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Research Article

Cognitive Functioning and Emotional Regulation: the Levels of Digital Screen Use in Relation to Socio-Demographic Factors

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Abstract:
When an individual is no longer a child but not yet an adult is described as the period of adolescence. Mobile formed the maximum used Screen Based Media. Adolescents who spent more time on media (including social media and electronic devices such as smartphone's) were more likely to report mental health issues, so there is a need to create awareness among parents, teachers, and children. Cognitive functioning and emotional regulation found to be an important variable associated with the screen use is affecting the population in varied ways both positively and negatively. This study aims to assess the interaction of multiple variables with levels of digital screen use in three phases of adolescence. The total sample size is 600 with an age group ranging from 10-19 years from Dakshina Kannada district, Karnataka. The data collection included systematic random sampling method and study adopts cross-sectional research design. The semi-structed interview and questionnaires were used for assessment of variables and socio-demographic data. MANOVA, Kruskal-Walli's test and SPSS 23 version is used for the analysis of data. The result shows significant difference in problem solving across age, domicile, gender and levels of digital screen use. Also, there is a significant difference in cognitive reappraisal and expressive suppression in early and mid-adolescence across domicile, gender and levels of digital screen use.

Keywords: adolescence, digital screen use, cognitive functioning, emotional regulation, gender

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Introduction:

Digital screen-use and Adolescence: According to WHO "Adolescence is a phase of development on many fronts: from the appearance of secondary sex characteristics (puberty) to sexual and reproductive maturity; the development of mental processes and adult identity; and the transition from total socio-economic and emotional dependence to relative independence". In search of independence, adolescents find screen-based devices are the great way to escape from parents and their daily problems in connection with the peer group (crone & Konijn, 2018). Being a part of the peer group will boost the confidence in adolescents while also pressuring them to conform to the norms of the group. In order to avoid these disturbances, communication through different digital media will help them supplement the face-to-face approach and bring satisfaction (Van Cleemput, 2010). There found an association between Screen Based Media usage and the socio-demographic status i.e. age, type of family, father's education, and father occupation with the statistical significance of p value <0.05 (Shwetha G et al., 2020). Effects differ depending on the type of use: whereas procrastination and passive use are related to more negative effects, social and active use are related to more positive effects (Dienlin. T & Johannes. N (2020).

Digital screen-use and Cognitive functioning: Cognitive functioning refers to "multiple mental abilities, including

learning, thinking, reasoning, remembering, problem solving, decision making, and attention" (Gwenith G. Fisher, 2019). According to Woodsworth and Marquis (1948) "Problem Solving behaviour occurs in novel or difficult situations in which a solution is not obtainable by the habitual methods of applying concepts and principles derived from past experience in very similar situation." According to the study by Rahul Chauhan (2020), a person distraught to digital screen may get into psychological problems such as frustration, distress, isolation, depression, fatigues, sadness, loneliness, and other behavioural changes. It is reported that "there exists a relationship between use of internet and mental well-being. Little bit of internet use can have positive impact on children and young people's wellbeing in minor level, while the two extremes of not being online at all and excessive use can have a small negative impact on mental wellbeing" (UNICEF, 2017). Screen time usage of more than 2 hours per day increases the social isolation among young adults compared to that of those who use screen time less than 30 mins a day (Primack BA, 2017). The research studies on brain development reports negative impact of high screen time on white matter pathways, which are responsible for reading and language, also poor executive functioning. The study also addresses the concern over the generation affected by screen time, where the age group (young children) who are prone to the development of brain plasticity when exposed to screen use might lead to certain deficiency. (Horowitz-Kraus T, et al., 2018; Hutton JS, 2019; Small, GW et al., 2020).

Digital screen-use and Emotional Regulation: Gross has proposed a model on emotional regulation, which defines Emotional regulation as "the processes by which we influence which emotions we have, when we have them, and how we experience and express these emotions" (Gross, 1998b). This involves few strategies such as Antecedent focused and response focused strategies. Antecedent focused strategies include regulating the response of the emotions through modification in incoming information before the generation of emotions. This might be through situation selection, situation modification, attentional deployment and cognitive change. Response – focused strategies is based on the expressive, cognitive or physiological emotional response elicited, which includes expressive suppression (Gross, 2001; Gross & John, 2003; Gomez-Ortiz O et al., 2016).

Research methodology:

Objectives:

- To assess the influence of socio-demographic factors on cognitive functioning, emotional regulation among adolescents with varied level of digital screen use.

Hypotheses:

Ha_1: There is a significant difference in adolescents with varied level of digital screen use in their cognitive functioning across age, domicile and gender.

Ha_2: There is a significant difference in adolescents with varied level of digital screen use in their emotional regulation across age, domicile and gender.

Variables:

Independent variable: Age, gender, levels of digital screen use
Dependent variable: cognitive functions – memory and problem solving, emotional regulation – cognitive reappraisal and expressive suppression

Sample Design:

The study was conducted on 600 adolescents with the age of 10 to 19 years pursuing their studies in schools and colleges of Dakshina Kannada district. The sample was collected through systematic random sampling method. The research design of the study was Expost facto cross sectional research design. The sample was divided as 200 from each phase such as early adolescence (10-14 years), middle adolescence (15-17 years) and late adolescence (18-19 years). The level of digital screen use as high, moderate and low was assessed.

Inclusion criteria:

- 10-19 years adolescent boys and girls studying in schools and colleges of Dakshina Kannada district.
- Adolescents with the proficiency of English.
- Adolescents who use digital screen for daily activities.

Exclusion criteria:

- The adolescents with any form of mental and physical illness.

Tools:

- The Questionnaire for screen time of adolescents (QueST) by Knebel. M et al., (2020)
- Wechsler memory scale III edition (1998)
- Problem solving ability test developed by L.N Dubey (2011)
- Emotional regulation questionnaire for Children and Adolescents (ERQ-CA) by Eleonora Gullone and John Taffe (2011)

Procedure:

The quantitative data was collected by obtaining the assent and informed consent from the sample. The responses for the questionnaires were obtained by contacting the participants personally. Having followed by all the ethical considerations, the demographic details were collected through semi-structured interview and examined for meeting the inclusion criteria of the study. The results were analysed using statistical techniques.

Statistical analysis:

- MANOVA
- Kruskal-Walli's test

Result and discussion:

Demographic details of the data

Figure 1 *Levels of digital screen use among adolescents*

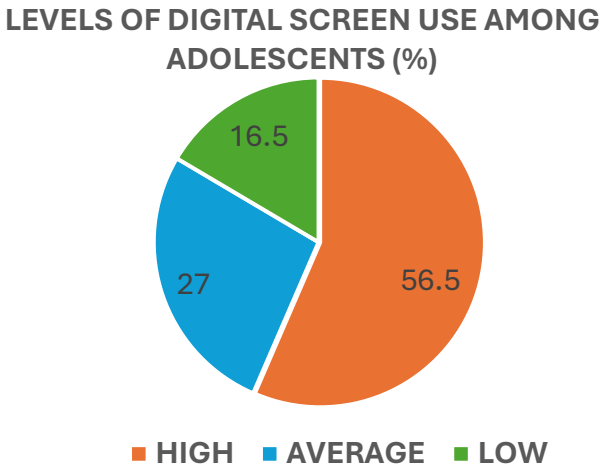


Figure 2 *Level of digital screen use among adolescents across gender*

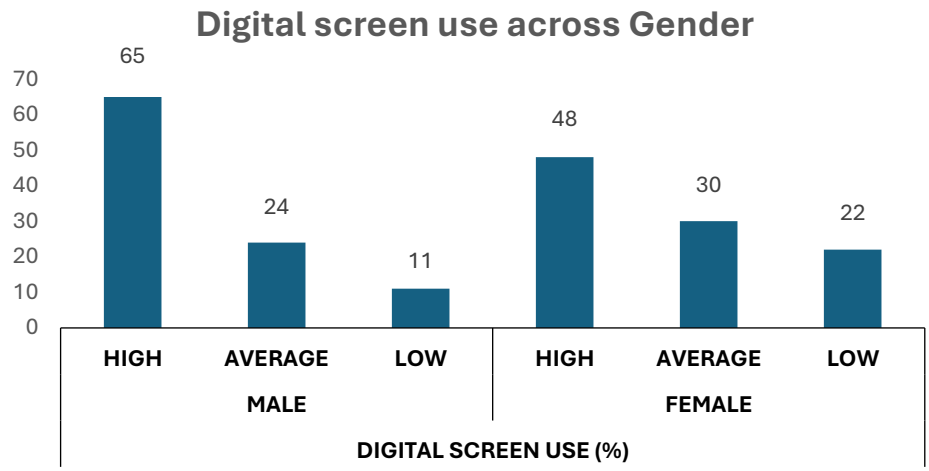


Figure 3 *Level of digital screen use among adolescents across domicile*

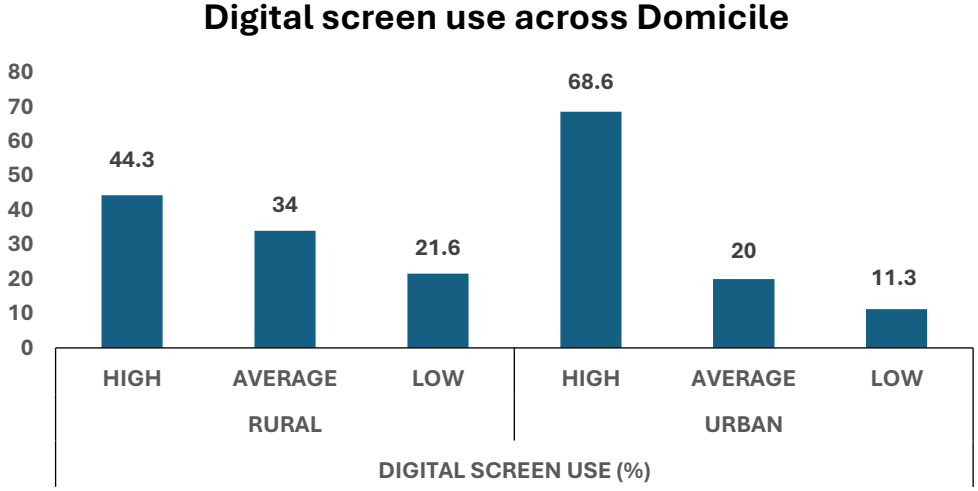


Figure 4 *Level of digital screen use among 10-14 years adolescents across gender and domicile*

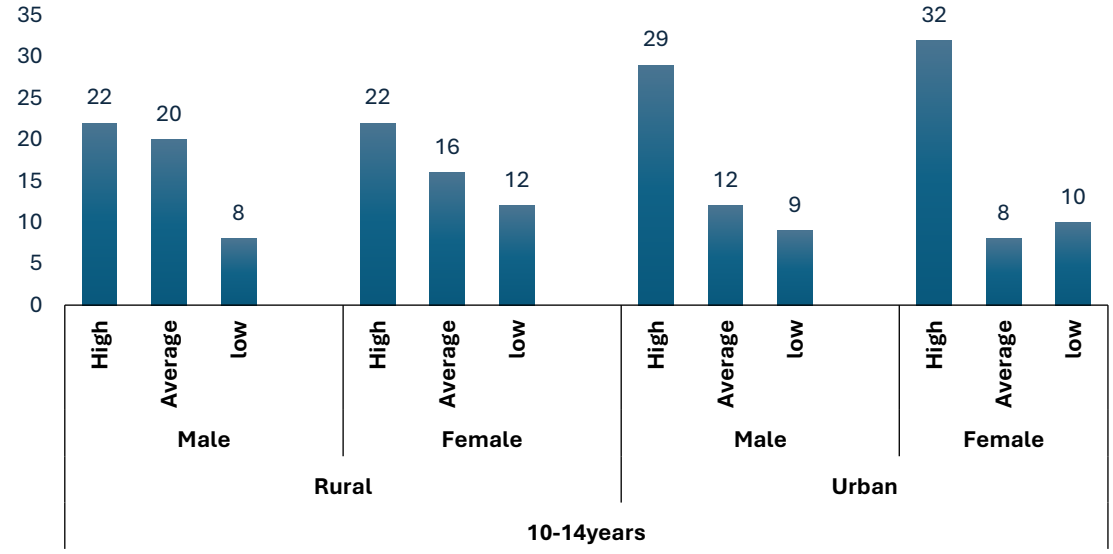


Figure 5 *Level of digital screen use among 15-16 years adolescents across domicile*

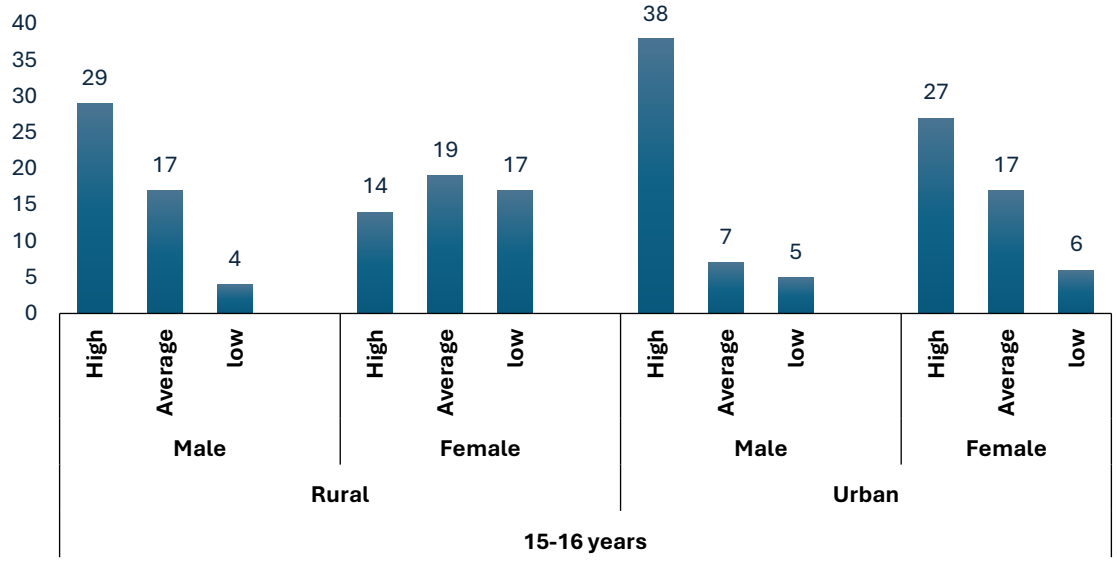
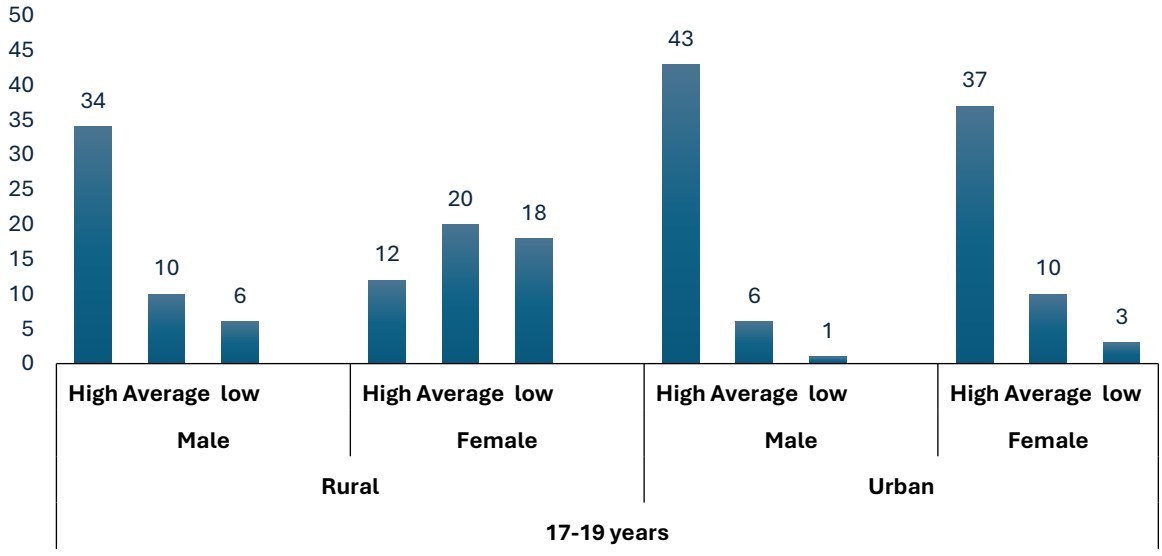


Figure 6 *Level of digital screen use among 17-19 years adolescents across domicile*



The hypothesis stating "There is a significant difference in adolescence with varied level of digital screen use in their cognitive functioning across age, domicile and gender" was tested using MANOVA.

Table 1 *Mean, SD of Memory in early adolescence across domicile, gender and levels of digital screen use*

Phases	Domicile	DSU	Gender	N	Mean	SD	F value	p value
E	R	A	Male	20	3.11	1.09		
			Female	16	2.85	.88		
		H	Male	22	3.35	.91		
			Female	11	3.12	.73		
		L	Male	08	3.11	.51		
			Female	23	2.93	.98	0.64	0.79
	U	A	Male	12	2.91	.84		
			Female	08	2.90	.88		
		H	Male	29	2.92	.77		
			Female	32	3.24	.93		
		L	Male	09	3.17	1.33		
			Female	10	2.76	.92		

Note. E = early adolescence; R = rural domicile; U = urban domicile; A = average digital screen use; H = high digital screen use; L = low digital screen use.

Figure 7 *Mean values of Memory in early adolescence across domicile, gender and levels of digital screen use*

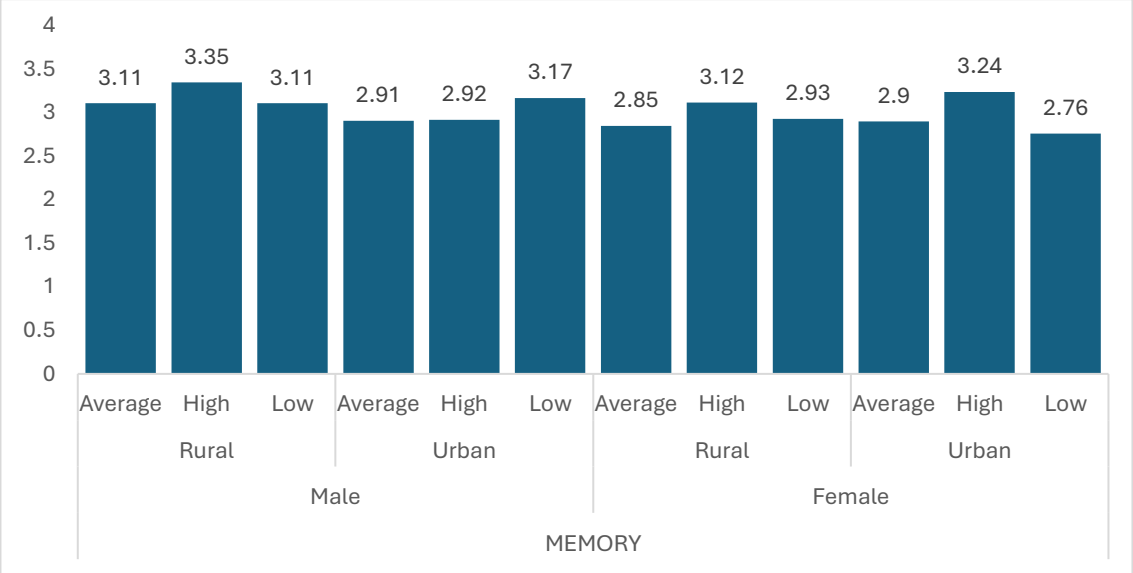


Table 2: Mean, SD of Memory in Mid-adolescence across domicile, gender and levels of digital screen use.

Phases	Domicile	DSU	Gender	N	Mean	SD	F value	p value
M	R	A	Male	17	3.19	1.13		
			Female	14	2.92	.92		
		H	Male	30	3.22	.85		
			Female	19	2.93	.91		
		L	Male	03	3.23	.68		
			Female	17	2.99	.89	0.60	0.82
	U	A	Male	07	3.36	.33		
			Female	17	3.24	1.20		
		H	Male	38	2.84	.95		
			Female	27	2.98	.73		
		L	Male	05	3.38	.82		
			Female	06	3.15	.91		

Note. E = early adolescence; R = rural domicile; U = urban domicile; A = average digital screen use; H = high digital screen use; L = low digital screen use.

Figure 8 *Mean values of Memory in mid adolescence across domicile, gender and levels of digital screen use*

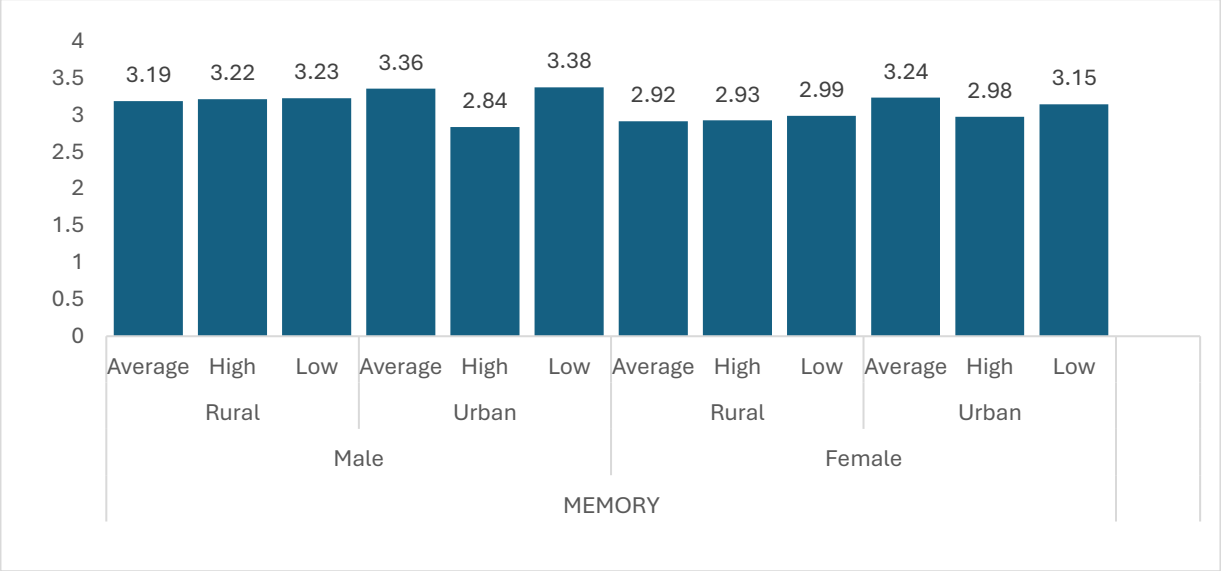
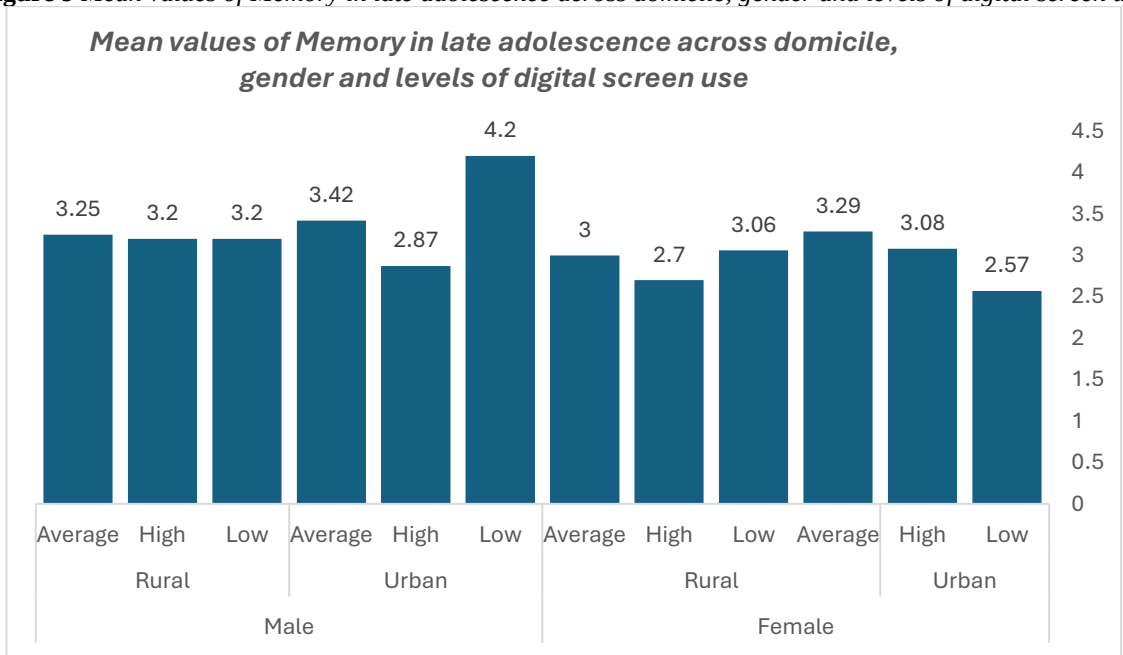


Table 3: Mean, SD of Memory in Late-adolescence across domicile, gender and levels of digital screen use.

Phases	Domicile	DSU	Gender	N	Mean	SD	F value	p value
L	R	A	Male	10	3.25	1.03		
			Female	20	3.00	.92		
		H	Male	34	3.20	.97		
			Female	12	2.70	.83		
		L	Male	06	3.20	.56		
			Female	18	3.06	.91	0.82	0.61
	U	A	Male	06	3.42	.31		
			Female	10	3.29	1.52		
		H	Male	43	2.87	.92		
			Female	37	3.08	.71		
		L	Male	01	0	4.20		
			Female	03	2.57	.92		

Figure 9 *Mean values of Memory in late adolescence across domicile, gender and levels of digital screen use*



The table 1 shows the mean value of early adolescence across domicile, gender and levels of digital screen use in memory. The result shows that there is no significant relationship between memory across domicile, gender and levels of digital screen use in early-adolescence (F = 0.64, p =0.79, p >0.05). Hence null hypothesis is accepted.

The table 2 shows the mean value of mid-adolescence across domicile, gender and levels of digital screen use in memory. The result shows that there is no significant relationship between memory across domicile, gender and levels of digital screen use in mid-adolescence (F = 0.60, p =0.82, p >0.05). Hence null hypothesis is accepted.

The table 3 shows the mean value of late-adolescence across domicile, gender and levels of digital screen use in memory. The result shows that there is no significant relationship between memory across domicile, gender and levels of digital screen use in late-adolescence (F = 0.82, p =0.61, p >0.05). Hence null hypothesis is accepted.

Table 4: Mean, SD of Problem solving in early-adolescence across domicile, gender and levels of digital screen use.

Phases	Domicile	DSU	Gender	N	Mean	SD	F value	p value
E	R	A	Male	20	-2.26	.77		
			Female	16	-1.77	.48		
		H	Male	22	-2.31	.56		
			Female	11	-2.10	.73		
		L	Male	08	-2.44	.65		
			Female	23	-1.54	.56	5.91	0.0001*
	U	A	Male	12	-2.44	.73		
			Female	08	-1.54	.56		
		H	Male	29	-2.62	.59		
			Female	32	-1.87	.67		
		L	Male	09	-1.77	.48		
			Female	10	-1.48	.71		

Note. E = early adolescence; R = rural domicile; U = urban domicile; A = average digital screen use; H = high digital screen use; L = low digital screen use.
*p < .001.

Figure 10 *Mean values of Problem solving in early adolescence across domicile, gender and levels of digital screen use*

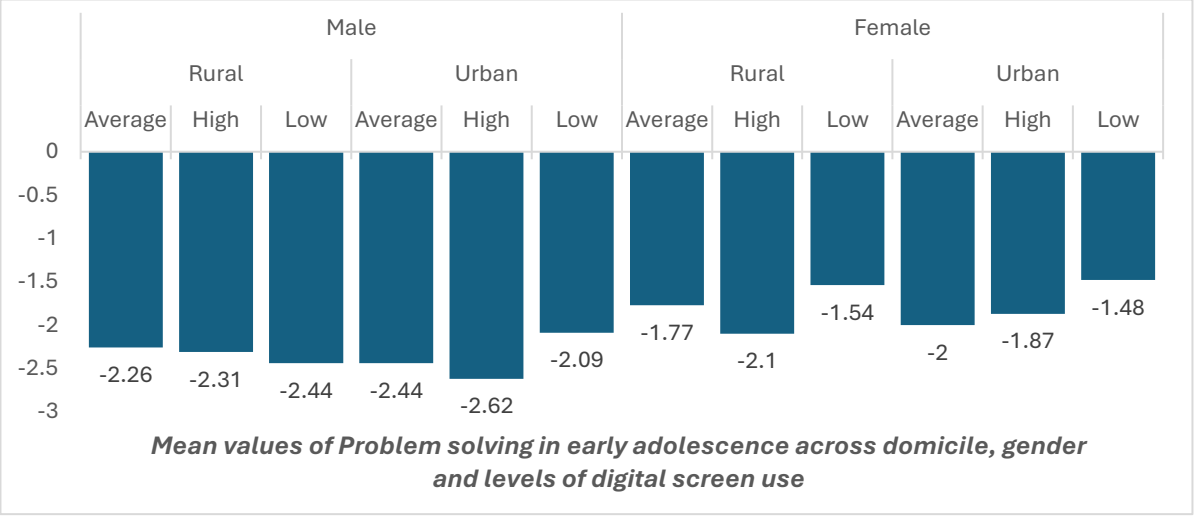


Table 5: Mean, SD of Problem solving in mid-adolescence across domicile and levels of digital screen use.

Phases	Domicile	DSU	Gender	N	Mean	SD	F value	p value
M	R	A	Male	17	-2.10	.71		
			Female	14	-1.72	.49		
		H	Male	30	-2.39	.62		
			Female	19	-1.85	.73		
		L	Male	03	-2.80	0		
			Female	17	-2.00	.58	6.31	0.0001
	U	A	Male	07	-2.55	.54		
			Female	17	-2.00	.58		
		H	Male	38	-2.52	.65		
			Female	27	-1.86	.64		

L	Male	05	-2.10	.72
	Female	06	-1.03	.53

Figure 11 *Mean values of Problem solving in mid adolescence across domicile, gender and levels of digital screen use*

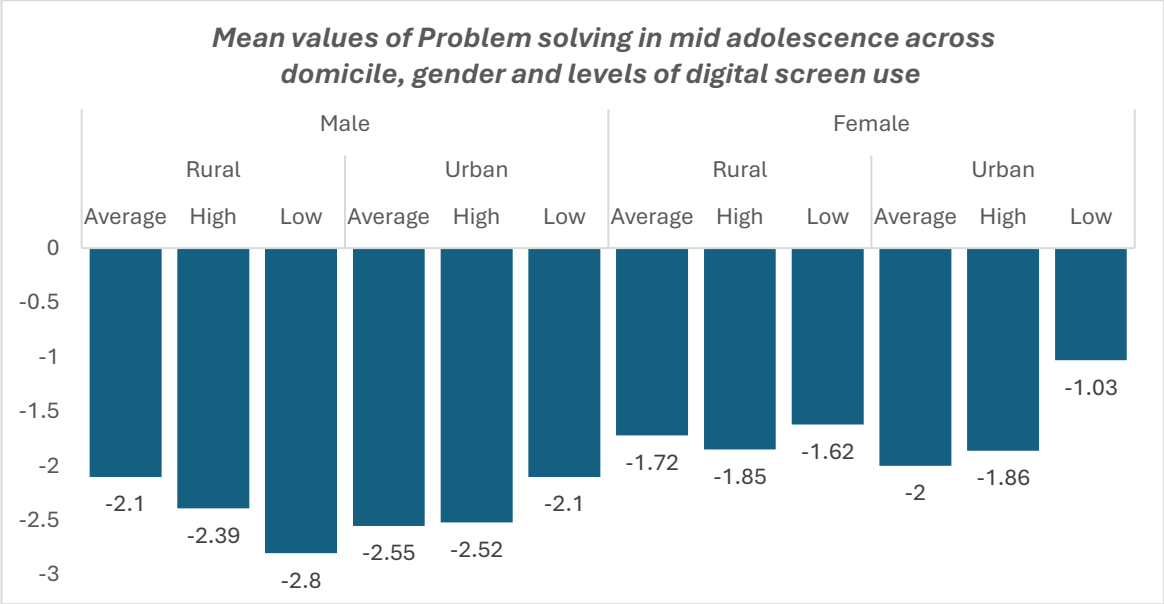
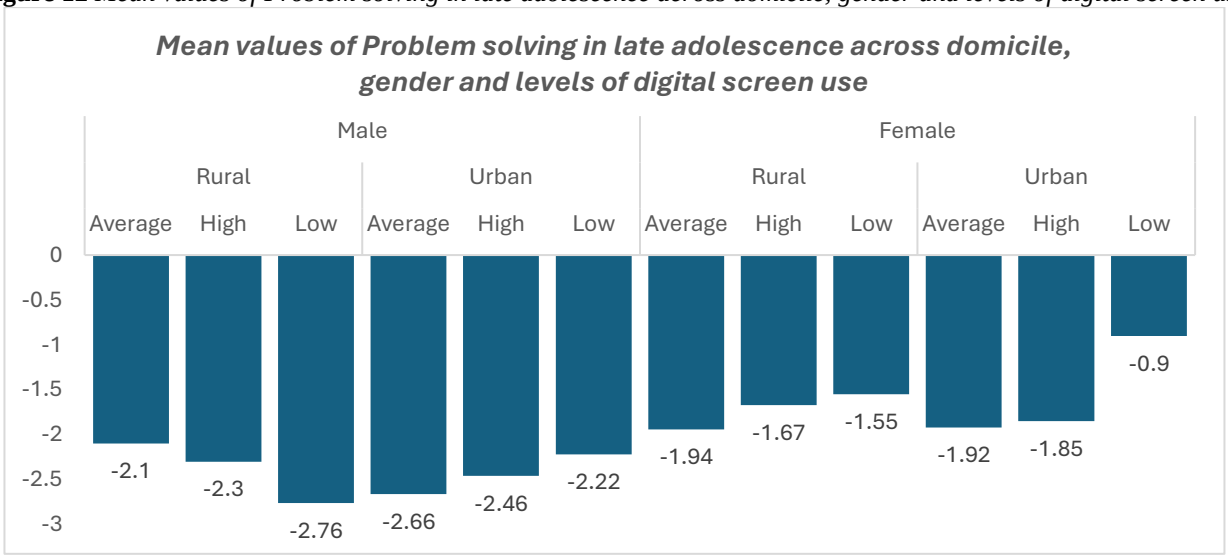


Table 6: Mean, SD of Problem solving in late-adolescence across domicile and levels of digital screen use. (MANOVA)

Phases	Domicile	DSU	Gender	N	Mean	SD	F value	p value
L	R	A	Male	10	-2.10	.53		
			Female	20	-1.94	.57		
		H	Male	34	-2.30	.71		
			Female	12	-1.67	.62		
		L	Male	06	-2.76	.20		
			Female	18	-1.55	.59	5.94	0.0001
	U	A	Male	06	-2.66	.51		
			Female	10	-.90	.30		
		H	Male	43	-2.46	.67		
			Female	37	-1.85	.69		
		L	Male	01	-2.22	0		
			Female	3	-.90	.30		

Figure 12 *Mean values of Problem solving in late adolescence across domicile, gender and levels of digital screen use*



The table 4 shows the mean value of early-adolescence across domicile, gender and levels of digital screen use in problem solving. The result shows that there is a significant difference between problem solving across domicile, gender and levels of digital screen use in early-adolescence (F = 5.91, p =0.0001, p<0.05). Hence null hypothesis is rejected and alternate hypothesis is accepted.

The table 5 shows the mean value of mid-adolescence across domicile, gender and levels of digital screen use in problem solving. The result shows that there is a significant difference between problem solving across domicile, gender and levels of digital screen use in mid-adolescence (F = 6.31, p =0.0001, p<0.05). Hence null hypothesis is rejected and alternate hypothesis is accepted.

The table 6 shows the mean value of late-adolescence across domicile, gender and levels of digital screen use in problem solving. The result shows that there is a significant difference between problem solving across domicile, gender and levels of digital screen use in late-adolescence (F = 5.94, p =0.0001, p<0.05). Hence null hypothesis is rejected and alternate hypothesis is accepted.

The hypothesis (Ha_2) stating "There is a significant difference in adolescents with varied level of digital screen use in their emotional regulation across age, domicile and gender" was tested using MANOVA and Kruskal-Wallis test.

Table 7: Mean rank of Emotional regulation - reappraisal in early-adolescence across domicile, gender and levels of digital screen use.

Phases	Domicile	DSU	Gender	N	Mean Rank	Chi square value	df	f value
E	R	A	Male	20	104.03			
			Female	16	118.00			
		H	Male	22	105.84			
			Female	11	85.77			
		L	Male	08	82.75			
			Female	23	87.80			
	U	A	Male	12	99.33			
			Female	08	89.19	9.06	11	0.61
		H	Male	29	108.34			
			Female	32	101.59			
		L	Male	09	126.56			
			Female	10	74.05			

Figure 13 *Mean values of Emotional regulation - reappraisal in early adolescence across domicile, gender and levels of digital screen use*

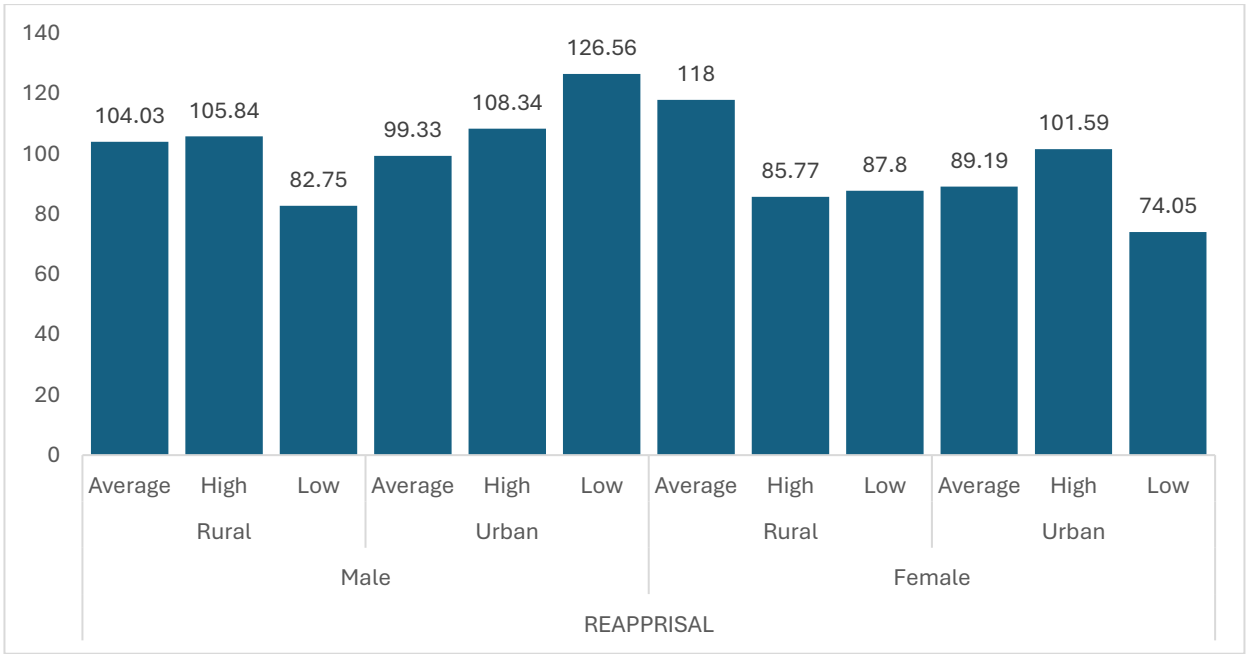


Table 8: Mean rank of Emotional regulation – reappraisal in mid-adolescence across domicile and levels of digital screen use.

Phases	Domicile	DSU	Gender	N	Mean Rank	Chi square value	df	p value
M	R	A	Male	17	101.38			
			Female	14	118.39			
		H	Male	30	100.82			
			Female	19	88.18			
		L	Male	03	107.67			
			Female	17	89.29			
	U	A	Male	07	67.00			
			Female	17	68.94	19.31	11	0.05
		H	Male	38	110.68			
			Female	27	114.24			
		L	Male	05	159.60			
			Female	06	4.75			

Figure 14 *Mean values of Emotional regulation - reappraisal in mid adolescence across domicile, gender and levels of digital screen use*

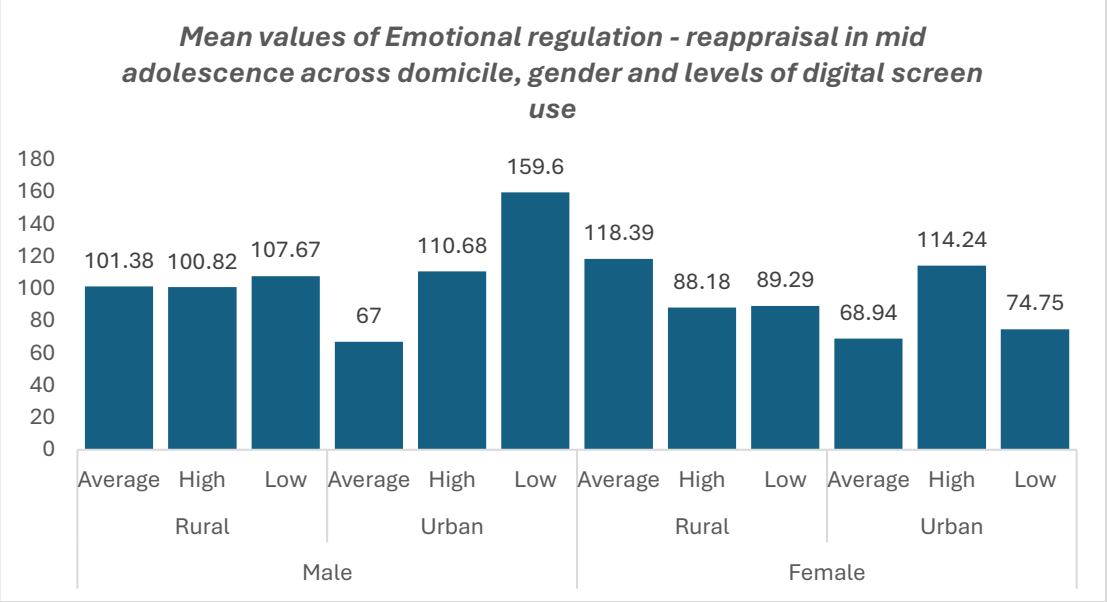
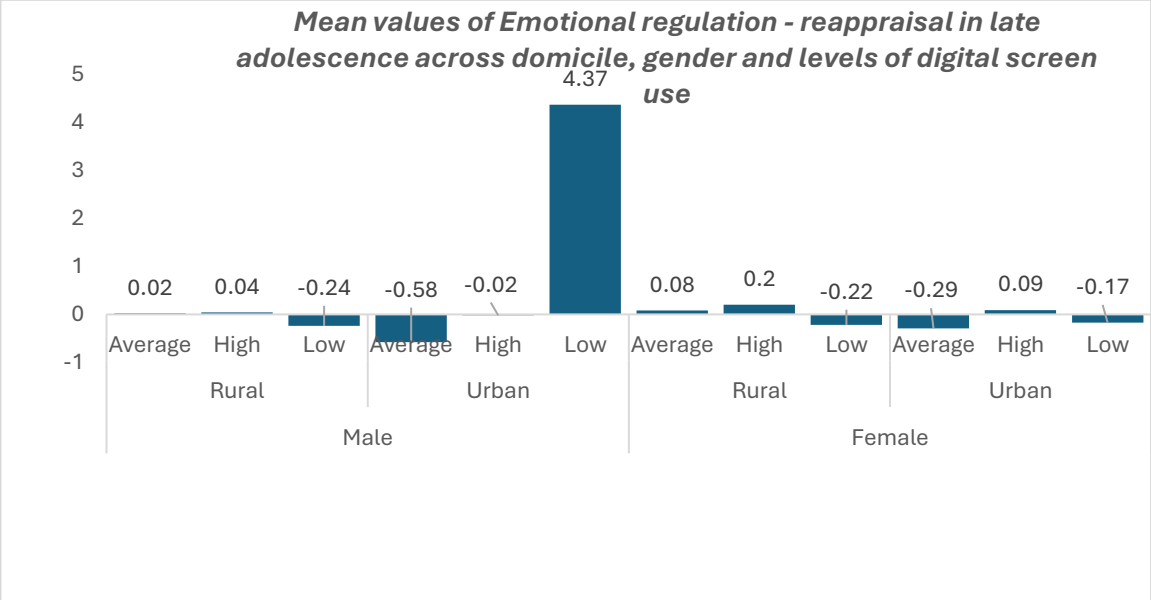


Table 9: Mean rank of Emotional regulation – reappraisal in late-adolescence across domicile, gender and levels of digital screen use.

Phases	Domicile	DSU	Gender	N	Mean	SD	F value	p value
L	R	A	Male	10	0.02	1.29		
			Female	20	0.08	.99		
		H	Male	34	0.04	.98		
			Female	12	.20	1.13		
		L	Male	06	-.24	.56		
			Female	18	-.22	.92	2.41	0.008
	U	A	Male	06	-.58	.02		
			Female	10	-.29	.75		
		H	Male	43	-.02	.81		
			Female	37	.09	1.05		
		L	Male	01	4.37	0		
			Female	3	-.17	1.08		

Figure 14 *Mean values of Emotional regulation - reappraisal in late adolescence across domicile, gender and levels of digital screen use*



The table 7 shows the mean value of early-adolescence across domicile, gender and levels of digital screen use in emotional regulation- reappraisal. The result shows that there is no significant relationship between emotional reappraisal across domicile, gender and levels of digital screen use in early-adolescence ($p = 0.61$, $p > 0.05$). Hence null hypothesis is accepted.

The table 8 shows the mean value of mid-adolescence across domicile, gender and levels of digital screen use in emotional regulation- reappraisal. The result shows that there is no significant relationship between emotional regulation through reappraisal across domicile, gender and levels of digital screen use in mid-adolescence ($p = 0.05$). Hence null hypothesis is accepted.

The table 9 shows the mean value of late-adolescence across domicile, gender and levels of digital screen use in emotional regulation- reappraisal. The result shows that there is a significant relationship between emotional regulation through reappraisal across domicile, gender and levels of digital screen use in late-adolescence ($p = 0.008$, $p < 0.05$). Hence null hypothesis is rejected.

Table 10: Mean rank of Emotional regulation – suppression in early-adolescence across domicile, gender and levels of digital screen use.

Phases	Domicile	DSU	Gender	N	Mean	SD	F value	p value
E	R	A	Male	20	3.33	.53		
			Female	16	3.49	.52		
		H	Male	22	3.38	.56		
			Female	11	3.00	.56		
		L	Male	08	3.60	.52		
			Female	23	3.35	.56		
	U	A	Male	12	3.43	.76		
			Female	08	3.49	.41	1.29	0.23
		H	Male	29	3.07	.72		
			Female	32	3.23	.62		
		L	Male	09	3.50	.78		
			Female	10	3.34	.62		

Figure 15 *Mean values of Emotional regulation - suppression in early adolescence across domicile, gender and levels of digital screen use*

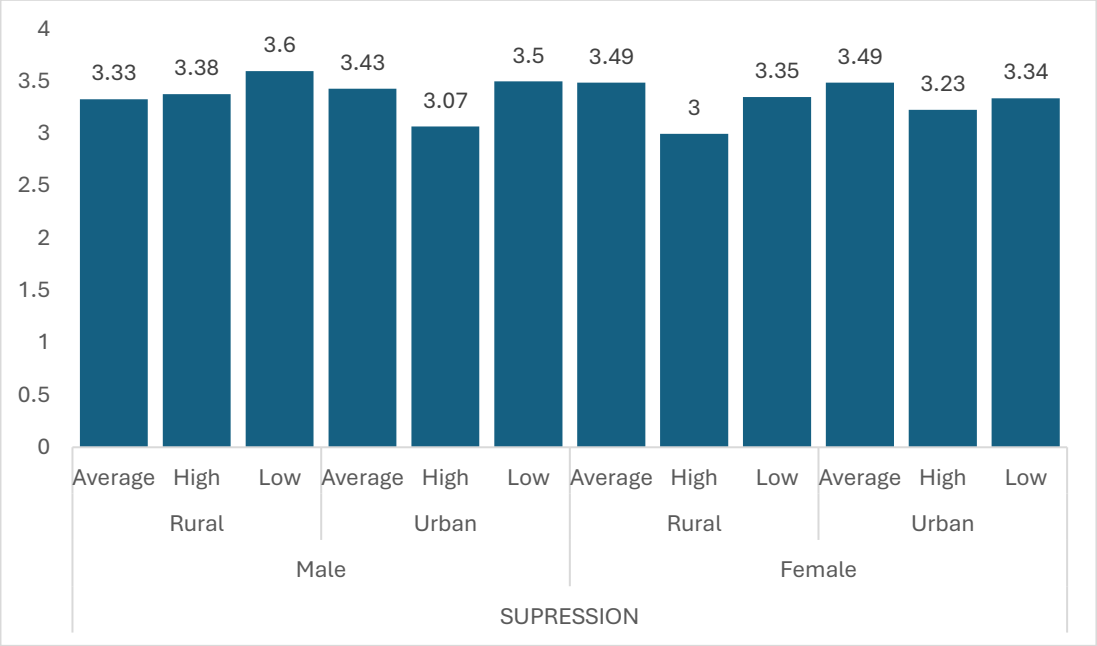


Table 11: Mean rank of Emotional regulation – suppression in mid-adolescence across domicile and levels of digital screen use.

Phases	Domicile	DSU	Gender	N	Mean	SD	F value	p value
M	R	A	Male	17	3.38	.55		
			Female	14	3.50	.56		
		H	Male	30	3.39	.55		
			Female	19	3.18	.56		
		L	Male	03	3.53	.50		
			Female	17	3.32	.57	0.82	0.61
	U	A	Male	07	3.54	.87		
			Female	17	3.38	.54		
		H	Male	38	3.14	.68		
			Female	27	3.22	.47		
		L	Male	05	3.50	.56		
			Female	06	3.40	.72		

Figure 16 *Mean values of Emotional regulation - suppression in mid adolescence across domicile, gender and levels of digital screen use*

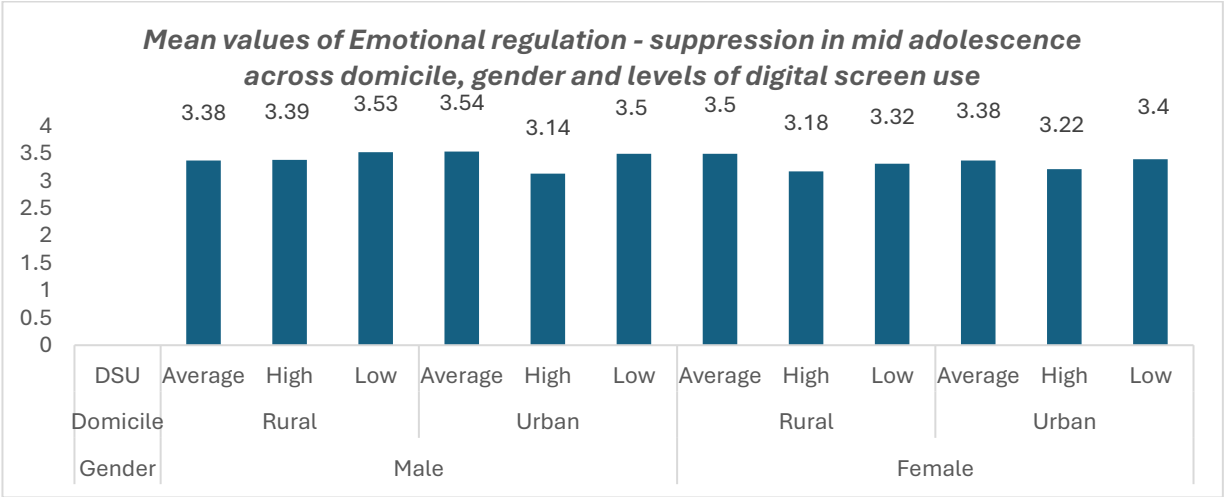
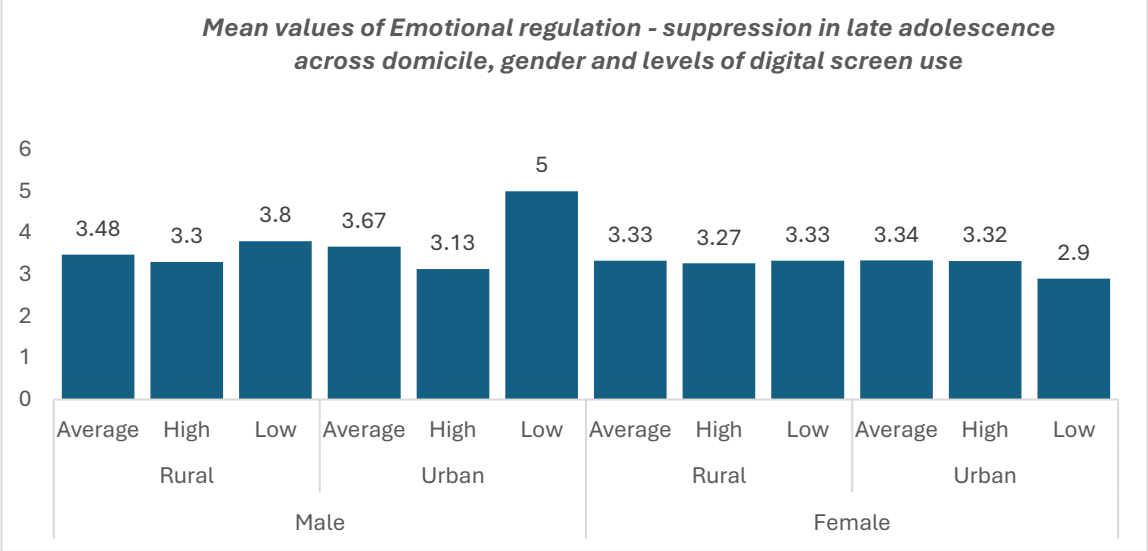


Table 12: Mean rank of Emotional regulation – suppression in late-adolescence across domicile and levels of digital screen use.

Phases	Domicile	DSU	Gender	N	Mean	SD	F value	p value
M	R	A	Male	10	3.48	.62		
			Female	20	3.33	.58		
		H	Male	34	3.30	.51		
			Female	12	3.27	.61		
		L	Male	06	3.80	.43		
			Female	18	3.33	.55	1.93	0.03
	U	A	Male	06	3.67	.89		
			Female	10	3.34	.49		
		H	Male	43	3.13	.67		
			Female	37	3.32	.51		
		L	Male	01	5.00	.0		
			Female	03	2.90	.72		

Figure 17 *Mean values of Emotional regulation - suppression in late adolescence across domicile, gender and levels of digital screen use*



The table 10 shows the mean value of early-adolescence across domicile, gender and levels of digital screen use in emotional regulation- suppression. The result shows that there is no significant relationship between emotional regulation through suppression across domicile, gender and levels of digital screen use in early-adolescence ($F = 1.29$, $p = 0.23$, $p > 0.05$). Hence null hypothesis is accepted.

The table 11 shows the mean value of mid-adolescence across domicile, gender and levels of digital screen use in emotional regulation- suppression. The result shows that there is no significant relationship between emotional regulation through suppression across domicile, gender and levels of digital screen use in early-adolescence ($F = 0.82$, $p = 0.61$, $p > 0.05$). Hence null hypothesis is accepted.

The table 12 shows the mean value of late-adolescence across domicile, gender and levels of digital screen use in emotional regulation- suppression. The result shows that there is a significant relationship between emotional regulation through suppression across domicile, gender and levels of digital screen use in early-adolescence ($F = 1.93$, $p = 0.03$, $p < 0.05$). Hence null hypothesis is rejected.

Major findings:

- There is no significant difference in memory across age, domicile, gender and levels of digital screen.
- There is a significant difference in problem solving across age, domicile, gender and levels of digital screen.
- There is a significant difference in emotional regulation – cognitive reappraisal across domicile, gender and levels of digital screen in early and mid-adolescence, and there is a significant difference in emotional regulation – cognitive reappraisal across domicile, gender and levels of digital screen in late-adolescence.
- There is a significant difference in emotional regulation – expressive suppression across domicile, gender and levels of digital screen in early and mid-adolescence, and there is a significant difference in emotional regulation – expressive suppression across domicile, gender and levels of digital screen in late-adolescence.

Summary and conclusion:

The majority of the sample shown high level of digital screen use. This is in accordance with the findings that digital devices are becoming familiar to pre-schoolers before the exposure to books (Brody, 2015; Hopkins et al., 2013). The level of digital screen use found to be drastically increasing among the

adolescents across age especially in urban region. High screen users are found among male in comparison to female, whereas low screen users are found more in females. This data is in accordance with the study by Maurya, C et al., (2022) and Johnson AR et al., (2022) which showed that in comparison to females, males spent more time on smartphones among adolescents and are found 12 times more of screen addiction in males compared to females. Urban region has high screen users compared to that of rural region. This report is in accordance with the study by Kumar A, P et al., (2023) which showed that the screen usage in rural region was comparatively less to that of urban areas showing around 21% of students with more than 2 hours per day.

The study by Balleine & Killcross, (2006) & Bickart et al., (2011) showed that use of social network has been correlated with an increase in grey matter in the region of amygdala which functions for emotional learning, memory and fear conditioning. Male with low digital screen users from rural and urban region, and female from rural region has influenced the level of memory. Emotional regulation – reappraisal has found to be high across domicile. But contrast result has been shown among male adolescence across domicile, where lower screen users found to be adopting more of reframing strategy and understand the impact of emotion than high screen users in urban region. Among gender, overall male uses more of reappraisal strategy compared to that of women. This result is in accordance with the study by Domes et al., (2010) & McRae et al., (2008), which says that Men reappraise the situations more effectively compared to that of women.

The result shows that digital screen use prevents the emotional suppression among males and hence they found safe and comfortable to express and relieve the emotions. And among female, overall suppression of emotions has been found more. This is in accordance with the study which states girls express more of positive emotions and internalize more negative emotions such as anxiety, and boys express externalizing emotions such as ager. Thus, girls use more adaptive strategies like active coping and maladaptive ones like suppression (Chaplin and Aldao, 2013; Sanchis. A, 2020). To sum up, across the age cognitive development in adolescents found to be contributing to the regulation of emotions. According to the previous studies, moderate engagement in digital screen use contributed positively towards the adolescent mental health. The study found highest impact among low digital screen users on the variables. As a part of interaction with the changing environment, it means mandatory to equip oneself with the skills and updates on e-devices.

Limitations:

- Self-report measure was used for data collection. This might limit the accuracy of data owing to social desirability.
- The inclusion of sample from only Dakshina Kannada might limit the geographical limitation in generalizability of the findings.

Implications:

- Framing the policies and guidelines concerning the health of adolescence.
- Need of counselling and a psychologist in education sector.
- Planning the interventions for the students tested with high digital screen use.

Scope for further research:

- An intervention studies can be planned for the deep knowledge and interpretation.
- Longitudinal research study can be undertaken.
- Additional socio-demographic factors such as socio-economic status, number of siblings, parental occupation and qualification can be considered for the studies.

References:

1. Daniel R. Anderson, S Kaveri and on behalf of the Cognitive Impacts of Digital Media Workgroup Paediatrics November 2017, 140 (Supplement 2) S57-S61; DOI**:** https://doi.org/10.1542/peds.2016-1758C
2. Dubey M, Nongkynrih B, Gupta SK, Kalaivani M, Goswami AK, Salve HR (2018). Screen-based media use and screen time assessment among adolescents residing in an Urban Resettlement Colony in New Delhi, India. J Family Med Prim Care. 2018 Nov-Dec;7(6):1236-1242. doi: 10.4103/jfmpc.jfmpc_190_18. PMID: 30613503; PMCID: PMC6293917.
3. Rathoria E, Bansal U, Rathoria R, Gupta NB, Biswas SK (2022). Impact of Sociodemographic Factors on Screen Time Use Among Early Adolescents. Child today. Vol 3: 1-10. September 2022. DOI: 10.5281/zenodo.7734507
4. Gardener EKT, Carr AR, MacGregor A, Felmingham KL (2013) Sex Differences and Emotion Regulation: An Event-Related Potential Study. PLOS ONE 8(10): e73475. https://doi.org/10.1371/journal.pone.0073475
5. Gottschalk. F (2019) Impacts of Technology Use on Children: Exploring Literature On The Brain, Cognition And Well-Being OECD Education Working Paper No. 195, organization for economic co-operation and development, 31 January 2019
6. Park J-A, Park M-H, Shin J-H, Bo Li, Rolfe D T, Yoo J-Y, Dittmore SW (2016), Effect of sports participation on Internet addiction mediated by self-control: A case of Korean adolescents, Kasetsart Journal of Social Sciences, Volume 37, Issue 3, 2016, Pages 164-169, ISSN 2452-3151, https://doi.org/10.1016/j.kjss.2016.08.003. (https://www.sciencedirect.com/science/article/pii/S2452 31511630025X)
7. Johnson AR, Sridhar PR, Joseph M (2022). Is Screen Addiction a Problem Among Rural School-Going Adolescents? A Cross-Sectional Study in South Karnataka. *Journal of Indian Association for Child and Adolescent Mental Health*. 2022;18(2):137-143. doi:10.1177/09731342221096481
8. Kardefelt-Winther, D. (2017), "How does the time children spend using digital technology impact their mental well-being, social relationships and physical activity? An evidencefocused literature review", Innocenti Discussion Paper 2017-02, UNICEF Office of Research – Innocenti, Florence, https://www.unicef-irc.org/publications/pdf/Children-digitaltechnology-wellbeing.pdf (accessed on 23 February 2018)
9. Malhotra, Sumit, Kant, Shashi, Ramashankar. R, Farhad A, Ramadass S; Gupta, Kumar S (2022) Excess Screen

Time and its Associated Factors among Young Men in a Rural Community of North India. Indian Journal of Public Health 66(3):p 327-330, Jul–Sep 2022. | DOI: 10.4103/ijph.ijph_2027_21

10. Laura M, Anne-Linda C, Rosalba M (2021), The Developing Brain in the Digital Era: A Scoping Review of Structural and Functional Correlates of Screen Time in Adolescence, Frontiers in Psychology, vol 12, 2021, URL=https://www.frontiersin.org/articles/10.3389/fpsyg.2021.671817 DOI=10.3389/fpsyg.2021.671817, ISSN=1664-1078
11. McRae K, Ochsner K N, Mauss. I B et al., (2008) Gender Differences in Emotion Regulation: An fMRI Study of Cognitive Reappraisal, HHS Public Access, Group Process Intergroup Relat. 2008 April; 11(2): 143–162. doi:10.1177/1368430207088035
12. M.T. Knebel, B.G. da Costa, P.C. dos Santos et al., (2021) The conception, content validation, and test-retest reliability of the Questionnaire for Screen Time of Adolescents (QueST), Jornal de Pediatria, https://doi.org/10.1016/j.jped.2021.05.004
13. Nagata JM, Ganson KT, Iyer P, Chu J, Baker FC, Pettee Gabriel K, Garber AK, Murray SB, Bibbins-Domingo K (2022). Sociodemographic Correlates of Contemporary Screen Time Use among 9- and 10-Year-Old Children. J Pediatr. 2022 Jan;240:213-220.e2. doi: 10.1016/j.jpeds.2021.08.077. Epub 2021 Sep 2. PMID: 34481807; PMCID: PMC9107378.
14. Kumar A P, Shabadi N, Sinha Roy B, Nath AR, Gopi A (2023). Association of Physical Activity and Screen Time Usage of Adolescents in Rural Areas of Mysore. Digital Journal of Clinical Medicine. 2023; 5(1): 1-10. doi: https://doi.org/10.55691/2582-3868.1129
15. Sanchis-Sanchis A, Grau MD, Moliner A-R and Morales-Murillo CP (2020) Effects of Age and Gender in Emotion Regulation of Children and Adolescents. Front. Psychol. 11:946. DOI: 10.3389/fpsyg.2020.00946