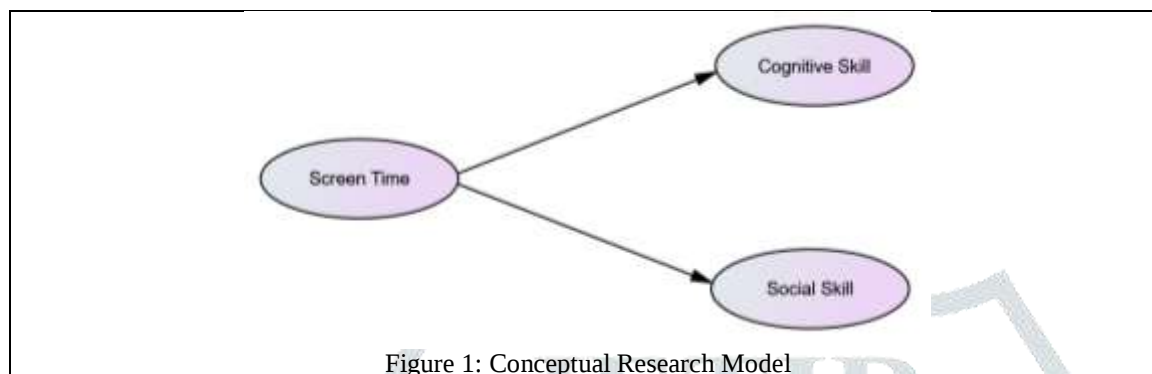
Screen time and its effects on adolescents has garnered significant attention in recent years, primarily due to the increasing prevalence of digital devices and their integration into daily life. As adolescents spend more time interacting with screens whether through smartphones, computers, or video games, there is growing concern regarding how such extensive engagement influences their cognitive and social development. Cognitive skills, which encompass the mental processes of perception, memory, judgment, and reasoning, are crucial for academic success and lifelong learning. Meanwhile, social skills, which include communication, empathy, and relationship-building, are essential for healthy interpersonal relationships and emotional well-being. Numerous studies have attempted to unravel the complex relationship between screen time and these developmental aspects, highlighting both potential benefits, such as improved technological literacy and access to educational content, and drawbacks, including decreased attention spans, poor academic performance, and impaired social interactions. It is imperative to critically assess how the nature and context of screen time such as passive consumption versus active engagement contribute to these outcomes, as well as the role that parental guidance and environmental factors play in shaping adolescents' screen experiences. By exploring both the positive and negative ramifications of screen time, we can better understand its role in the contemporary adolescent experience and inform families, educators, and policymakers about effective strategies to foster healthy digital habits and promote balanced developmental outcomes in this age group. This comprehensive exploration will not only elucidate the intricate dynamics between screen time, cognitive skills, and social abilities but also pave the way for a more nuanced understanding of how to navigate the digital landscape in a manner that supports the holistic development of adolescents in an ever-evolving technological world.

II. LITERATURE REVIEW

A literature review attempts to give a broad overview of current knowledge, theories, and conclusions by critically analyzing and summarizing the body of research on a certain subject. It places the current work into the larger academic debate, identifies gaps in the literature, and underlines the methodological strengths and flaws. A literature review aids in establishing the importance of the research subject by combining pertinent sources, directing researchers in the formulation of their hypotheses and influencing their methods. In the end, it provides a basis for expanding knowledge and encouraging additional research in the selected topic. This study employed a Mendeley desktop and Mendeley reference manager to review earlier research. The references at the conclusion of this study were compiled using the American Psychological Association's (APA) 7th edition referencing style. For convenient access to the references for every finding, a bookmark and hyperlink were also used. The previous findings are arranged in the chronological order from recent to past as under: (Shalash et al., 2024) found that young individuals who spent more time in front of screens at night had lower cognitive scores in the areas of speed information processing, working memory, math, and attention. In addition, girl had lower cognitive ratings than boy did. (George et al., 2023) found that teenagers who are exposed to too much digital media and

screens are badly affected in a number of ways, including their physical and mental health, social skills, academic performance, and overall well-being. Research indicates that spending time in front of a screen without moving around can inhibit exercise, sports, and healthy growth. This can lead to obesity, posture problems, lower bone density, vision problems, and metabolic dysfunction. Screen exposure also disrupts circadian biology, which can lead to sleep cycle disturbances and intellectual impairment. (Shanmugasundaram & Tamilarasu, 2023) found that adolescents use digital technology the most. They frequently utilize social media and social networking platforms, as well as online communication and entertainment outlets. The usage of digital technology can have an impact on adolescents in a variety of ways, including their mental health, academic achievement, and socio-emotional status. In other study, (Rabbani et al., 2022) found that the quantity of time spent in front of a screen was significantly related to psychological well-being. There was no significant association between the amount of screen usage and the parenting style. Next, it was determined that the relationship between the amount of time spent on screens and the style of parenting was not significant. As a result, the study indicates that the way parents raise their children does not have an impact on the relationship between the amount of time children spend in front of screens and their mental health. In other study, (Paulich et al., 2021) found that more screen usage is somewhat linked to poorer mental health, more behavioral issues, lower academic achievement, and worse sleep, but it is also related with better quality of peer interactions. On the other hand, the impact sizes that were connected to screen time and the different outcomes were small; SES was more closely related to each outcome measure. The previous study demonstrated a cause-and-effect relationship, and the tiny effect sizes that were detected indicate that increased screen time is not likely to be directly hazardous to children aged 9 and 10. In other study, (Oswald et al., 2020) found that in a connected world, children and adolescents may experience increasing screen Time (ST) and decreasing Green Time (GT), potentially affecting their mental health. However, research typically fails to take into account the ways in which both ST and GT affect psychological well-being. Longitudinal and intervention research should examine the psychological impacts of both, taking into account unique developmental ages and low socioeconomic status backgrounds. GT proposes a possible technique to reduce elevated ST levels, however additional data is required to support this. In other study, (Kaur et al., 2019) found that in high- and middle-income nations, children under the age of five are more likely to spend too much time in front of a screen. Excessive screen time can have a number of negative effects on health, including emotional, sleep, and behavioral problems. These difficulties can hinder the growth and cognitive development of children under the age of five. Most of the high-income countries have created recommendations for regulating the excessive digital-media usage for all age groups like Canada, Australia, and Italy. In other study, (Victorin, 2018) discussed that smartphones were introduced in 2007, school pupils have demonstrated major changes in their behavior. As a result, young people are experiencing a decline in social engagement, interest in driving, dating, and sexual activities, which suggests that they are not developing in real life and are not sensitive to others. In other study, (Przybylski & Weinstein, 2017) found that the potential negative relationship between media consumption and well-being may not be as important as it seems, and they emphasize the ongoing need to carefully reassess research assertions that exceed the data that is available. the necessity of a thorough cost-benefit review of the current professional advice, which currently supports the allocation of valuable pediatrician consultation time to addressing media use with caregivers. In other study, (Chassiakos et al., 2016) found that new digital and social media make it easier to interact with others and encourage participation and engagement by allowing people to both see and create information. However, the impact of media use is influenced by a variety of factors, including the type of media, the manner in which it is used, the frequency and duration of use, and the unique qualities of the child or teenager who is consuming it. Parents should be encouraged to create personalized Family Media Use Plans for their families that take into account the age, health, temperament, and developmental stage of each child. This is because children today are growing up in an era of highly personalized media use experiences. These plans should ensure that each child can practice and benefit from the essentials for healthy growth and development, such as a healthy diet, good sleep hygiene, adequate physical activity, and positive social interactions. In other study, (Mills, 2014) found that the brains of adults are still capable of functional change, even if internet use is affecting the growing brain during adolescence. In fact, training programs that are centered on the internet are being created to take advantage of that. (Govindaiah, 2012) found that children today have access to a wide variety of media, including television, cell phones, movies, music, video games, and the Internet, at all times. Media can improve children's education, learning chances, curiosity, creativity, and communication skills. On the other hand, technology can also impart negative life lessons, take up too much of children's time, and distract them from exercising, playing physically, and socializing with others. Parents can help their children make better choices about the media they consume by learning about the different types of media available today (including the latest Internet formats for obtaining and consuming media and for communicating), by monitoring the media their children consume, by reviewing media before allowing their children to see it, by using media blocking technologies to make it harder for their children to view inappropriate content, and by setting and enforcing clear rules and boundaries for balanced media use. In other study, (Helsel, 2008) found that adolescents who use social media platforms excessively have been found to experience harmful psychological impacts. Adolescents use their blogs to express themselves and reflect on their lives, which helps them improve their social skills and sense of identity. The principles for ethical behavior when examining teenagers' social network site profiles are offered, along with recommendations for how counselors and counselor educators can use blogs to improve traditional therapies. (Meier et al., 2007) found that when leisure-based screen time is reduced, encouraging physical activity from parents, spouses, educators, and siblings, as well as creating additional chances for physical activity, could all be beneficial in increasing physical activity in both adults and children. If not, other sedentary hobbies may simply take the place of the time spent in front of a screen.

2.1 Conceptual Research Model



Source: AMOS 23.0

According to the conceptual research model depicted in figure 1, screen time is the independent latent constructs and cognitive and social skill are the dependent latent construct. All the screen time, cognitive skill and social skill constructs having 4 items/statements to measure it.

The objectives of this study are as follows:

- To find the effect of the screen time on the cognitive skill of the adolescent.
- To find the effect of the screen time on the social skill of the adolescent.

The hypotheses of this study are as follows:

- H01: There is no significant effect of the screen time on the cognitive skill of the adolescent.
- H02: There is no significant effect of the screen time on the social skill of the adolescent.

III. RESEARCH METHODOLOGY

This study utilized an exploratory and descriptive research design. In exploratory research design new information and knowledge was explored as well as hypotheses were formulated. In a cross-sectional descriptive design, hypotheses were tested using statistical tools. The correlation-regression analysis was used in this study. The reliability and validity of the questionnaire was checked using Cronbach's alpha, Bartlett test of significance and Kaiser-Meyer-Olkin (KMO) values.

3.1 Data

The primary data was collected using a web based (Google form) structured questionnaire. The study measured demographic variables such as age, gender, and education using a nominal scale, also referred to as grouping variables, and screen time, cognitive skill and social skill construct are measured using a 5-point Likert scale stating as 1 code is strongly agree, 5 code is strongly disagree and 3 code is neither agree nor disagree.

3.2 Population & Sampling

The sampling population targeted 400 respondents and successfully received 384 responses from the web-based Google form survey from the adolescent and their parents. The responses rate was 96.0%. The primary data was collected using non-probability snowball sampling.

3.3 Pilot Study

Pilot research was conducted as a preliminary investigation, using a sample size that represented approximately ten percent of the total sample size. The reliability test using Cronbach's alpha. An acceptable value for Cronbach's alpha must be greater than or equal to 0.700. We used the KMO test to assess a sufficient sample. We consider a KMO value of at least 0.60 as the minimum requirement for achieving optimal outcomes. The greater the quality of something, the more elevated its KMO value. We regard a KMO value of 0.848 as outstanding.

Table 1 : Reliability and Validity Summary

Construct	Cronbach's Alpha	Kaiser-Meyer-Olkin (KMO) Test	% of Variance	Number of Items
Screen Time	.809	.707	65.006	4
Cognitive Skill	.807	.648	64.011	4
Social Skill	.871	.726	72.127	4

Source: SPSS 23.0

The table 1 results indicate that the Cronbach alpha value and KMO values are (.809, .807, .871) and (.707, .648, .726) as well as the % of variance are (65.006%, 63.011%, 72.127%) for all three constructs (Screen Time, Cognitive Skill, and Social Skill), hence the reliability and validity conditions are satisfied. Some items under each construct are deleted whose Corrected item-total correlation (CITC) values are below 0.300 under the reliability testing. The component matrix displays the factor loading for each item across all three constructs as follows:

Table 2 : Component Matrix: Screen Time, Cognitive Skill, and Social Skill

Screen Time - Statements	Factor Loading
ST1.1 I spend more than 3 hours per day on recreational screen activities (e.g., gaming, social media, streaming).	.880
ST1.2 I often use my smartphone or tablet while doing other tasks, such as homework or chores.	.916
ST1.3 I feel that the amount of time I spend on screens affects my sleep quality.	.610
ST1.4 AI technologies have the potential to positively impact the future of my career.	.784
Cognitive Skill - Statements	
CS1.1 I often find it easy to remember information I learned recently.	.910
CS1.2 I regularly engage in activities that require problem-solving, such as puzzles, math, or strategy games.	.831
CS1.3 I am able to focus on tasks for extended periods without becoming distracted.	.817
CS1.4 I feel confident in my ability to understand and analyze complex information or concepts.	.613
Social Skill: Statements	
SS1.1 I feel comfortable in the social gatherings.	.812
SS1.2 I am comfortable in starting a conversation with someone new.	.814
SS1.3 I am comfortable with sharing personal information with others.	.862
SS1.4 I am comfortable in expressing my displeasure with others.	.905

Source: SPSS 23.0

According to the component matrix table 2, it is clear that all items under each construct is extracted using Principal Component Analysis (PCA) method. The factor loading of each item under each construct is above 0.5 which is acceptable for further statistical analysis.

IV. RESULTS AND DISCUSSION

4.1 Correlation and Regression between Screen Time and Cognitive Skill

The cause-and-effect analysis was tested using correlation and regression analysis. The correlation analysis explored how each variable is correlated with other variable whether positive or negative or low or high. The regression analysis finds the cause-and-effect relationship with the magnitude and strength of the relationship between variables. The correlation and regression analysis are discussed as under using SPSS 23.0 version software.

Table 3: Correlations: Screen Time and Cognitive Skill

		Cognitive Skill	Screen Time
Pearson Correlation	Cognitive Skill	1.000	-.897
	Screen Time	-.897	1.000
Sig. (1-tailed)	Cognitive Skill	.	.000
	Screen Time	.000	.
N	Cognitive Skill	384	384
	Screen Time	384	384

Source: SPSS 23.0

According to the correlation table 3, it is clear that the Pearson Correlation coefficients is -0.897, between screen time and cognitive skill, hence screen time had negative high significant (0.000) correlation with cognitive skill among adolescent., therefore it can be concluded that by increasing the screen time, the cognitive skill among adolescent will decrease significantly.

First Regression Model

$$Y (\text{Cognitive Skill}) = a + b X (\text{Screen Time})$$

Where a and b are the constant.

Table 4: Variables Entered/Removed: Screen Time and Cognitive Skill

Model	Variables Entered	Variables Removed	Method
1	Screen Time ^b	.	Enter
a. Dependent Variable: Cognitive Skill			
b. All requested variables entered.			

Source: SPSS 23.0

According to the variables Entered/Removed table 4, it is clear that screen time is the independent variables whereas cognitive skill is the dependent variable. The enter regression method is used in this study.

Table 5: Model Summary: Screen Time and Cognitive Skill

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.897 ^a	.805	.804	.17415	.805	1574.648	1	382	.000

a. Predictors: (Constant), Screen Time

Source: SPSS 23.0

According to the model summary table 5, the R square value is 0.805, hence 80.5% variance is explained in the cognitive skill dependent variable by combined all the four items of independent variable screen time. Therefore, it is a good selection of questions to measure the cognitive skills and screen time in the questionnaire.

Table 6: ANOVA: Screen Time and Cognitive Skill

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	47.759	1	47.759	1574.648	.000 ^b
	Residual	11.586	382	.030		
	Total	59.345	383			

a. Dependent Variable: Cognitive Skill

b. Predictors: (Constant), Screen Time

Source: SPSS 23.0

According to the ANOVA table 6, it is clear that F value is (1574.648) and significant (0.000), hence the selected model is highly significant for the further interpretation of the coefficient table which explained about the magnitude and strength of the relationship between screen time and cognitive skill.

Table 7: Coefficients: Screen Time and Cognitive Skill

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	6.083	.066		92.817	.000	5.954	6.212
	Screen Time	-.643	.016	-.897	-39.682	.000	-.675	-.611

a. Dependent Variable: Cognitive Skill

Source: SPSS 23.0

According to the coefficient table 7, it is clear that for (Screen Time), the significant value is (0.000), hence it is safe to reject the first null hypothesis (H01: There is no significant effect of the screen time on the cognitive skill of the adolescent.) and it can be concluded that there was a significant effect of the screen time on the cognitive skill of the adolescent. The regression equation can be formulated as

First Regression Equation

$$Y (\text{Cognitive Skill}) = 6.083 + (-.897) X (\text{Screen Time})$$

Based on the above regression equation, it can be concluded that by increasing one unit in the screen time, then there was decrease of 0.897 unit in the cognitive skill of the adolescent. The regression line between screen time and cognitive skill are shown below:

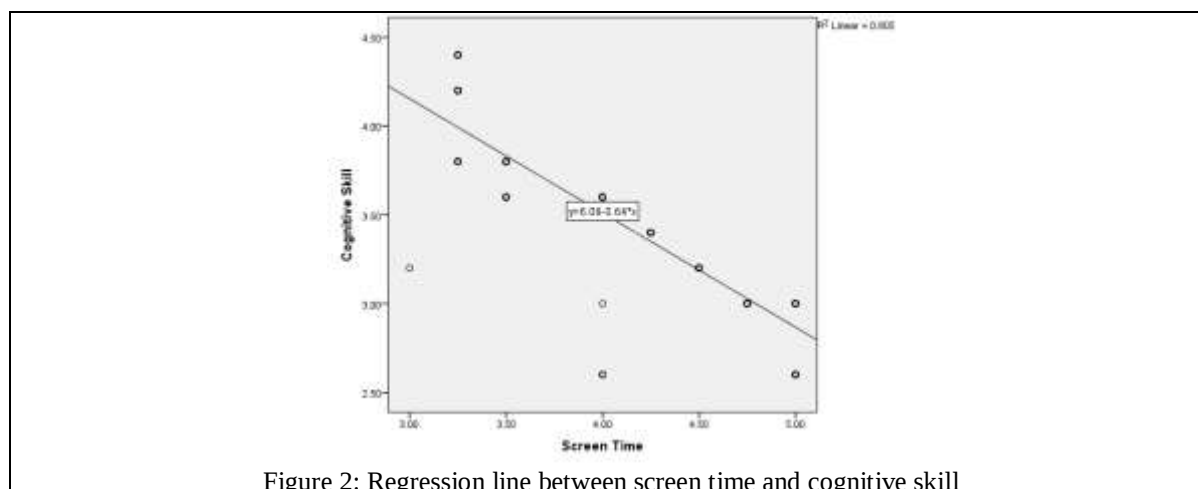


Figure 2: Regression line between screen time and cognitive skill

Source: SPSS 23.0

According to the regression line between screen time and cognitive skill figure 2, it is clear that by increasing the screen time, the cognitive skill will decrease significantly.

4.2 Correlation and Regression between Screen Time and Social Skill

Table 8: Correlations: Screen Time and Social Skill

Pearson Correlation	Social Skill	Social Skill	Screen Time
	Screen Time	Screen Time	Screen Time
Sig. (1-tailed)	Social Skill	.	.000
	Screen Time	.000	.
N	Social Skill	384	384
	Screen Time	384	384

Source: SPSS 23.0

According to the correlation table 8, it is clear that the Pearson Correlation coefficients is -0.882, between screen time and social skill, hence screen time had negative high significant (0.000) correlation with social skill among adolescent., therefore it can be concluded that by increasing the screen time, the social skill among adolescent will decrease significantly.

Second Regression Model

$Y (\text{Social Skill}) = a + b X (\text{Screen Time})$

Where a and b are the constant.

Table 9: Variables Entered/Removed: Screen Time and Social Skill

Model	Variables Entered	Variables Removed	Method
1	Screen Time ^b	.	Enter
a. Dependent Variable: Social Skill			
b. All requested variables entered.			

Source: SPSS 23.0

According to the variables Entered/Removed table 9, it is clear that screen time is the independent variables whereas social skill is the dependent variable. The enter regression method is used in this study.

Table 10: Model Summary: Screen Time and Social Skill

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.882 ^a	.779	.778	.26550	.779	1343.242	1	382	.000
a. Predictors: (Constant), Screen Time									

Source: SPSS 23.0

According to the model summary table 10, the R square value is 0.779, hence 77.9% variance is explained in the social skill dependent variable by combined all the four items of independent variable screen time. Therefore, it is a good selection of questions to measure the social skill and screen time in the questionnaire.

Table 11: ANOVA: Screen Time and Social Skill

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	94.682	1	94.682	1343.242	.000 ^b
	Residual	26.926	382	.070		
	Total	121.609	383			
a. Dependent Variable: Social Skill						
b. Predictors: (Constant), Screen Time						

Source: SPSS 23.0

According to the ANOVA table 11, it is clear that F value is (1343.242) and significant (0.000), hence the selected model is highly significant for the further interpretation of the coefficient table which explained about the magnitude and strength of the relationship between screen time and social skill.

Table 12: Coefficients: Screen Time and Social Skill

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	7.205	.100		72.113	.000	7.008	7.401
	Screen Time	-.905	.025	-.882	-36.650	.000	-.954	-.857
a. Dependent Variable: Social Skill								

Source: SPSS 23.0

According to the coefficient table 12, it is clear that for (Screen Time), the significant value is (0.000), hence it is safe to reject the second null hypothesis (H02: There is no significant effect of the screen time on the social skill of the adolescent.) and it can be

concluded that there was a significant effect of the screen time on the social skill of the adolescent. The regression equation can be formulated as

Second Regression Equation

$$Y (\text{Social Skill}) = 7.205 + (-.882) X (\text{Screen Time})$$

Based on the above regression equation, it can be concluded that by increasing one unit in the screen time, then there was decrease of 0.882 unit in the social skill of the adolescent. The regression line between screen time and social skill are shown below:

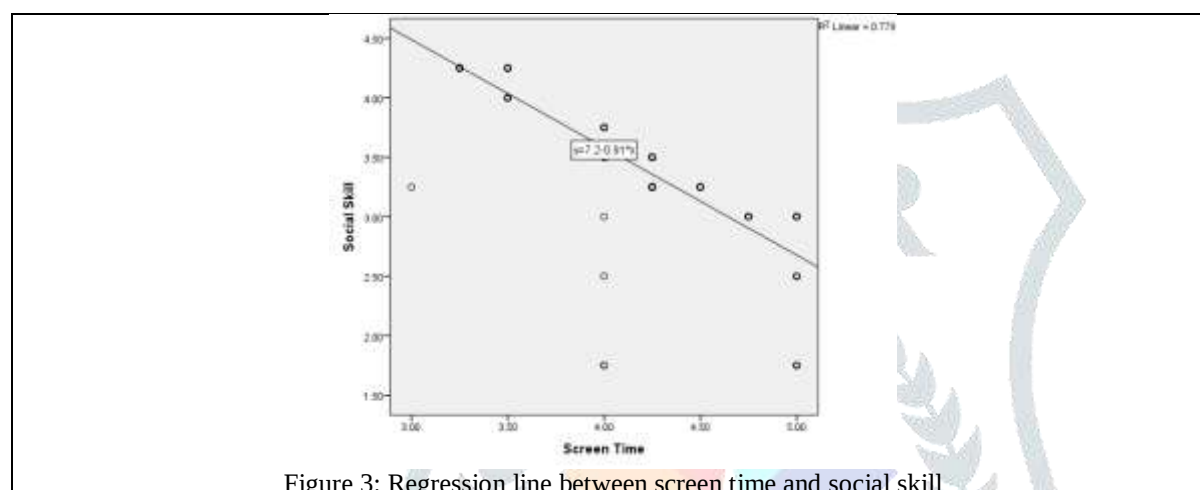


Figure 3: Regression line between screen time and social skill

Source: SPSS 23.0

According to the regression line between screen time and social skill figure 3, it is clear that by increasing the screen time, the social skill will decrease significantly.

V. CONCLUSION

In the case of first regression model, for (Screen Time), the significant value is (0.000), hence it is safe to reject the first null hypothesis (H01: There is no significant effect of the screen time on the cognitive skill of the adolescent.) and it can be concluded that there was a significant effect of the screen time on the cognitive skill of the adolescent. The significant value for the second regression model is (0.000), hence it is safe to reject the second null hypothesis (H02: There is no significant effect of the screen time on the social skill of the adolescent.) and it can be concluded that there was a significant effect of the screen time on the social skill of the adolescent. (Shalash et al., 2024) also gives the similar findings.

VI. ACKNOWLEDGMENT

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VII. STATEMENTS AND DECLARATIONS

The authors have disclosed no potential conflicts of interest regarding the research, authorship, and/or publication of this article.

VIII. ETHICAL CONSIDERATIONS

The questionnaire included a 'Consent Form to Data Confidentiality', requiring respondents to sign a confidentiality agreement to keep their data confidential for the research work only. The study methods were conducted in accordance with the university's approved guidelines.

IX. CONSENT TO PARTICIPATE

The adolescent and their parents provided their written informed consent to participate in this study.

X. FUNDING STATEMENT

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